Abstract

Anecdotal evidence suggests that trade unions succeed in ameliorating workplace health and safety, but no attempt has been made to link specific workplace injury rates with a respective union presence. Relying on WERS98, this paper establishes a cross-sectional link between trade unions and occupational injury rates, revealing that unions gravitate to accident-prone workplaces and react by reducing injury rates within these types of employment units. However, the ability for unions to reduce injury rates does not appear to increase monotonically as they progress along a workplace instrumentality continuum from recognition alone to a pre-entry closed shop.

This paper was produced under the 'Future of Trade Unions in Modern Britain' Programme supported by the Leverhulme Trust. The Centre for Economic Performance acknowledges with thanks, the generosity of the Trust. For more information concerning this Programme please e-mail R.May@lse.ac.uk

Trade Unions and Industrial Injury in Great Britain

Adam Seth Litwin

August 2000

Series Editor: Graham Ingham

Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

ISBN 0 7530 1407 6

Individual copy price: £5

Trade Unions and Industrial Injury in Great Britain

Adam Seth Litwin

The Centre for Economic Performance is financed by the Economic and Social Research Council.

Acknowledgements

The author gratefully acknowledges the generous financial support of the Rotary Foundation as well as the ESRC Data Archive for the provision of WERS98 data, which were originally collected by the Department of Trade and Industry, ESRC, ACAS, and the Policy Studies Institute. This paper is based on research which was originally an MSc in Industrial Relations. The author would like to thank Martin Asher, Andy Charlwood, Steve McIntosh, Stephen Wood, and, especially, David Metcalf for their comments on an earlier draft.

Adam Seth Litwin is a member of the Board of Governors of the Federal Reserve System, USA. This research does not necessarily reflect the opinion of the Federal Reserve Board.

Trade Unions and Industrial Injury in Great Britain

Adam Seth Litwin

1. Introduction

> … the United Society of Boilermakers has insisted, in its elaborate agreement with the Ship Repairers' Federation of the United Kingdom, upon the following clause: "The employers undertake that, before men are put to work on [repairing the great tank ships for carrying petroleum in bulk, in which dangerous vapour accumulates], an expert's certificate shall be obtained daily to the effect that the tanks are absolutely safe. Such certificate to be posted in some conspicuous place." Innumerable other regulations aim at the removal of conditions injurious to the workers' health. Thus, the various Trade Unions of "ovenmen" (potters) have for a whole generation protested against being forced to empty the ovens before these have been allowed to grow cool, on the express ground that this unnecessary exposure to a temperature between 170 and 210 degrees Fahrenheit is seriously detrimental to health. Several strikes have taken place solely on this point, and the Staffordshire Ovenmen's Union now has a by-law authorising the support of any member who is dismissed for refusing to work in a temperature higher than 120 degrees. (Webb and Webb, 1897: 358)

Thus, the birth of an historical expectation that trade unions embrace workplace health and safety as a fundamental responsibility. Sidney and Beatrice Webb (1897) provided one of the earliest descriptions of the means by which trade unions reduce the number of accidents in the workplace, including lobbying for safety legislation and making workplace hazards more costly to employers by raising the tacit risk premia embedded in wages, *i.e.* compensating wage differentials. Unions also take direct action on the shop floor to make the workplace safer.

More recently, the nationalisation of Britain's railways, ardently supported by the National Union of Railwaymen (NUR) and by the Trades Union Congress (TUC), led to a reduction in both the number and proportion of railway staff sustaining fatal accidents (Bagwell, 1982). British Rail's safety record for non-fatal injuries in 1978, the approximate peak of trade union power in the UK, also compared well with that of the other 14 countries sending returns to the International Union of Railways (UIC). Injury reduction came as no surprise to the labour movement, as the amelioration of health and safety topped its pro-nationalisation rhetoric since as early as 1894. This outcome suggests that surplus profits, generated by product market monopoly in this instance, can be transferred from capital to labour not only in the form of a union wage mark-up, but also via an improvement in the conditions under which work is undertaken.

Even today, the expectation of a negative relationship between occupational injury rates and a trade union presence remains firmly fixed. The electricians working on the extension of London Underground's Jubilee Line, relying on their favourable Marshallian conditions, went on strike in order to express concern over health and safety issues (Milne, 1998; Steel, 1998). Furthermore, the sectoral shift from goods to services only reinforces the need for an institutional force to balance management's demands with labour's safety. While it may initially appear counterintuitive, since we tend to imagine injuries occurring in coal mines and on assembly lines, Toon (1993) points out that the restaurant industry ranks among those with the largest number of occupational injuries in the U.S. It alone accounts for 5% of all on-the-job injuries nationwide. Injuries include slips and falls, lacerations, and punctures. Workers in the hotel industry also incur injuries from lifting, bending, reaching, twisting, and needle sticks. Delivery drivers in various industries suffer musculoskeletal injuries associated with repetition and rapidly rising productivity standards. Grocery store clerks suffer disproportionately from wrist injuries and upper extremity injuries associated with poor till design—twisting the wrist to scan horizontally and reaching up to weigh produce. According to Toon (1993), members of the Food and Commercial Workers Union and the International Brotherhood of Teamsters have worked with employers to advance workplace ergonomics, particularly in situations where changes were not aligned with short-term profit maximisation.

This anecdotal evidence, then, propounds a more rigorous test of organised labour's ability to make workplaces safer. Should the anecdotal evidence translate into statistical substantiation, the proposed model will reveal an unmeasured cost of the decay of labour's collective institutions. Conversely, should unions fail to demonstrate a negative impact on injury rates, the model will serve as one more arrow in the quiver of those that believe trade unions have outlived their usefulness. Toward these ends, the next section will delineate the hypotheses that the model will test, including a review of the research already done in this area and a list of crucial control variables that will allow for the isolation of a union impact on injury rates. Section 3 will describe the underlying data set, the Workplace Employee Relations Survey (WERS98), and the statistical methods applied to it. In Section 4, I will present the results of the initial attempt to model workplace injury rates, as well as a brief foray into "de-layering" the workplace union variable. From this, the model will yield implications for those considering the contemporary role of trade unions. Finally, Section 5 will provide conclusions.

2. Hypotheses

Historical and neoteric accounts together provide an initial anecdotal expectation of a negative cross-Sectional relationship between trade unions and occupational injury. Nichols (*e.g.* 1990, 1994, 1997), however, has used this evidence as seed for theory. He has intensively studied industrial injury and its correlates, using the Workplace Industrial Relations Survey (WIRS3) to unearth linkages to industrial injury for variables such as health and safety legislation, health and safety arrangements (*e.g.* the presence of health and safety joint consultative committees at the workplace), workplace size, and most notably, trade unionism. The hypotheses outlined below will capture many of his findings.

Reilly *et al.* (1995) also rely on WIRS3 to focus specifically on workplace arrangements for health and safety determination. They apply eight binary variables to assess the effect of union participation in health and safety determination upon the natural logarithm of the injury rate. The weakest form of union determination occurs when management deals with health and safety matters without any form of worker consultation. On the other end of the union involvement continuum, unions choose *all* employee representatives for a management and labour joint consultative committee (JCC) that deals *exclusively* with matters of health and safety. Similarly, Weil (1999) sought to determine whether U.S. labour unions were complements or substitutes with more novel forms of employee representation, particularly in regard to enforcement of policies prescribed by the Occupational Safety and Health Administration (OSHA). Both Reilly *et al.* (1995) and Weil (1999) demonstrate that trade unions supplement the effectiveness of other institutions intended to make the workplace safer.

The model presented in this paper will explain workplace injury rates as a function of an array of explanatory variables. The dependent variable will be the number of employees who have sustained any type of eight listed injuries during working hours over the last 12 months, divided by the sum of full-time and part-time workers employed at the workplace. Listed injuries include bone fractures, burns, amputations, and any injury that results in immediate hospitalisation for more than 24 hours. Since this calculation is distributed log-normally across workplaces where injuries occurred, the equation will take the natural logarithm of the LHS variable, allowing us to interpret all partial slopes as percentage changes in the dependent variable resulting from marginal changes in any one of the independent variables.

Based on the longitudinal work by Nichols and evidence provided by the Webbs and the Jubilee Line electricians, among others, this paper broadly hypothesises a negative, cross-sectional relationship between trade unions and rates of injury at their respective workplaces. Once the vector of control variables is in place, a unionised workplace should be expected to have a lower rate of injury, *ceteris paribus*. As explained by the Webbs, unions will increase risk premia, take direct action at the workplace, and remove health and safety provisions from competition by lobbying for universal regulations. Trade unions can also play a key role in training workers about risk reduction, training which may be general enough in nature such that employers would otherwise not choose to fund it. Besides being more committed to workers' welfare than management, unions have the capacity to improve industrial health and safety in ways that individual workers do not have at their disposal, namely through the union's power and resources to command greater knowledge of workplace risk (Nichols, 1997). Trade unions can also crack the public goods problem associated with research into health and safety that may typically be forgone due to the inappropriability of the resulting information. After collecting and interpreting this information, unions apply their findings to the bargaining and enforcement of health and safety provisions in collective agreements. Unions may also direct their power toward obtaining contractual guarantees against dismissal, which allow workers to exercise their rights under the law. This ground level institutionalisation of "voice" over "exit" will lower injury rates, as "trouble makers" will be listened to rather than banished, thus preventing similarly caused injuries from recurring. Unions also work to correct distortions arising from unequal bargaining power between labour and management, an inequality that limits an individual worker's labour market mobility (Schurman *et al*, 1998). This lack of mobility further renders market-based solutions implausible.

However, unions also process information on industrial safety in ways that could offset the negative relationship between variables of workplace union power and injury rates, signalled by the paltry magnitude of the accident rate correlation coefficient in Table 1. First, if unions bargain for safety by raising compensating wage differentials above what they would be in a non-union firm, as demonstrated by Thaler and Rosen (1975), the short run will not give rise to a reduction in accident rates. While conventional market wisdom suggests that competition will force management to reduce injuries and wage differentials once capital is no longer fixed, neo-classical economic assumptions may be inapplicable, as unions tend to remain powerful where product markets are quite concentrated (Metcalf, 1993). Second, unions formalise grievance procedures which will yield, *ceteris paribus*, a greater number of reported injuries (*e.g.* Krueger and Burton, 1990). Such grievance procedures work to prevent management from "fudging" the injury data downward and to increase the likelihood that an employee will report his or her injury, as he knows he will be protected from dismissal and expects the injurious situation to be remedied. Third, Nichols (1997) reminds us that "it is not trade unions that call forth unsafe working conditions, but rather unsafe working conditions that call forth trade unions" (151). Workers who belong to trade unions will have more hazardous jobs than those who do not belong to trade unions. And, Kochan (1979) adds that workers exposed to physical hazards in the workplace are more likely to vote for union recognition.

Allowing this prior research to direct the arrow of causality, Table 1 proposes that accident-prone workplaces beckon trade unions and that trade unions respond by reducing the rates of injury within these workplaces. This forces us to hypothesise, paradoxically, that unions will be recognised where injuries are more likely to occur, but will correlate negatively with injury rates within these types of workplaces. As will be justified in the following section, the OLS model, then, will only predict injury rates where injuries occur.

The developed model will isolate many of these offsetting issues through RHS control variables. First, the model will control for the vintage of the workplace by taking account of the number of years it has been at its current and previous addresses. Typically, older workplaces house antiquated capital and complacent managers. Thus, the variable should enter the model with a positive coefficient, though likely to have a minute effect on the dependent variable. The magnitude and significance of a vintage control variable would be greater when it characterises the entire organisation as opposed to when it only characterises the individual workplace, as health and safety policy is likely to be promulgated from above. Nevertheless, trade unions tend to survive in older workplaces, rendering it crucial that we separate union effects upon injury rates from vintage effects upon the same.

The model will also control for the male percentage of the workplace labour force. Since males disproportionately compose trade union membership on a macro level, this control erodes at the conflation between union effects and gender effects. Reilly *et al.* (1995) found that the percentage of female workers in the employment unit exerts a statistically significant negative effect on the log-odds of an injury, believing that females tend to undertake occupations involving less physical effort and thus, less opportunity for occurrence of injury. Our model, then, should find, particularly at the highest levels of gender inequity in workplace employment, a positive relationship between the male fraction of the labour force and the natural log of injury rates.

The size of the employment unit, defined as the number of full-time and part-time workers it comprises, consistently provides a statistically significant control variable for any union-related dependent variable. Conventional wisdom implies that size controls should carry positive coefficients when predicting injury rates, as we typically imagine accidents occurring in large plants, not in corner shops. However, Nichols (1997) found that smaller employment units have, on average, a higher rate of injury. This robust relationship holds even when he defines the entity as the entire firm to which the workplace belongs, as smaller workplaces in smaller firms have the worst safety records. Reilly *et al.* (1995) confirm and strengthen this result in their study of safety committees, where the magnitude of the estimated employment size coefficient is considerably greater in absolute terms than that of any of the other workforce composition variables. This prediction for the proposed model underlines the fixed-cost nature of reducing risk at the workplace—greater size facilitates the development of management safety resources such as purchases of new capital and investments in more safety-specialist knowledge. Of course, due to the similar fixed-cost intensity of union organising, unions tend to be rooted where the potential membership base is plentiful. Consequently, controlling for workplace size allows for the separation of union efforts to reduce injury rates from the effect that size alone has on the dependent variable. Still, the variables controlling for workplace size should significantly reduce log injury rates.

The injury model will also control for the climate of collective bargaining at the workplace. Toward this goal, the regression will include one subjective exogenous binary variable set to equal one in cases where the manager respondent has stated that management at the establishment generally opposes union membership amongst its employees. Including one such subjective variable provides an opportunity for "tasting" the effects of subjective explanations for workplace injury. One would predict the variable's coefficient to be weakly positive, as such a value would signal that lack of labour-management co-operation could prevent the valuable interchange of health and safety information. Moreover, one would expect the injury rate to be lower in workplaces that have had industrial action in the last five years, as the heightened legitimacy of the "nuclear threat" forces management to take safety matters more seriously than it might otherwise.

The findings of Reilly *et al.* (1995) and Weil (1999) propound that we separate the effects of health and safety committees and JCCs from the effects of the variables of workplace union strength. The former provided a rigorous test of the injury effects of such committees, concluding that they are strongly negative, and of increasing magnitude based on their level of union involvement. Finally, the model will control for industry effects by employing single digit industrial classifications and applying manufacturing as a base case. Assuming technology is distributed randomly across workplaces within an industry, this will also allow some control for technology without necessitating reliance on detailed industry dummies that could desensitise other coefficients to changes in injury rates.

Once the model establishes a link between trade unions and accident rates, I will make an initial attempt to unmask the effects of different levels of union presence in the workplace—recognition alone, high density, post-entry closed shop, and pre-entry closed shop—on injury rates. Disaggregation will allow us to better link specific institutions with injury rate outcomes. The model should reveal incremental reductions in log injury rates based upon the proxies for step-wise increases in union power at the workplace. In other words, a pre-entry closed shop should reduce injury rates by more than does recognition alone.

3. Data

Source

My information comes from the fourth (1998) Workplace Employee Relations Survey (WERS98), known as the Workplace Industrial Relations Survey (WIRS) in its previous three administrations. (See Cully *et al.* (1998) for a concise, but thorough description of the design and conduct of the survey.) WERS98 is interviews-based, collecting information from 2,191 British workplaces with 10 or more workers, making it the largest survey of industrial relations practices of its kind. The response rate was 80%. All information in this study came from the manager respondent responsible for personnel matters. That Nichols (1990, 1994, 1997) and Reilly *et al.* (1995) relied on ancestral data sets to the one employed in this paper, coupled with the fact that WERS98 samples a population representing all but a quarter of British workers (Cully *et al., 1*998) lends credence to comparisons and incremental conclusions related to the general issue of trade unions and accident rates.

Methods

The most statistically transparent method for modelling injury rates necessitates an OLS equation, where injury rates are regressed on a binary union variable and the aforementioned array of control variables. However, the nearly perfect log-normality of the distribution of injury rates obtains in part due to the undefined nature of the natural log of zero. In the 1,366 (62%) workplaces where no injuries occurred, the numerator of the injury rate fraction occasions the entire observation be dropped from the OLS prediction, meaning the regression analysis only predicts injury rates where injuries occur. In an effort to keep the quantitative analysis as pellucid as possible, the model employs a converted probit to predict the likelihood of injury occurring at a given workplace. Then, in cases where a workplace has not eliminated all instances of injury, the OLS predicts injury rates. This convention facilitates our testing the hypothesis evoked by Table 1, that accident-prone workplaces summon collectivisation and that trade unions respond by reducing the rates of injury within these workplaces. This method also "raises the bar" for rejecting the null hypothesis, since unions that succeed in eliminating all workplace injuries will not have the opportunity to "represent the union cause" in the OLS equation.

While the complete sample comprises 2,191 observations, this model relies on considerably fewer. Besides the dropping of the zero-injury observations, additional workplaces drop out of the analysis due to missing values assigned to two of their explanatory variables. The variable constructed to account for union recognition drops 40 observations, which can be considered randomly distributed across the workplaces surveyed. The variable assembled to assess the vintage of the workplace sums two WERS98 variables where both were available or when survey routing allowed a naught value to be assumed equal to zero. In cases where respondents simply were not certain of how long an employment unit had been at its current or previous address, the analysis dropped the observation, which occurred 551 times. Unlike the recognition variable, the vintage variable will more likely be dropped in cases in which its value is relatively high, just when it is predicted to most increase injury rates. Thus, missing values for this variable will soften the significance of the vintage variable and decay at its effect on the coefficient of determination.

4. Results and Implications

Overall model

Tables 2 and 3 capture the results of the probit and OLS, explaining 33% of the variance in injury rates where injuries occur. The partial slopes in the converted probit (Table 2) can be interpreted as the additional likelihood of injury occurring for a single unit increase in the case of the continuous variable reflecting industrial vintage, or resulting from a change in designation from zero to one for any of the binary variables. Likewise, the coefficients in the OLS equation (Table 3) signify the percentage change in log injury rates for single unit increases in industrial vintage or a movement from zero to one for any dummy variable, relative to the base case where noted.

The results of the statistical analysis sustain the hypothesis articulated above. High incidence of injury in the workplace appears to prompt collectivisation, as a union presence in the workplace increases the likelihood of injury by about 8%, significant at the 1% level. However, in these same types of workplaces, unions succeed in reducing log injury rates by almost a quarter, significant at the 5% level. Consequently, when coupled with the anecdotal evidence, the model rejects the null hypothesis that trade unions fail at reducing injury rates. The model also strengthens the proposed link, bolstering the injury-reduction power of trade unions, by allowing us to control for many of the other workplace factors that themselves affect injury rates.

Workplace vintage positively and significantly forecasts the likelihood of injury occurring at the workplace, as well as the injury rate. While both coefficients are statistically significant, their magnitudes are trifling. As noted above, the absolute value of the partial slopes representing the vintage control variable would be greater if the variable measured the vintage of the entire organisation rather than only its member workplace, as health and safety policy may be dictated by headquarters.

Only when males compose over 2/3 of the labour force does the gender imbalance yield greater likelihood of injury occurring. And even then, the same cannot be said definitively of a positive gender effect where injuries still occur. However, the presence of a supermajority of males where accidents do occur appears to increase injury rates. This presents an instructive and illuminative comparison to the union variable. As mentioned above, accidents call forth trade unions, and trade unions react by organising to reduce accident rates. But, while males may gravitate to more dangerous workplaces, their mere presence does nothing to reduce accident rates. This squares with the model's predictions regarding unionism by rejecting another potential mechanism that could be reducing accident rates.

Workplace size controls offer another powerful result, though quite comparable to the findings regarding variables of union strength. As conventional wisdom assumes, workplace size associates positively with workplace accident rates. In other words, we are correct to envisage accidents occurring in expansive workplaces, as a workplace employing more than 50 workers has a 26% greater likelihood of injury occurring. However, a "mile-long" payroll equips larger workplaces with the fixed-cost advantages to reduce log injury rates by an estimated 176%. While the OLS separates union effects from size effects, note that larger workplaces also offer trade unions fixed-cost advantages to organising.

The controls for collective bargaining climate exert little influence on accident rates. The insignificance of the single, subjective attempt to predict these rates does support our attempt to predict injury rates through objectively measurable determinants, which lends assurance to the "science" of injury rate prediction. The partial slopes of the industrial action variable imply that strikes and slow-downs serve as efficacious union tools for reducing workplace injuries. While industrial action associates positively with the likelihood of injury occurring, it appears, not surprisingly, to reduce injury rates where injuries occur, just missing the mark for statistical significance in both cases.

Health and safety determination also seems to affect accident rates in much the same way unions do. Both proxies positively predict the likelihood of an accident, with health and safety JCCs significant even at the 1% level. However, the same proxies enter the regression equation negatively, implying that these committees react by reducing injury rates. The effects of committee discussion and of JCCs cannot be regarded as conclusively as those regarding unionism generally, since the former are not significant in the regression output. However, present results square with Reilly *et al.*'s (1995) conclusions regarding health and safety determination.

Finally, seven of the eleven industry dummies exert a significant effect on the likelihood of injury. Only the variable representing hotels and restaurants yields a curious result. While this may seem counterintuitive at first, recall that Toon (1993) found similar results in the U.S., dismissing the myth that service sector unions need not concern themselves with issues of occupational safety. Interestingly, six of the industry dummies undergo a change of sign between the probit and OLS equations, again indicating a marked difference between industry effects when predicting injury likelihood compared with industry effects when predicting actual injury rates where injuries occur.

Union instrumentality model

The binary variable representing a union presence at the establishment facilitates a transparent linkage between trade unions and injury rates, but potentially masks the huge assumed instrumentality differences between unions that barely succeed in achieving recognition versus those that have a firmly-entrenched pre-entry closed shop. Though either would flag the binary variable equal to one, the latter should presumably have more resources at its disposal for reducing injury rates, or "tightening the reigns" on the governance of production processes. In order to safeguard against this conflation, I constructed a model just like the previous one, except in its treatment of the trade union variable. Hypothesising monotonic increases in coefficient magnitude, I divided the union variable into four separate binary variables—recognition, density in excess of 80%, post-entry closed shop, and pre-entry closed shop.

As Tables 4 and 5 illustrate, the hypothesis of an increased ability for unions to reduce accident rates as they progress along the instrumentality continuum does not quite pass muster. Instead, variables of instrumentality increase almost monotonically in their strength at predicting the likelihood of an accident occurring at the workplace. Only the pre-entry closed shop reduces the likelihood of injury occurring, though this result is likely due to chance. Interestingly, the OLS reveals that in the absence of either form of closed shop, high density increases injury rates where injuries occur. Density in excess of 80% of the employment unit more than doubles log injury rates relative to workplaces where there are no recognised unions. However, a pre-entry closed shop, the most "encompassing" form of unionism, reduces log injury rates by over 140%, fully offsetting the positive injury rate effects of high density in the absence of a closed shop. A post-entry closed shop also yields a negative impact on workplace injury rates, though the coefficient is not significantly different from zero.

Consequently, the model does not reveal the predicted monotonic incremental reductions in log injury rates based upon the proxies for step-wise increases in union power at the workplace, even after the model captures the array of control variables. Instead, the model proffers a cosine wave-shaped relationship between accident rates and trade union strength in the workplace. Where injuries occur, a bit of union power—exemplified by recognition—reduces injury rates. However, increasing union strength in the workplace beyond recognition alone achieves no incremental reduction in accident rates, until unions achieve the highest level of workplace strength—the pre-entry closed shop. At the apex of union power, collectivism again works to significantly reduce accident rates.

Implications

Trade unions impact upon the likelihood of workplace injuries and the level of workplace injury rates in opposing directions, rendering a conundrum for those attempting to glean implications from the model. The most intelligible method, then, for clarifying the ramifications of the model will involve the conventionalisation of a pair of stereotypical union and non-union workers. The archetypes in Table 6 evolve from the information provided in the model, from which we determined the probability of injury and the number of injuries per thousand workers.

Regarding the union status of workers, the most revealing comparison will be between non-union workers and members of a pre-entry closed shop. These polar opposite cases form the foundation of the inter-worker comparison. The comparison will also capture the plausible assumption that vestiges of unionism remain mostly in older workplaces, and that non-union workers function in disproportionately newer workplaces. Likewise, one envisages union workers labouring in large, male-intensive workplaces, with non-union counterparts working in smaller, more female-intensive employment units. A poor, adversarial IR climate imbues the union shop, though health and safety must be assumed to be co-determined by labour and management. The opposite holds for the non-union shop.

Specifically, the union worker labours in a pre-entry closed shop in a 50 year old workplace that is over 2/3 male. The workplace, in the manufacturing sector, has more than 50 workers and a poor IR climate, characterised by management's negative attitude toward trade unionism amongst its employees and industrial action having taken place in the last five years. Discussions over health and safety take place by committee and via JCC. Note that this stylised worker does not represent the safest or most dangerous characteristics that a worker could embody, as the aim is not to create a worker with high probability of injury. If that were the goal, this worker would be in a small workplace, for example. Instead, he captures the stereotype of what policymakers or lay people would consider a "union worker." Likewise, the non-union worker, in the financial services sector, toils in a two year-old workplace, where there are no recognised unions. The employment unit consists of less than 25 workers, over 2/3 of which are female. Management attitude towards trade unionism is equivocal, and health and safety standards arise without discussion by committee or JCC. Non-union workers have not taken industrial action over this or any other issues in the last five years.

In order to vivify this explanation, we can assume the union and non-union workers are an assembly-line worker and a merchant banker, respectively. Note that the union worker is more likely to be injured, though the actual frequency of injury for union workers appears markedly less where injuries occur. This result bears no astonishment at this point, but facilitates interpretation.

The non-union merchant banker faces just a 2% chance of sustaining injury, compared with his or her union counterpart, an assembly line worker, who has a 58% of sustaining injury. This difference in probability of injury arises mostly from the large size of the union workplace, the relative differences in incidence of raw injuries in the two industries, and the male domination of the union worker's employment unit. These same characteristics feed into actual injury rates per workplace, where the non-union worker fairs much worse. At her workplace, 31 workers per thousand sustain injury, compared with just two per thousand on the assembly line.

Clearly, one should focus on the second column, since reducing injury rates will also work toward creating more zero-injury workplaces, thereby thinning the probability values as well. Encouraging collectivism will reduce injury rates so long as it leads to union recognition. Debarring the pre-entry closed shop would do even more for attenuating injury rates. But, beware of the "middle ground" outcome of high density without a closed shop. Where density exceeds 80%, the shop must be closed to prevent upward pressure on injury rates. Moreover, adversarial IR may be constructive in reducing injury rates, inasmuch as industrial action proxies such an environment. The same does not hold when managerial attitude proxies for IR climate, though the absolute value of its coefficient is much smaller than that belonging to industrial action.

Workplace size does not cut both ways as it may first appear. Again, by focusing on the second column, one realises by cultivating large workplaces, injury rates will fall. This reduction in injury rates fully offsets the increase in probability of injury arising from increasing workplace size, and will eventually decay even at the probability estimate. That male-dominated employment units yield greater accident rates only attaches greater impetus to policies aiming to integrate females into the labour market and to desegregate jobs within it.

Finally, injury rates can be reduced by allowing for co-determination regarding health and safety, even in situations where IR may be otherwise characterised as adversarial. Even if unions and management quarrel over all other issues, labour possesses vital, tacit, shop floor knowledge regarding health and safety, knowledge that is imperative for reducing accident rates.

5. Conclusions

British trade unions lodge themselves in accident-prone workplaces and respond by reducing rates of injury within these workplaces. Only in situations where union density is above 80%, but without a closed shop, do unions assuredly fail at reducing accident rates. Thus while the paper succeeded in substantiating anecdotal evidence linking trade unions to improved working conditions, it incorrectly hypothesised a monotonic, inverse relationship between union instrumentality in the workplace and injury rates.

Studies aiming to build on this one must capture some of the other union methods for ameliorating health and safety, such as inflated union compensating wage differentials for risk. Researchers must explore links to the product market, namely the notion that product market power may affect workplace accident rates. Bargaining arrangements may also make a difference in the way unions transform information into action regarding workplace health and safety.

Future research must incorporate measures of worker illness - the more germane type of work-related ill health to consider when assessing the challenges facing workers in new, “technological” workplaces. Investment bankers and computer programmers may well suffer from bone fractures, but illnesses such as stress and breathing difficulties urgently require researchers to surmount the mensural issues associated with relatively subjective illness designations. Reliance on individual surveys such as the Employment Department’s Labour Force Survey or the individual employee survey incorporated into WERS98 provides a good start for researchers, though neither data set would fully dispose of the imprecision associated with the subjectivity, dispositionality, and delayed manifestation of illness. For example, certain workers may always feel “stressed” regardless of their occupation or may wrongfully believe that problems associated with work caused or exacerbated their asthma, when in fact, unfortunate genetics or problems at home caused the illness. Additionally, the respondent may still feel strains associated with previous employment, leading to the incorrect matching of ailments with occupations, firms, or workplaces.

Finally, the public goods nature of union efforts to reduce workplace injury causes the model to actually understate organised labour’s ability to reduce the incidence of industrial injury. In this study, the model dichotomously assigned variables of union strength to each workplace, regardless of whether injuries occurred to union or non-union workers. Thus, any injury occurring to anyone at the workplace appears as a blot against trade unions. However, one would expect unions to establish a common “safety net” that would apply to *all* workers in the employment unit regardless of union status. Additionally, managers of non-union workplaces will attempt to employ similar safety standards to those of their union competitors as a means of competing effectively in the labour market. We can also expect these same managers to mimic union safety standards as a method of deterring union organising—the so-called "union threat" and "union avoidance" effects typically discussed in relation to the processes of wage determination.

Regardless of the apparent benefits, the dismantling of labour's collective institutions does not come without cost, namely in the form of an injury externality. Granted, in the long run, potential workers will demand excessive compensating wage differentials from employers who do not offer a safe working environment, and employers will gradually respond by shutting down, meeting risk differentials, or investing in safer capital. However, until the dawning of the *laissez-faire* labour market's long run, trade unions serve as an effective institutional force for reducing injury rates.

Table 1
UNION-INJURY SUMMARY STATISTICS

UNION PRESENCE	MEAN NUMBER OF ACCIDENTS PER WORKPLACE	MEAN WORKPLACE ACCIDENT RATE
union	4.9211	0.0155
non-union	1.4859	0.0207
r_{union}	0.0665	-0.0387

Table 2
Trade Unions and Likelihood of Occupational Injury[*]

Independent Variables	∂F/∂x	std. error
Union Status (base case: no recognised unions)		
union	.0808[?]	.0310
Industrial Vintage		
number of years establishment has been at this address and previous address	.0005[†]	.0002
Male Percentage of Labour Force (base case: less than 1/3)		
males compose under 2/3	-.0040	.0350
males compose over 2/3	.1296[?]	.0423
Size of Workplace (base case: less than 25 workers)		
less than 50 workers	.1159[†]	.0519
more than 50 workers	.2643[?]	.0377
Climate of Collective Bargaining		
managerial attitude toward unions (1=union opposition)	-.0383	.0403
industrial action (1=occurred within the last 5 years)	.0761	.0518
Determination of Health and Safety		
health and safety discussed by committee (1=affirmative)	.0385	.0346
health and safety discussed by JCC (1=affirmative)	.1088[?]	.0352
Industry Controls (base case: manufacturing)		
electricity, gas, and water	-.2573[?]	.0433
construction	.0043	.0679
wholesale and retail	-.0531	.0486
hotels and restaurants	.3601[?]	.0588
transport and communications	-.1223[†]	.0543
financial services	-.2706[?]	.0478
other business services	-.1602[?]	.0474
public administration	-.2289[?]	.0423
education	-.1474[?]	.0488
health	-.0151	.0576
other community services	-.0606	.0642
Pseudo R^2 .1290		
N 1640		

Notes:

[*] The LHS variable for the converted probit is the binary variable set to equal one when an observed workplace has had one or more employees suffer any one of the listed injuries within the last 12 months.

[†] denotes variable significant at 5% level.

[?] denotes variable significant at 1% level.

Table 3
Trade Unions and Occupational Injury Rates*

Independent Variables	coefficient	std. error
constant	-2.7863?	.2594
Union Status (base case: no recognised unions)		
union	-.2441†	.1166
Industrial Vintage		
number of years establishment has been at this address and previous address	.0015♦	.0008
Male Percentage of Labour Force (base case: less than 1/3)		
males compose under 2/3	-.0540	.1381
males compose over 2/3	.2618	.1700
Size of Workplace (base case: less than 25 workers)		
less than 50 workers	-.5348†	.2305
more than 50 workers	-1.7620?	.2093
Climate of Collective Bargaining		
managerial attitude toward unions (1=union opposition)	.0302	.1604
industrial action (1=occurred within the last 5 years)	-.2646	.1722
Determination of Health and Safety		
health and safety discussed by committee (1=affirmative)	-.0639	.1196
health and safety discussed by JCC (1=affirmative)	-.1313	.1344
Industry Controls (base case: manufacturing)		
electricity, gas, and water	-.1815	.2898
construction	.1853	.2260
wholesale and retail	.2134	.1886
hotels and restaurants	1.2808?	.2059
transport and communications	.3210	.2172
financial services	-.7164	.4463
other business services	-.3930♦	.2307
public administration	.6527?	.2328
education	.1686	.2166
health	.5268†	.2157
other community services	.4667♦	.2476
Adj. R^2 .3333		
N 639		

Notes:

* The LHS variable is the natural logarithm of the injury rate at the workplace, defined as the number of employees having sustained any of the listed injuries during working hours within the last 12 months over the sum of part-time and full-time workers.

♦ denotes variable significant at 10% level.

† denotes variable significant at 5% level.

? denotes variable significant at 1% level.

Table 4
Trade Unions and Likelihood of Occupational Injury*

Independent Variables	∂F/∂x	std. error
Degree of Union Instrumentality (base case: no recognised unions)		
recognition	.0659†	.0322
density above 80 percent	.1002	.1283
post-entry closed shop	.3390†	.1349
pre-entry closed shop	-.1241	.1699
Industrial Vintage		
number of years establishment has been at this address and previous address.	.0005†	.0003
Male Percentage of Labour Force (base case: less than 1/3)		
males compose under 2/3	-.0098	.0355
males compose over 2/3	.1185?	.0429
Size of Workplace (base case: less than 25 workers)		
less than 50 workers	.1107†	.0521
more than 50 workers	.2717?	.0379
Climate of Collective Bargaining		
managerial attitude toward unions (1=union opposition)	-.0292	.0414
industrial action (1=occurred within the last 5 years)	.0833	.0524
Determination of Health and Safety		
health and safety discussed by committee (1=affirmative)	.0417	.0352
health and safety discussed by JCC (1=affirmative)	.1088?	.0357
Industry Controls (base case: manufacturing)		
electricity, gas, and water	-.2504?	.0452
construction	.0242	.0702
wholesale and retail	-.0577	.0493
hotels and restaurants	.3624?	.0595
transport and communications	-.1154♦	.0562
financial services	-.2704?	.0488
other business services	-.1755?	.0473
public administration	-.2248?	.0437
education	-.1328†	.0511
health	-.0151	.0587
other community services	-.0567	.0658
Pseudo R^2	.1330	
N	1607	

Notes:

* The LHS variable for the converted probit is the binary variable set to equal one when an observed workplace has had one or more employees suffer any one of the listed injuries within the last 12 months.

♦ denotes variable significant at 10% level.

† denotes variable significant at 5% level.

? denotes variable significant at 1% level.

Table 5
Trade Unions and Occupational Injury Rates*

Independent Variables	coefficient	std. error
constant	-2.6857?	.2606
Degree of Union Instrumentality (base case: no recognised unions)		
recognition	-.2672†	.1186
density above 80 percent	1.1070?	.4210
post-entry closed shop	-.1742	.4052
pre-entry closed shop	-1.4006♦	.8529
Industrial Vintage		
number of years establishment has been at this address and previous address	.0010	.0009
Male Percentage of Labour Force (base case: less than 1/3)		
males compose under 2/3	-.0534	.1380
males compose over 2/3	.2140	.1707
Size of Workplace (base case: less than 25 workers)		
less than 50 workers	-.5377†	.2294
more than 50 workers	-1.7800?	.2081
Climate of Collective Bargaining		
managerial attitude toward unions (1=union opposition)	.0050	.1608
industrial action (1=occurred within the last 5 years)	-.2671	.1715
Determination of Health and Safety		
health and safety discussed by committee (1=affirmative)	-.0741	.1200
health and safety discussed by JCC (1=affirmative)	-.1174	.1346
Industry Controls (base case: manufacturing)		
electricity, gas, and water	-.1996	.2932
construction	.1291	.2262
wholesale and retail	.1604	.1894
hotels and restaurants	1.2202?	.2071
transport and communications	.3814♦	.2201
financial services	-.7812♦	.4441
other business services	-.4559†	.2366
public administration	.4867†	.2360
education	.1180	.2180
health	.4277†	.2177
other community services	.3816	.2482
Adj. R^2 .3445		
N 629		

Notes:
* The LHS variable is the natural logarithm of the injury rate at the workplace, defined as the number of employees having sustained any of the listed injuries during working hours within the last 12 months over the sum of part-time and full-time workers.
♦ denotes variable significant at 10% level.
† denotes variable significant at 5% level.
? denotes variable significant at 1% level.

Table 6 PROTOTYPICAL WORKERS AND OCCUPATIONAL INJURY		
	union assembly line worker & non-union merchant banker	
	probability of injury	**injuries per 1000 workers**
"union" (i)	0.5762	2.3435
"non-union" (ii)	0.0213	31.2761

Notes:
(i) "union" worker: pre-entry closed shop, 50 year-old workplace, over 2/3 male, more than 50 workers, poor IR climate, health and safety committees, and health and safety JCCs
(ii) "non-union" worker: no unions recognised, 2 year-old workplace, less than 1/3 male, less than 25 workers, no signs of poor IR, no health and safety committees or JCCs

References

Bagwell, P.S. (1982), *The Railwaymen: The History of the National Union of Railwaymen: Volume 2: The Beeching Era and After*. George Allen & Unwin: London.

Cully, M., O'Reilly, A., Millward, N., Forth, J., Woodland, S., Dix, G. and Bryson, A. (1998), *The 1998 Workplace Employee Relations Survey*: *First Findings*, Department of Trade and Industry: London.

Kochan, T.A. (1979), 'How American Workers View Labor Unions', Monthly Labor Review, 102(4): pp.23-31.

Krueger, A. and Burton, J. (1990), 'The Employers' Cost of Workers' Compensation Insurance: Magnitudes, Determinants, and Public Policy', The Review of Economics and Statistics, 72(2): pp.228-240.

Metcalf, D. (1993), 'Industrial Relations and Economic Performance', British Journal of Industrial Relations, 31(2): pp.255-283.

Milne, S. (1998), 'Jubilee Line Strike Crisis Intensifies'. *Guardian*, 25 November.

Nichols, T. (1990), 'Industrial Safety in Britain and the 1974 Health and Safety at Work Act: The Case of Manufacturing', International Journal of Sociology of Law, 18: pp.317-342.

Nichols, T. (1994), 'Research Note: Problems in Monitoring the Safety Performance of British Manufacturing at the End of the Twentieth Century', Sociological Review, 42(1): pp.104-110.

Nichols, T. (1997), *The Sociology of Industrial Injury*, Mansell: London.

Reilly, B., Paci, P., and Holl, H. (1995), 'Unions, Safety Committees and Workplace Injuries', British Journal of Industrial Relations, 33(2): pp.275-288.

Schurman, S.J., Weil, D., Landsbergis, P., and Israel, B.A. (1998), 'The Role of Unions and Collective Bargaining in Preventing Work-Related Disability', in T. Thomason, J.F. Burton, Jr., and D.E. Hyatt (eds.), *New Approaches to Disability in the Workplace*. Industrial Relations Research Association: Madison.

Steel, M. (1998), 'Spark Plug', *Guardian*, 25 November.

Thaler, R. and Rosen, S. (1975), 'The Value of Saving a Life: Evidence from the Labor Market', in R. Terlekyj (ed.), *Household Production and Consumption*, National Bureau of Economic Research: Princeton.

Toon, S. (1993), 'Service Industries Say Safety Plays a Key Role in Putting Customer First'. Occupational Health & Safety, 62(11).

Webb, S. and Webb, B. (1897), *Industrial Democracy*, Green and Co., Longmans: London.

Weil, D. (1999), 'Are Mandated Health and Safety Committees Substitutes for or Supplements to Labor Unions?', Industrial & Labor Relations Review, 52(3): pp.339-360.

CENTRE FOR ECONOMIC PERFORMANCE
Recent Discussion Papers

467	P. B. Kenen	Currency Areas, Policy Domains and the Institutionalization of Fixed Exchange Rates
466	S. Gomulka J. Lane	A Simple Model of the Transformational Recession Under a Limited Mobility Constraint
465	F. Green S. McIntosh	Working on the Chain Gang? An Examination of Rising Effort Levels in Europe in the 1990s
464	J. P. Neary	R&D in Developing Countries: What Should Governments Do?
463	M. Güell	Employment Protection and Unemployment in an Efficiency Wage Model
462	W. H. Buiter	Optimal Currency Areas: Why Does the Exchange Rate Regime Matter?
461	M. Güell	Fixed-Term Contracts and Unemployment: An Efficiency Wage Analysis
460	P. Ramezzana	Per Capita Income, Demand for Variety, and International Trade: Linder Reconsidered
459	H. Lehmann J. Wadsworth	Tenures that Shook the World: Worker Turnover in Russia, Poland and Britain
458	R. Griffith S. Redding J. Van Reenen	Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries
457	J. Swaffield	Gender, Motivation, Experience and Wages
456	C. Dougherty	Impact of Work Experience and Training in the Current and Previous Occupations on Earnings: Micro Evidence from the National Longitudinal Survey of Youth
455	S. Machin	Union Decline in Britain
454	D. Marsden	Teachers Before the 'Threshold'
453	H. Gospel G. Lockwood P. Willman	The Right to Know: Disclosure of Information for Collective Bargaining and Joint Consultation

452	D. Metcalf K. Hansen A. Charlwood	Unions and the Sword of Justice: Unions and Pay Systems, Pay Inequality, Pay Discrimination and Low Pay
451	P. Martin H. Rey	Financial Integration and Asset Returns
450	P. Martin H. Rey	Financial Super-Markets: Size Matters for Asset Trade
449	A. Manning	Labour Supply, Search and Taxes
448	S. Nickell L. Nunziata	Employment Patterns in OECD Countries
447	W. Buiter	The Fallacy of the Fiscal Theory of the Price Level
446	R. Portes H. Rey	The Determinants of Cross-Border Equity Flows
445	G. Duranton D. Puga	Nursery Cities: Urban Diversity, Process Innovation and the Life-Cycle of Products
444	D. Quah	UK Phillips Curves and Monetary Policy
443	L. Feinstein	The Relative Economic Importance of Academic, Psychological and Behavioural Attributes Developed in Childhood
442	D. Quah	Cross-Country Growth Comparison: Theory to Empirics
441	D. Quah	Internet Cluster Emergence
440	E. Mellander	The Multi-Dimensional Nature of Labour Demand and Skill-Biased Technical Change
439	F. Green A. Felstead D. Gallie	Computers are Even More Important than You Thought: An Analysis of the Changing Skill-Intensity of Jobs

To order a discussion paper, please contact the Publications Unit
Tel 020 7955 7673 Fax 020 7955 7671 Email info@cep.lse.ac.uk
Web site http://cep.lse.ac.uk