Employee Voice, Workplace Closure and Employment Growth

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Abstract

This paper uses the 1990–98 Workplace Industrial Relations Survey (WIRS) Panel to analyse the impact of worker voice on workplace closure and employment growth among workplaces in Britain.

In general, worker voice had little effect on workplace closure in the private sector as a whole. Workplace performance, market conditions, workforce composition and structural features of the workplace, such as size and ownership, were more important. However, union voice – and, in particular, unions with substantial bargaining power – was associated with lower employment growth among continuing workplaces, the growth rate being roughly 3–4 per cent lower than similar non-unionised workplaces. The employment effect is still apparent once we account for workplace organisational and technical change, the concentration of unions in declining industries, and the age of unionised workplaces. The findings are consistent with the notion that unions will raise wages at the expense of potential new workers, but not to the point where the firm is sufficiently unprofitable to go out of business. Non-union worker voice had no significant effect, suggesting that the union effect arose through wage bargaining.

Union effects differed markedly across the three broad sectors of the economy: private manufacturing, private services and the public sector.

On average, unions increased the probability of closure in manufacturing, the average impact being to increase the chances of closure by 15 per cent relative to similar workplaces that were not unionised. However, the effect varied with the nature of union representation. Unions representing only manual workers at the workplace were the only ones that increased the chances of closure. This effect can be mitigated by broadening the occupational scope of union representation at the workplace. Having a recognised union representing non-manual workers reduced the likelihood of closure, while those representing the broad spectrum of occupations, both manual and non-manual, were neutral in their impact. Chances of closure were only higher where there was a single union: multi-unionism had no effect. Again,

this suggests that it is unions representing a narrow range of occupations that increase the chances of plant closure in manufacturing, perhaps through the pursuit of sectional interests to the detriment of the plant as a whole. The scope of bargaining was also important in determining closure chances. Where unions had no role in determining staffing levels or recruitment the likelihood of closure was higher. But where managements did allow unions a role in determining these aspects of employment the chances of closure were no different from those of non-unionised plants. This may be because unions become more sensitive to the employment consequences of their wage claims where management involve them in decisions over employment. Or it may be that an involvement in the broader set of issues affecting the future of the plant engenders a more constructive relationship between unions and management.

Unionisation reduced employment growth rates by 3 per cent per annum in private manufacturing workplaces relative to non-unionised workplaces. The effect was only apparent where at least 80 per cent of workers had their pay set through collective bargaining. Below this threshold there was no union effect. This suggests unions required a certain degree of bargaining strength to affect employment growth in manufacturing.

Worker voice had no effect on workplace closure in private services. However, the annual growth rate of unionised workplaces in private services was 4–5 per cent less than comparable non-union workplaces. This effect was not apparent where bargaining coverage was low and among unions representing manual workers. Furthermore, union effects were confined to unions negotiating over wages but not employment. Where they negotiated over staffing levels, growth rates were not significantly different from those in non-unionised workplaces. This suggests unions modify their wage claims where management involves them in decisions over employment. Non-union worker voice had no effect on employment growth in private services.

In the highly unionised public sector, closure probabilities were greater where workers were able to limit management's ability to organise work, and where there were unions representing non-manual workers at the workplace. However, public sector workplaces with a single union were less likely to close than workplaces without unions. Employment growth rates were not generally affected by worker voice in the public sector. However, public sector workplaces with single-table bargaining grew at a rate of 3 per cent per annum less than other comparable workplaces.

1 Introduction

It is commonly accepted that workers should be able to make their voice heard in the workplace, not simply because they have a right to expression as citizens but because, in a pluralist democracy, the pursuit of improved terms and conditions at work is regarded as a legitimate aim. It is further recognised that worker voice can have both positive and negative implications for productivity and profitability. On the one hand, by compelling employers to offer better terms and conditions than those offered in its absence, worker voice may reduce workplace competitiveness. On the other hand, worker voice can enhance management's ability to manage effectively and efficiently, while the benefits of voice can feed through to improved worker productivity. The balance between these two countervailing influences can determine the effect of worker voice on the fortunes of a workplace. Taking this as our starting point, this paper analyses the association between different forms of employee 'voice' and employment change in the 1990s. We use outcome data for 1998 on workplaces interviewed as part of the 1990 Workplace Industrial Relations Survey (WIRS90). These outcome data identify whether in the intervening 7–8 years the workplace closed, shrank below the survey's lower employment threshold of 25 employees, or remained in the survey population. We describe these outcomes as closure, shrinkage and survival respectively. For 'surviving' workplaces we can also identify changes in employment between 1990 and 1998.

In 1990, there were 22.5 million employees in employment. This fell by a million during the recession of the early 1990s, only to rise to around 23 million by 1998.[2] Changes in the total number of employees in employment arise from two sources: the setting up of new workplaces and the closure of existing ones; and the shrinkage and expansion of existing workplaces. In this paper we consider the role played by unions in decisions to close

2 Based upon employees in employment for Great Britain, derived from the relevant Labour Force Surveys, reported in *Labour Market Trends*.

workplaces and expand or contract employment. Our focus is what happened to workplaces in existence in 1990. However, new workplaces that came into existence during the 1990s accounted for one-fifth of all workplaces by 1998, and one-sixth of all employment, if we exclude the very small workplaces excluded from the 1990–98 WIRS Panel. There are several reasons why we do not give equal attention to the jobs created by newly established workplaces during the same period. The first reason for omitting detailed analysis of new workplaces is because the prospect of possible unionisation is unlikely to deter managers from setting them up.[3] This is especially so for new small firms with a single workplace. Decisions to set up new workplaces within multi-site organisations could be influenced by experiences of union activity elsewhere in the same organisation, if it exists.[4] However, there is no survey dataset that could be used to address this issue through statistical analysis. Secondly, even for new workplaces set up between 1990 and 1998, there is no information in the 1998 Workplace Employee Relations Survey (WERS98) on the circumstances facing management at the time they set up the new workplace, or indeed decided not to set up others. Consequently, we can say nothing about any role unions might have in discouraging or encouraging the establishment of new workplaces. Thirdly, although we could say something about employment growth among workplaces set up since 1990, these workplaces are only a little younger than our 1990 sample. We think the best guide to their employment changes is the pattern of employment change of workplaces existing in 1990, as described in this paper.

As discussed in more detail below, we know from previous analyses of the Workplace Industrial Relations Surveys (WIRS) that unions had no impact on workplace closure in the trading sector in the 1980s but, across the economy as a whole, unionised workplaces grew at a slower rate than non-unionised workplaces. We assess the effect of worker voice for the 1990s and, for the first time in Britain, we extend the analyses to the public sector and present results separately for private services and private manufacturing. The motivation for the analysis is the profound change in British industrial relations that has occurred since the early 1980s. The study comes at the end of two decades of decline for trade unions, the traditional means by which employees have sought to influence employers in Britain. The unionised sector

3 The low level of unionisation in the private sector supports this view. Only one private sector industry (electricity, gas and water supply) out of fourteen industries has over half of its workforce belonging to trade unions (Bland, 1999).

4 A 1992 survey of large, multi-site companies showed that many of those with recognised unions in their existing workplaces set up new workplaces without recognising unions in them. This was more common where existing bargaining arrangements were decentralised (Marginson et al, 1993).

of the economy has shrunk due to a continual fall in union membership since the early 1980s and, since the mid–1980s, a rapid drop in the number of employers recognising unions for collective bargaining (Millward et al, 2000). Even where unions continue to be recognised for bargaining purposes, their bargaining power may have diminished with changes in the political and economic climate, and declines in the proportion of employees whose terms and conditions are set by collective bargaining (Millward et al, 2000; Bryson and Wilkinson, 2001). Certainly, they appear to have lost influence over a range of workplace outcomes (Stewart, 1995; Gallie and Rose, 1996: 47), and their influence on workplace economic outcomes has become increasingly conditional on their organisational strength and bargaining power (Machin and Stewart, 1996; Menezes-Filho, 1997).

Employers, perhaps intent on regaining managerial prerogatives, seem to be capitalising on changes in the labour market and the legal framework which have strengthened their bargaining power *vis-à-vis* employees to refashion their relationship with organised labour. Employers have hardened their attitudes towards unions since the mid-1980s (Gallie et al, 1998: 107; Bryson, 1999a: 86) and there is growing evidence that unions are often by-passed in managerial decision-making (Marchington and Parker, 1990; Darlington, 1994; Cully et al, 1999: 110, 207). These considerations may lead us to suspect that managers are less constrained than they were in the 1980s in pursuing corporate goals, sometimes at the expense of employees. Consequently, other things being equal, employee representations to management may be less influential in decisions concerning the loss, retention or growth of jobs than they were in the 1980s.

However, to conclude that employees' influence over corporate behaviour may have diminished simply because unions may have lost influence, is to overlook important changes in the nature of worker voice which have occurred over the same period. Within unionised workplaces, there has been a substantial shift from the use of single-channel union representation to 'dual-channel' voice involving increasing use of direct non-union methods of communication with management (Bryson, 2000). Furthermore, in the population of workplaces as a whole, there has been a shift to purely non-union voice (Millward et al, 2000: 121–26). Although these trends may simply reflect the decline in union influence, it is clear that non-union voice mechanisms have their own impact on financial performance (Bryson, 1999b; McNabb and Whitfield, 1998) and employee perceptions of management behaviour (Bryson, 2000). It is therefore important to account for these alternative measures of employee voice when considering employee influence over management behaviour in the 1990s.

The remainder of the paper is set out as follows. Section 2 presents our analyses of workplace closure. First, we outline the theory relating to employee influence on workplace closure. Then, having introduced our data, we present descriptive analyses of workplace closure for the private sector as a whole. This is followed by multivariate analyses of closure for the sector. Section 2.5 presents similar analyses, but for private manufacturing and private services separately. Finally in Section 2, we present our results for the public sector.

Section 3 presents our analyses of employment change. It follows a similar format to Section 2, with sections on theory and data before presenting results in the same sequence as Section 2. However, Section 3 includes an additional section which adjusts the private sector employment growth analysis to take account of workplace survival.

2 WORKPLACE CLOSURE

The analysis of workplace closure is important to the analysis of employment change. First, workplace closure is the most dramatic manifestation of a management decision to reduce the number of jobs. If the voice of workers is positively or negatively associated with the likelihood of closure, this is significant in itself. As we show below, there are grounds for supposing that the rent-seeking behaviour of unions may threaten the long-term viability of workplaces. On the other hand, some have argued that worker voice can contribute to improved performance, for instance through better communications and employee involvement, and that unions can enhance productivity. Therefore, the actual impact of voice is an empirical issue.

The second reason why the analysis of workplace closure is important is that it lays the foundations for analyses of workplace survival in the survey population, and hence of employment change. Models estimating survival are used in Section 3 to adjust estimates of voice impacts on employment change in our 1990–98 panel of continuing workplaces. Failure to take account of this selection process could result in biased estimates of workers' impact on employment change.

Having outlined the theory linking employee behaviour to workplace closure in Section 2.1 and our data in Section 2.2, Section 2.3 presents descriptive data on closure, shrinkage and survival rates for different measures of voice, workplace characteristics, workforce characteristics, product market conditions and workplace performance measures. Section 2.4 presents results from models estimating the probability of closure in the private sector as a whole, while Section 2.5 presents results for private services

and private manufacturing separately. Analyses for the public sector appear in Section 2.6.

Both the descriptive and multivariate analyses indicate that voice measures do not have a major role in explaining closure in the economy as a whole. We identify some measures of voice that are significantly associated with subsequent closure but, in general, aspects of product market competition, workplace performance, and to some extent, labour deployment, play a more significant role in understanding closure. However, worker voice is important in explaining closure in private manufacturing and the public sector.

2.1 Theory relating to employee influence on workplace closure

If firms are best able to maximise profits where management can pursue that objective without modifying its behaviour in response to employees' demands, the viability of the firm may be compromised where management is constrained to respond to the competing demands of employees.

In the short-term, enterprise survival depends on whether average variable costs exceed average revenues at the profit-maximising output. When costs are greater than revenue, management may be more inclined to shut the workplace, although there may be sound economic reasons for 'weathering the storm'.[5] Average variable costs depend on labour productivity and labour costs – mainly wages and other worker benefits – both of which may be influenced by unionism, as well as other factors which employees can not influence.[6] Average revenues will depend on market conditions that determine entry of competitive firms and market prices.

Unions may increase the likelihood of workplace closure by raising wages above the rate that is optimal for profit maximisation, that is, above the market rate that would be obtained in the absence of unions. It is usually assumed that since unionism is often associated with higher wages and benefits for workers (Forth and Millward, 2000; Freeman and Kleiner, 1990), and lower profits for firms (Becker and Olson, 1992; Bronars and Deere, 1990; Hirsch and Connolly, 1987), unions may increase the likelihood of workplace closure. If unions are successful in maintaining restrictive practices that reduce labour productivity, this may also increase the likelihood of closure. On the other hand, following Freeman and Kleiner (1999), there are two reasons why this simple assumption may not hold.

5 For instance, if an employer foresees a change in market conditions which might enhance profitability, it may be worthwhile holding on to labour ('hoarding' it) rather than incurring the costs of lay-offs and rehiring.

6 For example, aspects of labour costs which employees can not influence, such as National Insurance costs, and non-labour costs such as new plant and machinery and interest rates.

First, the extra 'surplus' accruing to workers through improved wages may come, not through normal profits, but through 'excess profits'. Excess profits may arise through the operation of unions in improving productivity, thus increasing the size of the pie, permitting unions to improve their position without it being at the expense of the employer. Excess profits may also arise where employers operate in less competitive market places, or where they dominate a particular market place, a position that allows them to be price-makers rather than price-takers. In such circumstances, they may be able to acquiesce to employees' demands in the knowledge that they can simply pass extra costs on to consumers without losing market share.[7]

The second reason why union-induced higher wages may not necessarily translate into a higher probability of workplace closure is that unions may care about the employment of existing members, as well as their wages. As Freeman and Kleiner (1999: 512) note:

> 'while unions have incentives to drive up the wages and benefits of employees at the expense of potential new workers, they should seek to protect the employment of current members as long as those members earn a premium over their next best alternative employment. The rational union will not raise wages to the point where the firm is sufficiently unprofitable to go out of business and should grant wage concessions to keep the firm afloat as long as the post-concession compensation exceeds the next best alternative for the workers'.

Of course, unions may inadvertently bring about the demise of a business if it makes wage claims on faulty or incomplete information. In some circumstances, unions may deliberately compromise the viability of a 'poor' workplace in pursuit of better standard terms and conditions within an industry.

Unions may also affect workplace survival in the longer-term, since this depends on whether total revenues exceed total costs (including fixed costs). In the long-term, if unionised workplaces in competitive markets raise wages and costs, these workplaces will suffer declining employment and eventually go out of business. Union-induced reductions in profits may also deter investment in unionised workplaces, damaging the long-term performance of unionised workplaces.[8] On the other hand, as Freeman and Kleiner (op cit,

7 Empirical studies disagree on whether union-induced reductions in profits come out of normal or excess profits. Some find unions reduce profits in concentrated sectors with high profitability (Karier, 1985) while others find the opposite (Clark, 1984; Hirsch, 1991).

8 This may occur if lower research and development expenditure makes unionised plants less able to adjust to market change (Hirsch, 1992), or if investors are deterred from investing by the knowledge that unions may expropriate a share of rents associated with sunk capital investment (Grout, 1984).

p512) point out, unions may confine their activities to workplaces most able to pay union wages, namely those with sufficient economic rent to do so without increasing the probability of long-run business failure. Freeman and Kleiner also note that existing workplaces may benefit from union-induced higher costs if they deter new entrants to the market who will have to attract labour at union rates, while facing the risk that union concessions to existing firms will protect their competitive advantage.

It is also possible that in the long term, unionised workplaces may outperform non-unionised workplaces if unionisation offers sustainable competitive advantages, thus reducing the likelihood of workplace closure. There are at least three routes by which this may occur. First, by giving 'voice' to workers' concerns and grievances, and by helping to represent those concerns and grievances to management, unions may significantly increase worker motivation and organisational commitment, thereby improving productivity and performance (Freeman and Medoff, 1984). Secondly, unions can reduce employer 'agency costs' in maintaining and enforcing desired levels of worker effort. Thirdly, if unions improve information flows to management, this may enhance the effectiveness of managerial decision-making, leading to improved prospects of survival.

Freeman and Medoff (1984) have argued that union voice is more effective than non-union voice in delivering benefits *for workers*. However, the issue of whether union voice is superior to non-union voice in delivering benefits *to employers* is an important issue, given the rise of non-union voice since the mid-1980s. From the human resource management literature comes the notion that worker representation, rather than efficiently and effectively communicating workers' wishes and concerns to management, may actually create a barrier between management and workers. This barrier can be breached if management eschews intermediaries and deals directly with employees, either on a one-to-one basis or in groups (Lawler, 1986; Peters, 1988; Storey, 1992). Furthermore, the wishes and concerns of workers may vary, and so management may be better able to understand them and respond to them through direct voice channels (Lawler, 1992; Pfeffer, 1994; Storey, 1992). These propositions might lead one to argue that direct communication channels offer the best prospects of sustainable competitive advantage through better information flows, in which case we might expect non-union worker voice to be associated with lower closure probabilities.

Finally in this section, it is worth returning to trends in unionisation since the 1980s, discussed in the Introduction. It is often assumed that in a period in which unions lost influence both within the national polity and within the world of work, where management continued to deal with unions it was largely a matter of form. There is case study evidence that in some instances,

unions were reduced to the role of legitimising to the workforce the changes that management wished to make (Brown et al, 1998). It is conceivable that unions may have become so weak during the 1990s that they had little or no influence over labour costs and workplace performance. One commentator has suggested that collective bargaining 'may at times constitute a hollow shell' (Hyman, 1997: 318) with unions increasingly 'dominated by the employer, with no independent representation of workers' interests' (Hyman, 1997: 314).

In fact, evidence from analyses of the Workplace Employee Relations Survey 1998 (WERS98) for union effects on labour costs and performance is mixed. By 1998, unions had no significant effect on workplace financial performance (Addison and Belfield, 2000; Bryson and Wilkinson, 2001). However, Forth and Millward (2000) find evidence of a sizeable union wage 'mark-up' for some forms of unionism.[9] These two findings are incompatible if one starts from the premise that the wage mark-up comes at the expense of normal profits, but it would be consistent with the hypothesis that unions extract concessions when excess profits are available.

It appears that unions do continue to have an influence on workplace outcomes in specific circumstances. This should not be so surprising. The decline in unionisation in the economy as a whole does not necessarily entail a loss of union influence where they continue to operate. As Millward et al (2000: 179) note:

> 'An alternative possibility was that it was the weakest examples of workplace unionism that had disappeared; in this case, the unions' "batting average" would have improved, since a higher proportion of the surviving ones would be "strong".'

What Millward et al (2000: 179–83) go on to show is that union strength varies widely across unionised workplaces. It is therefore important for our purposes to go beyond the average effect of union recognition on workplace outcomes to explore variance in outcomes arising from the bargaining strength of employers, unions and employees in general under different circumstances. This leads us to consider the effect of unions according to their strength on the ground, their coverage of workers, and the nature of bargaining arrangements.

9 Unfortunately, the data used in this paper do not permit us to control for workplace-level wages, or proxy the union mark-up at the workplace. Where we identify union effects on closure we can only infer that the rent-seeking behaviour of unions is one possible cause.

2.2 The data

To analyse the probability of workplace closure over the period 1990 to 1998 we use data from the 1990–98 WIRS Panel. The level of observation is the workplace, namely a place of employment at a single address or site. All the workplaces interviewed in WIRS90 were followed up to establish whether they had closed by 1998 or survived. The WIRS90 cross-section survey from which the panel is drawn is based on a nationally representative sample of workplaces with 25 or more employees both at the time the sample was drawn from the Census of Employment 1987, and at the time of interview in 1990. Workplaces that did not meet the 25-employee threshold at both these points in time are excluded from the analysis. Consequently, the sample generalises to a population of workplaces with at least 25 employees at the beginning and end of the period 1987–90.[10]

Workplaces were selected for WIRS90 differentially from the 1987 Census of Employment across workplace size bands, where size is measured by employment. Large workplaces were over-sampled and some industries were under-sampled. To compensate for these inequalities in selection the data are weighted in all analyses by a probability weight that is the inverse of sample selection (Millward et al, 1992: 380–381).

Our analyses use four data sources. The first is the management interview in 1990, conducted face-to-face with the most senior workplace manager responsible for employee relations. This was supplemented by a pre-interview self-completion questionnaire providing workforce data that might have involved interrogating records. Interviews were conducted in 2061 workplaces with a response rate of 83 per cent.[11]

These two data sources provide most of our independent variables for analysis, discussed in Sections 2.3–2.5. The third source was the sampling frame based on the 1987 Census of Employment. This contains banded workplace size (number of employees) in 1987 that has been used in the analyses, together with information on sample stratification used in our multivariate analyses (see below).

Our final data source is the information on workplace outcomes in 1998 compiled from survey interviewers' contacts with workplaces as part of the

10 Research in the United States indicates that firms' (as opposed to workplaces') exit rates peak at around three years, and decline steadily thereafter (Troske, 1992). More generally, research indicates high 'infant mortality' among entrants and among small firms (Caves, 1998: 1954–59). This suggests that our sample of 1987–90 survivors with at least 25 employees will understate closure rates in the economy as a whole.

11 Subsequent data checks revealed 27 observations that had mistakenly been identified as workplaces when, in fact, they had been larger or smaller than a single workplace. These were dropped from all analyses.

second wave of the panel. The outcome codes provide the information to identify workplace closure. A random sample of 1301 1990 workplaces was issued for the panel follow-up in 1998. For these workplaces, information on closure and shrinkage was collected by telephone inquiries prior to interviewers seeking interviews at those workplaces. The same telephone inquiry was also conducted on 132 workplaces that formed part of the panel reserve sample, and on the remaining 628 workplaces that were not selected from the 1990 cross-section data file. Contact with these 760 workplaces was limited to establishing specific details relating to their survival status – namely, the size of the workforce and whether the workplace had moved, changed ownership, amalgamated with or split from another workplace since the 1990 interview (Airey et al, 1999). The details collected in the telephone inquiry enabled each of the 2061 workplaces that took part in the 1990 cross-section survey to be classified according to whether it continued in existence with 25 employees or more (1679 workplaces), was still in operation with less than 25 employees (123 workplaces) or had closed down (259 workplaces). We defined a workplace as closed if it had not continuously employed employees since 1990, and was not engaged in broadly similar activity to that which it was undertaking in 1990, either at the original site or elsewhere.[12]

In his analysis of workplace closure, Machin (1995) used the 1984–90 WIRS Panel. Our analysis benefits from two features of the 1990–98 panel which were not available to Machin. Firstly, whereas the 1984–90 data were confined to the trading sector, ours cover all sectors of the economy. We therefore present results for the private sector (including analyses for manufacturing and services separately) and the public sector. Secondly, our data set is considerably larger: outcome data were only available for 704 of the 1385 trading sector workplaces interviewed in 1984, whereas we have outcome data for all respondents to the 1990 cross-section.

We begin by analysing workplace closure in the private sector, turning to the public sector later.

2.3 Descriptive analyses of workplace closure in the private sector, 1990–1998[13]

Between 1990 and 1998, 18 per cent of workplaces closed, 15 per cent shrank below the 25-employee threshold, and the remaining 67 per cent survived

12 See Forth (2000) Appendix A for an explanation of how various fieldwork outcome codes were coded into closures, shrinkers, and survivors with 25 or more employees. The fieldwork survey agency and the research team spent considerable time assessing the status of each workplace, verifying its outcome status. We are therefore confident that our closure data are accurate.
13 All analyses are weighted to account for the probability of sample selection.

with at least 25 employees at the end of the period.[14] This section presents descriptive information on closure rates in the private sector. Appendix Table A1 presents closure, shrinkage and survival rates for workplaces according to their characteristics. These characteristics are grouped as follows:

- measures of employee voice;
- workplace characteristics;
- workforce characteristics;
- nature of product market; and
- workplace performance.

Below we briefly introduce some of the independent variables used in the multivariate analysis of closures presented later.[15] We note some key findings, focusing on closure rates, referring to characteristics in the order in which they appear above. Explanations of terms used below appear in Appendix Table A1.

Measures of voice

In general, the descriptive analysis indicates that the nature of worker voice had little impact on closure rates in the private sector as a whole.

Union and non-union voice: where union voice was present, closure rates were similar to those where there was no worker voice. They were a little lower where there was non-union voice only.

Representative and direct voice: closure rates were lowest where there was direct voice only. Where there was representative voice, closure rates were similar to those in workplaces with no worker voice. This suggests that if there was a productivity-enhancing or cost-reduction voice effect, it came through mechanisms such as briefing groups, regular workforce meetings, and problem-solving groups, not through the representation of worker interests to management through intermediaries.

Union presence: closure rates were marginally higher where unions were recognised for pay bargaining, with closure rates particularly high (0.30, or 30 per cent) among workplaces with three or more recognised unions.

14 The unweighted figures are 16, 7 and 78 per cent respectively.

15 Appendix Table A1 and our discussion is not exhaustive: it does not include our 11-category region variable, local unemployment and vacancy rates, or disaggregated standard industrial classifications, all of which have been used in the modelling and are discussed in the section presenting multivariate results.

Although strong unions may be best placed to extract higher wage premiums from employers, thus raising their cost base and threatening their long-term viability, there was no indication of a link between union strength and workplace closure.[16] Whether union strength was measured by the existence of a closed shop, pre-entry closed shop, on-site union representation, higher union density, or the presence of a formal agreement limiting management ability to organise work, it was not associated with closure rates.[17]

The *type* of recognised union was associated with differing closure rates. Where recognised unions only represented manual workers at the workplace, the closure rate was 0.26, compared to a closure rate of 0.15 among workplaces with unions representing non-manual workers only. Where a recognised union contained manual and non-manual workers, the closure rate was 0.20. Of course, a workplace may contain all three types of union, or any combination. Closure rates were highest (0.32) where a workplace contained all three types of union, reflecting the association with multi-unionism noted above. Where the only unions present represented manual workers only, the closure rate was 0.28, compared to 0.08 where the only unions present represented non-manual workers. It is not immediately obvious why this should be so, but there are several possibilities. Manual worker unions are more likely to be present in traditional industries with high concentrations of manual workers. These industries, including heavy industries that have been in decline and industries characterised by lower capital investment, had higher closure rates.[18] In his descriptive analyses, Machin (1995) found that trading sector workplaces with manual unions and high percentages of manual workers had high closure rates in the 1980s, although these effects were not statistically significant when controlling for other factors.

Unionised workplaces may have a higher probability of closure than non-unionised workplaces, not by virtue of their own union arrangements, but because they are located in a highly unionised sector of the economy with

16 In the main, union strength was not associated with closure or survival rates. This suggests that the evolutionary model of union decline, in which the 'fittest' unions survived, is not applicable.

17 In contrast, evidence for the United States indicates that although, on average, unionisation does not increase the likelihood of firm closure, the likelihood of closure rises with the percentage of workers in union membership (Freeman and Kleiner, 1999).

18 So, for example, 21 per cent of workplaces with recognised manual-only unions were located in the Metal Goods sector, and another 19 per cent were located in 'Other manufacturing'. These had closure rates of 0.23 and 0.31 respectively. By contrast, only 9 per cent of workplaces with recognised non-manual-only unions were located in Metal Goods and 7 per cent in Other Manufacturing. 40 per cent of those with non-manual-only unions were located in Banking, Finance, Insurance and Business Services, where closure rates were only 0.10.

high closure rates. To account for this possibility we constructed an indicator of the proportion of workers in union membership at the two-digit standard industrial classification level. Closure rates were identical for workplaces in low and high-density sectors.

Bargaining arrangements: bargaining arrangements can affect the likelihood of workplace closure because they reflect union bargaining power. If workers are close substitutes for one another, they may do better by joining forces in either a single union or joint bargaining arrangement, helping them to avoid 'divide and rule' tactics by the employer. However, if groups of workers are highly complementary, each group could be more powerful under separate bargaining if the employer needs all groups to maintain production. Therefore, it is argued that complementary workers may choose separate bargaining, while substitutable workers will choose joint bargaining (Horn and Wolinsky, 1988). Machin et al (1993) found that in the early 1980s, workplaces with multi-unionism and separate bargaining arrangements paid higher wages than those with joint bargaining or single unions, and that separate bargaining was associated with lower financial performance and more strike-proneness. Forth and Millward (2000), using matched employer–employee data from WERS98, found the union wage premium of roughly 10 per cent attaching to multi-unionism. This did not differ significantly between single-table and separate bargaining arrangements, but there was no wage premium associated with single unionism, relative to non-union workplaces. However, Bryson and Wilkinson (2001) found bargaining arrangements had no significant effect on financial performance in 1998. These findings suggest that bargaining arrangements are unlikely to have an impact on workplace closure but, if they do, closure rates may rise in the presence of multi-unionism. In fact, closure rates varied little with the number of bargaining units at the workplace, but they were considerably *higher* where unions bargain jointly. This is consistent with the hypothesis that unionised workers are substitutable and that they therefore derive more bargaining power through joint negotiation than by bargaining as separate groups.

Although unions may curb their wage demands where they are concerned about the employment consequences of their claims, there is no indication that workplaces in which unions bargain over staffing levels or recruitment were any less likely to close than those who only bargain over wages. Indeed, in the handful of private sector workplaces where unions negotiated over recruitment but not staffing levels, closure rates were very high (0.41).[19]

19 There were only 17 unweighted cases in the private sector where unions bargained over recruitment but not staffing levels.

Workplace characteristics

Closure rates were lower among larger workplaces, which is where unions were more prevalent. They were much higher in manufacturing and extraction than in the service sector. Single independent workplaces had lower closure rates than workplaces belonging to larger organisations. Despite concerns about the ability of foreign-owned multinationals to relocate their operations outside the UK with ease, UK-owned workplaces had higher closure rates than foreign-owned workplaces. Workplace age was not associated with closure rates.

Workforce characteristics

Closure rates were lower among workplaces that use fixed-term and short-term contract workers compared to those that did not, perhaps because it provided workplaces with the ability to adjust employment levels at lower cost.[20] Closure rates fell with higher percentages of female employees and part-time workers. Closure rates fell with higher proportions of non-manual employees, a finding consistent with non-manual workers continuing to increase their relative employment share (Machin, 1994).

Nature of product market

Workplaces will be more able to share rents with workers without a long-term risk of closure where there are large rents available in their product market. The low closure rates among workplaces dominating their market with no other competitors support this contention. However, there was no difference in closure rates between those with one to five competitors and those with six or more. As might be expected if an organisation is heavily reliant on revenue from a small range of products, closure rates were lower among those with diversified products or services. Those selling or producing a single product or service had the highest closure rates. Although closure rates varied with the location of the market, it is not obvious why they should be lowest among those operating in a local market yet highest among those operating in regional markets.

Workplace performance

Performance in 1989–90 was strongly associated with subsequent closure rates, with workplaces doing well in 1990 less likely to close. Closure rates were lower in workplaces that reported financial performance above average for their industry, compared to those reporting average or below average

20 Workplaces using flexible labour were also less likely to reduce the size of their labour force: shrinkage rates were 0.10 among those using short-term and fixed-term contracts, compared to 0.15 among those who did not.

performance. Workplaces reporting operating at considerably below full capacity were more likely to have subsequently closed than workplaces reporting operating at full capacity or somewhat below full capacity. These findings confirm Machin's (1995) findings for the trading sector in the 1980s. Where the value of sales had risen in the period 1989–90, closure rates were lower than where sales were reported to be falling or stable. Finally, where employment was reported to have risen by at least 5 per cent over 1989–90, closure rates were much lower than where employment was reported to be stable or falling.[21]

2.4 Multivariate analyses of workplace closure in the private sector, 1990–98

The descriptive analysis identifies some differences in closure rates according to the nature and extent of worker voice present at the workplace. However, the descriptive analysis showed other workplace characteristics were also associated with closure rates. To establish whether voice effects have any independent effect on closure, it is necessary to control for these other characteristics using multivariate analysis.

The closure indicator is a discrete (0–1) variable, with 1 = closure and 0 = non-closure.[22] We estimate a set of probit models of workplace closure to establish the independent effect of worker voice on closure, controlling for a range of other variables.[23]

Analyses take account of the complex survey design allowing results to be generalised to the workplace population from which the sample was drawn. Firstly, all models are run on data weighted by the inverse of the workplace's sampling probability. As well as allowing the results to be generalised to the population from which the sample is drawn, the use of probability weights

21 Other research has established links between employment trends in one period and closure in the next period. Using data for Wisconsin, USA, for the period 1978–87, Troske (1996: 726–727) shows that in both manufacturing and services 'firms experience a fairly steady decline in the mean rate of growth starting six years prior to exit, with the biggest drop in growth starting three years prior to exit'.

22 Non-closure is not synonymous with survival in our panel sample, since some workplaces shrink below the 25-employee threshold necessary for inclusion in the panel in 1998. Therefore, when we present selection adjusted models for employment growth in Section 3, our first stage model estimates survival in the sample rather than non-closure (survival or shrinkage).

23 The procedure assumes an unobserved, or latent, index – in this case the propensity for workplace closure – which is a linear function of the explanatory variables in the model plus an error term. The 0–1 indicator is modelled using the standard normal distribution function to compute the closure probability, the probit ensuring that predictions of closure lie within the 0–1 interval (Kennedy, 1998: 237–239).

also guards against estimation bias which can arise through differential sample selection probabilities.[24] Secondly, we employ the Huber-White robust variance estimator that produces consistent standard errors in the presence of heteroscedasticity.[25] Thirdly, we obtain accurate standard errors by taking account of sample stratification.

For simplicity, we present a selection of models focusing on a subset of voice measures, but we comment on other models. The main text reports changes in the estimated probability of closure for different types of workplace arising from infinitesimal change in each independent, continuous variable, and for changes in the probability of closure for switches in the value of discrete variables. So, for example, we can see the marginal effect of a change from non-union to union status for 'like' workplaces sharing the mean characteristics of the estimation sample.[26]

Full models for the private sector are appended.

To test the robustness of results, we assess the significance of voice effects in the presence of different sets of control variables. We use five specifications described in Table 2.1. Initially voice measures were entered into models alone. Then the model was built up with the gradual addition of control variables. There are two reasons why voice effects may alter with the addition of further controls. The first is that the new controls have an impact on voice effects. The second is that since the addition of controls reduces the sample for estimation, as workplaces with missing data are excluded from the equations, voice effects may vary with different subsamples. We test for this by rerunning the models where most observations have no missing data on the more restricted samples.

These models are predictive in the sense that they use information collected in 1990 to predict subsequent workplace closure. Controls measure conditions at 1990 or, in the case of performance and employment change measures, in the period 1989–1990. It is therefore reasonable to draw causal inferences about the variance in workplace closure using these 1990 predic-

24 Differential sampling fractions can result in standard estimator biases (Skinner, 1997). The weights account for all variation in sampling probabilities, thus eliminating differential sampling probability as a possible source of estimation bias.

25 This procedure uses pseudo-likelihood methods, the point estimates being those from a weighted 'likelihood' which is not the distribution function for the sample. Thus, standard likelihood-ratio tests are not valid (STATA Manual, Release 6, Volume 4, 1999). The F statistic reported for each model is a Wald test based on the robustly estimated variance matrix.

26 The marginal union effects are derived from the probit model $\Pr[Ci=1]=\Phi(Xi\beta+\delta Ui)$ where $\Phi(.)$ is the standard normal distribution function. Ui is the relevant union variable and denotes the other controls. The marginal effects are computed as $\Delta^U = \Pr[Ci=1 / Ui=1] - \Pr[Ci=1 / Ui = 0] = \Phi(Xi\beta+\delta) - \Phi(Xi\beta)$ with Xi evaluated at weighted sample means. Evaluating X at the sample means gives a *ceteris paribus* union effect on the probability of workplace closure.

Table 2.1: *Model specifications for private sector closure analysis*

Model	*Controls used*
Model 1	No controls
Model 2	Industry-level union density; log employment size in 1990; % non-manual employees; whether workplace is single independent workplace or belongs to larger organisation; region; two-digit standard industrial classification (1980)
Model 3	As Model 2 plus product market variables and labour deployment variables: if use short-term or fixed-term contracts; if no single product or service accounts for 25% or more of sales; if no competitors
Model 4	As Model 3 plus workplace financial performance in 1989–90: if financial performance is above average for the industry; if current premises and equipment are operating considerably below full capacity
Model 5	As Model 2 plus if employment rose by at least 5% between 1989 and 90

tors. However, if we accept that workplace performance may be a function of worker voice, as our discussion in Section 2.2 suggests, then the workplace performance measures in Model 4 may be endogenous with respect to the estimation of worker voice on closure; that is, workplace financial performance may not be wholly independent of union status. This may lead to bias in estimating the effects of worker voice.[27] Where the voice coefficients altered markedly with their inclusion in the model, we comment on this.

Results

Union recognition and strength: we begin by focusing on union recognition as an indicator of worker voice (Table 2.2). Across all five model specifications, the effect of union recognition is positive but not statistically significant.[28] Therefore, unionised workplaces were no more likely to have closed than non-unionised workplaces during the 1990s. However, the probability of workplace closure does rise significantly with higher industry-level union density.[29]

27 Assuming unionisation damages workplace performance, incorporating workplace performance in our models would lead to an underestimation of any positive effect of unionisation on workplace closure, since some of that effect is captured by the workplace performance variables.
28 Unionisation raises the probability of workplace closure by between 1.7 and 5.0 per cent according to the model specification, but the effect is not statistically significant. In other words, across 'like' workplaces sharing the mean characteristics of the estimation samples, the effect of switching to union recognition is small and statistically non-significant.
29 Other controls have predicted effects. Closure probabilities are lower among larger workplaces; those growing over the period 1989–90; where the workplace faces no other competitors; where the workplace has diversified production; where the workplace is performing well in 1990; and where the workplace uses fixed-term contracts.

Table 2.2: *The effect of union recognition on workplace closure in the private sector*

	M1: union dummy only	*M2: basic controls*	*M3: M2 + product market*	*M4: M3 + workplace performance*	*M5: M2 + employment change, 1989–90*
Union recognition	0.033 (1.08)	0.022 (0.67)	0.032 (0.92)	0.050 (1.20)	0.017 (0.47)
Industry-level union density	–	0.008 (2.46)*	0.007 (2.08)*	0.010 (2.01)*	–0.000 (0.01)
Mean closure rate	0.181	0.181	0.183	0.185	0.181
Sample size	1417	1413	1132	776	1223

Notes: (1) full models are appended in Appendix Table A2; (2) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%.

Union recognition continued to have no effect when accounting for the presence of a closed shop and on-site union representatives.

In the United States, there is evidence that union wage effects increase with the percentage of the workforce organised (Freeman and Medoff, 1982). This might account for Freeman and Kleiner's (1999) finding that the probability of workplace closure rose with union density. However, in our analysis, union strength measures (union density, an on-site worker representative, the closed shop, a formal union agreement restricting management ability to organise non-managerial staff) had no significant effects.[30] These findings are in line with the descriptive analysis.

Since the theory suggests that union activity is more threatening to survival where union wage gains are at the expense of normal profits, we sought to identify workplaces with and without access to excess profits. We used two measures: workplace market share, and the degree of market competition.[31] Closure probabilities did not differ according to workplace market share, or the degree of market competition faced by unionised workplaces.

Union type: Table 2.3 distinguishes between three types of union: those only representing manual workers at the workplace; those representing non-manual workers only; and those with both manual and non-manual members. Model 1, which contains no control variables, reflects the descriptive findings:

30 In line with the descriptive information in Appendix Table A1, the probability of workplace closure did rise significantly where workplace union density was within the range 20–49 per cent, relative to lower union density, but the finding is difficult to interpret.

31 Market share is proxied by the employment share of the workplace within its 4-digit SIC. The market competition variable distinguished workplaces with six or more competitors from those with fewer than six competitors.

Table 2.3: *The effect of union type on workplace closure in the private sector*

	M1: union variable only	*M2: basic controls*	*M3: M2 + product market*	*M4: M3 + workplace performance*	*M5: M2 + employment change, 1989–90*
Manual union	0.133 (2.95)*	0.065 (1.79)	0.061 (1.57)	0.062 (1.36)	0.051 (1.35)
Non-manual union	–0.061 (1.67)	–0.076 (1.88)	–0.090 (2.35)*	–0.094 (2.03)*	–0.083 (2.04)*
Union with manuals and non-manuals	0.024 (0.63)	0.006 (0.15)	0.035 (0.82)	0.093 (1.90)	0.004 (0.09)
Industry-level union density	–	0.009 (2.73)**	0.009 (2.50)*	0.012 (2.41)*	–0.000 (0.01)
Mean closure rate	0.181	0.181	0.183	0.185	0.181
Sample size	1417	1413	1132	776	1223

Notes: (1) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%
(2) the reference for union type is no recognised union.

those with manual unions had a significantly higher closure rate. However, once controls are added in Model 2, the size of the marginal effect is halved, so that the increased probability of closure for a workplace with mean sample characteristics rises by 6.5 per cent if it has a manual workers' union. Although the magnitude of this effect does not differ much in Models 3, 4, and 5, the effect loses statistical significance. By contrast, having a non-manual workers' union *reduces* the probability of closure by between 7 and 9 per cent. This effect is significant at a 95 per cent confidence level in three of the five models.

Of course, these types of union are mutually exclusive categories. However, it is possible for a workplace to have more than one of these types of union. In fact, there are eight possible combinations of union status, including having 'no recognised union'. Replacing the three union dummies with these combinations, we find that for comparable workplaces with the mean characteristics of the estimation sample, having a manual workers' union and no other union increases the probability of closure by 8 per cent compared to having no recognised union at all. However, the effect is only significant at a 90 per cent confidence level. This was the only union arrangement with any significant effect on closure.

These findings are significant for two reasons. Firstly, the effect was not apparent in the 1980s (Machin, 1995: 60–65). Secondly, since our models control for industrial sector and industry-level unionisation, the increased

likelihood of closure in the presence of manual unions cannot be explained purely by industrial decline in traditional, heavily unionised sectors. Nor can it be explained by the high incidence of manual workers within the workplace – a proxy for lower technological advancement – since we control for the percentage of employees who are non-manual workers. Instead, the effect is particular to the incidence of manual unions, as opposed to manual workers *per se* or unions *per se*. An exploration of the differences between workplaces with manual and non-manual unions revealed manual unions were *weaker*. Where they operated, fewer workers were union members, a lower proportion were covered by collective bargaining, and management were less likely to say that their ability to organise staff was constrained by workers. They were also less likely to negotiate as separate groups, perhaps reflecting substitutability among manual workers making unified bargaining more attractive. But whatever the explanation, it seems that the effect can be mitigated by broadening the scope of union membership at the workplace, since the presence of unions representing only non-manual workers, and those representing a broad spectrum of occupations (both manual and non-manual), nullified the effect.

Bargaining arrangements: the number of bargaining units at a workplace did not affect closure rates, confirming the descriptive analysis. Models excluding competition and performance variables indicated no significant effect for joint versus separate bargaining arrangements. However, with the introduction of these variables, including potentially endogenous performance measures, joint bargaining was associated with higher closure rates, as indicated by the descriptive analysis. Evaluated at the mean sample characteristics, joint bargaining increased the probability of closure over the period 1990–98 by 19.3 per cent relative to similar workplaces with no pay bargaining (t=2.32).

Number of recognised unions: multi-unionism may reduce workplace efficiency through demarcation disputes, jurisdictional disputes regarding rights to represent, membership poaching disputes, and 'competitive militancy'. All of these may occur, irrespective of whether the unions bargain jointly (Dobson, 1997). It is also possible that multi-unionism may increase productivity among heterogeneous workers if it is a superior means of diagnosing and articulating workers' grievances (Metcalf, et al, 1993: 9). Modelling closure without controls, the recognition of three or more unions was positively associated with closure. However, this effect was no longer significant on introducing control variables.

Union and non-union voice: in recognition of the changing nature of worker voice in Britain since the mid–1980s, we incorporated measures of union and non-union voice. Union voice either takes the form of a recognised union or the appointment of union representatives to a joint consultative committee. Non-union voice includes non-union appointment to a joint consultative committee; the existence of briefing groups; regular meetings between senior management and the workforce; problem solving groups; or the presence of non-union representatives where there are no union members. Where union and non-union voice are both present, this is often referred to as 'dual channel' voice. Predicted closure probabilities did not differ significantly between workplaces according to the existence or otherwise of union and non-union voice. Thus the 5-percentage point lower closure rate in workplaces with only non-union voice, apparent in the descriptive analysis, proved non-significant when controlling for other factors.

Summary

Whereas manual unions were associated with higher closure probabilities in some models, workplaces with non-manual unions had lower closure probabilities than workplaces without non-manual unions. This is despite the fact that non-manual unions tended to be 'stronger' than manual unions. Where unions represented a broad spectrum of occupations at the workplace, they did not raise the probability of closure. In some models, single-table bargaining was associated with higher closure rates than other bargaining arrangements, whereas multi-unionism was not. These effects are not easily comprehensible within the theoretical framework set out earlier. But, in general, worker voice had little effect on workplace closure in the private sector as a whole, a finding consistent with Machin's (1995) analysis for the 1980s.

Higher industry-level unionisation did affect workplace closure probabilities, a finding consistent with the observation that unions are more heavily concentrated in declining industries. Although our models also contain industry indicators, we have no information on other industry-level indicators that are also liable to affect closure and which may not be related to unions, such as technological innovation. We should therefore be cautious in interpreting the effect of industry-level unionisation as a union effect.

2.5 Analyses of workplace closure in private manufacturing and private services

There are four reasons why separate analyses of closure in private manufacturing and services are merited. Firstly, the closure rate was much higher over the period in manufacturing than in services (25 per cent against 15 per

cent), a finding that partly accounts for the shift towards private services in the British economy during the 1990s.[32] Separate analyses of closure in the two broad sectors may shed light on why this was so. Secondly, there are theoretical grounds for believing that closure processes differ across manufacturing and services. According to dynamic theories of firm entry and growth, firms enter an industry endowed with an underlying ability to produce output in the industry. If firms enter with an underlying high value for this parameter, they have high costs and low profits (Jovanovic, 1982). Although firms can invest to improve their competitiveness (Ericson and Pakes, 1995), higher start-up costs in manufacturing relative to services increase the potential for miscalculating their underlying competitiveness, raising closure probabilities.[33] Thirdly, the nature of worker voice differed across the two sectors: in private services non-union and direct voice was more common, while union voice was more common in manufacturing. Higher unionisation in the manufacturing sector implies a reduced threat of unionisation to workplace survival in that sector.[34] This is because in a sector with high bargaining coverage, there will be fewer non-union produced goods to compete with the more costly union goods (Curme and MacPherson, 1991).[35] Alternatively, non-union employers in highly unionised sectors may choose to match wages paid by unionised employers to keep unions out, thus reducing the union wage premium in those sectors (Podgursky, 1986). Fourthly, despite these differences in closure rates and the likely determinants of closure across the two sectors, this analysis has never been conducted for Britain.

In the remainder of this section, we present results from multivariate analyses of closure for private manufacturing, followed by private services. The modelling technique is the same as that used above. The independent variables entering the models are identical to those used earlier. The manufacturing and service sector models only differ with respect to the industry dummies they contain.

32 The primary reason was the higher incidence of private service workplaces among new entrants during the 1990s (Millward et al, 2000: 18–23).

33 This theory also predicts that manufacturers will require a longer period to reach their steady-state size, and may be more prone to substantial growth adjustments. Consistent with this is our finding that shrinkage rates were higher among manufacturers (16 per cent against 12 per cent).

34 In our sample, 44 per cent of private sector manufacturing workplaces had recognised unions in 1990, compared to 36 per cent of workplaces in private sector services.

35 Although competition from abroad may increase sources of non-union output.

Table 2.4: *The effect of union recognition on workplace closure in private manufacturing*

	M1: union dummy only	*M2: basic controls*	*M3: M2 + product market*	*M4: M3 + workplace performance*	*M5: M2 + employment change, 1989–90*
Union recognition	0.053 (0.92)	0.144 (2.11)*	0.126 (1.79)	0.093 (1.19)	0.145 (2.08)*
Industry-level union density	–	–0.008 (1.45)	–0.007 (1.33)	–0.016 (2.59)*	–0.007 (1.13)
Mean closure rate	0.243	0.243	0.243	0.240	0.244
Sample size	626	626	536	381	569

Notes: (1) Full models are appended in Appendix Table A4; (2) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%

Workplace closure in private manufacturing

Union recognition: once again, we begin by focusing on union recognition as an indicator of worker voice. Descriptive analyses reveal that closure rates were 5 percentage points higher among unionised manufacturing workplaces than they were among non-union manufacturing workplaces (Appendix Table A3). If we turn to the models presented in Appendix Table A4, this difference is not statistically significant in the absence of control variables (Model 1). However, once basic controls are added, the effect of unionisation is significant. Among 'like' workplaces with the mean characteristics for the estimation sample, union recognition increased the likelihood of closure over the period by 14.4 per cent (Table 2.4, and Appendix Table A4, Model 2). The size of the effect drops a little with the introduction of controls for the product market and labour deployment, but remains significant (albeit at a 90 per cent confidence level). The effect is also robust to the inclusion of employment change between 1989 and 1990. The effect becomes statistically insignificant with the introduction of workplace performance controls. Although financial performance is significant, and may be capturing some of the effect of unionisation, further checks revealed that it was the drop in the sample size associated with the introduction of these extra controls that eliminated the union effect.

Closure rates did not rise with the strength of unions. Although high market share and operating in less competitive markets (those with fewer than six competitors) reduced the probability of closure for non-unionised workplaces, these made no difference to the likelihood of closure among unionised manufacturing workplaces.

Table 2.5: *The effect of union type on workplace closure in private manufacturing*

	M1: union variable only	*M2: basic controls*	*M3: M2 + product market*	*M4: M3 + workplace performance*	*M5: M2 + employment change, 1989–90*
Manual union	0.104	0.191	0.185	0.121	0.187
	(1.59)	(2.72)**	(2.65)**	(1.69)	(2.62)**
Non–manual union	–0.135	–0.141	–0.161	–0.167	–0.137
	(2.16)*	(2.61)**	(2.95)**	(2.70)**	(2.44)*
Union with manuals and non–manuals	–0.030 (0.51)	–0.023 (0.36)	–0.034 (0.54)	0.117 (1.54)	–0.031(0.47)
Industry–level union density	–	–0.008 (1.48)	–0.008 (1.45)	–0.015 (2.43)*	–0.008 (1.20)
Mean closure rate	0.243	0.243	0.243	0.240	0.244
Sample size	626	626	536	381	569

Notes: (1) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%; (2) reference category for union variable is no recognised union.

Union type: the probability of manufacturing workplaces closing rose in the presence of unions representing manual workers only in the workplace, and fell in the presence of unions representing only non-manual workers. The effects are more pronounced than they were for the whole private sector. Among 'like' workplaces with mean characteristics for the estimation sample, depending on the model specification, closure probabilities rose by between 12 and 19 per cent in the presence of a manual union, and fell by between 13 and 17 per cent in the presence of non-manual unions (Table 2.5).

We also analysed the combined effects of having more than one of these types of union. We find that for comparable workplaces with the mean characteristics of the estimation sample, having a manual workers' union and no other union increases the probability of closure by 27 per cent compared to having no recognised union at all. Having a non-manual workers' union and no other union reduced the probability of workplace closure by 19 per cent compared to having no recognised union at all.[36] All other combinations of unions had no significant effect on closure. So it is clear that in private manufacturing, although the average effect of union recognition is to increase the likelihood of closure, different types of union can both increase and reduce the chances of closure.

36 These marginal effects are derived from a model containing the base controls (Model 2) and the eight-category union combination variable. The effects are nearly identical with Model 3 controls which incorporate market characteristics (+26 per cent and –18 per cent respectively).

Table 2.6: *The effect of bargaining over employment on workplace closure in private manufacturing*

	M1: union variable only	*M2: basic controls*	*M3: M2 + product market*	*M4: M3 + workplace performance*	*M5: M2 + employment change, 1989–90*
No negotiation on employment	0.082 (1.16)	0.189 (2.38)*	0.169 (2.08)*	0.097 (1.07)	0.188 (2.31)*
Negotiate staffing levels	0.052 (0.55)	0.134 (1.21)	0.110 (0.90)	0.224 (1.71)	0.132 (1.11)
Negotiate recruitment	0.048 (0.29)	0.068 (0.37)	0.044 (0.27)	–0.060 (0.37)	0.071 (0.40)
Negotiate both	–0.016 (0.19)	0.075 (0.77)	0.062 (0.61)	0.097 (0.85)	0.089 (0.85)
Industry-level union density	–	–0.008 (1.49)	–0.007 (1.34)	–0.018 (2.91)**	–0.007 (1.23)
Mean closure rate	0.243	0.243	0.243	0.240	0.244
Sample size	626	626	536	381	569

Notes: (1) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%; (2) Reference category for negotiation is no union recognition

Bargaining arrangements: closure probabilities in private manufacturing varied with bargaining arrangements. Descriptive data presented in Appendix Table A3, column two, suggest closures were most likely where unions bargained with their employer as a single bargaining unit. This is born out by the modelling. *Ceteris paribus*, evaluated at the mean sample characteristics, having a single negotiating unit raised the probability of closure over the period 1990–98 by 19 per cent relative to workplaces with no pay bargaining.[37] Further analysis revealed that this was a single-union bargaining effect, rather than the result of joint negotiation among multiple unions.[38] The closure probability of private manufacturing workplaces with multiple unions was not significantly different from the closure probability of non-unionised workplaces, whether they negotiated jointly or separately.

So, bargaining arrangements are important in understanding closure in private manufacturing in the 1990s. But so too was the scope of bargaining. The union effect on closures in manufacturing was confined to instances in which unions had no role in negotiating staffing levels or recruitment (Table 2.6). Where unions negotiated over wages but not employment, the chance of

37 This effect is derived from the model with basic controls (Model 2) and is significant at a 5 per cent confidence level. With Model 3, the effect is 16.7 per cent.

38 Single-union workplaces made up 81 per cent of private manufacturers with a single bargaining unit.

closure was 17–19 per cent higher than a 'like' workplace sharing the mean characteristics of the estimation sample but with no recognised unions.

Where unions negotiated over staffing levels, recruitment, or both, manufacturing workplace closure probabilities were not significantly different from those of non-unionised manufacturers. This finding is consistent with the hypothesis that unions moderate their wage claims where their role in bargaining over staffing and recruitment makes them more sensitive to the employment consequences of those claims.

Number of recognised unions: we have already noted the increased likelihood of workplace closure in private manufacturing associated with single-unionism, and the non-significance of bargaining arrangements where multiple unions operate. This is confirmed when we replace the bargaining arrangement variable with a variable identifying the number of recognised unions at the workplace. Where there was a single recognised union, the chances of closure were significantly higher than for comparable non-union workplaces. But where there were two or more unions the likelihood of closure was no different.[39] It is difficult to account for this single-union effect, but single-unionism is not a proxy for union strength. In fact, the reverse is the case. Single-union workplaces had weaker unions than multiple-union workplaces: they had lower union membership, fewer employees covered by collective bargaining, and the union was less likely to have a representative on- or off-site. Together with results on the effects of different types of union, this result suggests that it is unions representing a narrow range of occupations that increase the chances of workplace closure in manufacturing, possibly by pursuing sectional interests to the detriment of the workplace as a whole.

Union and non-union voice: there is a further qualification to the association between workplace closure in the private manufacturing sector and unionisation. Union voice, whether in isolation, or in combination with non-union voice, did not significantly increase the likelihood of closure relative to manufacturers with no worker voice (Table 2.7). However, 'dual channel' arrangements did raise the probability of closure relative to non-union voice only. This is a significant finding, nevertheless, since nearly four-fifths of unionised workplaces had 'dual channel' voice by 1998 (Bryson, 2000).

It is not obvious why dual channel voice is most strongly associated with an increased likelihood of closure. There may be some incompatibility

39 In Model 2, compared to having no recognised unions, the marginal effect associated with single-unionism is 19 per cent (t=2.34) and 18 per cent (t=2.18) in Model 3. Among workplaces with two or more recognised unions the corresponding effects were 0.08 (t=0.94) and 0.06 (t=0.70).

Table 2.7: *The effect of union and non-union voice on workplace closure in private manufacturing*

	M1: union variable only	*M2: basic controls*	*M3: M2 + product market*	*M4: M3 + workplace performance*	*M5: M2 + employment change, 1989–90*
Union voice only	0.600 (0.68)	0.140 (1.47)	0.122 (1.26)	0.227 (1.95)	0.116 (1.18)
Dual channel	0.179 (2.49)*	0.282 (3.16)**	0.253 (2.74)**	0.117(1.33)	0.283 (3.08)**
No voice	0.165 (1.65)	0.171 (1.72)	0.117 (1.20)	–0.006 (0.04)	0.139 (1.37)
Industry union density	–	–0.008 (1.56)	–0.007 (1.38)	–0.017 (2.80)**	–0.006 (1.14)
Mean closure rate	0.243	0.243	0.243	0.240	0.244
Sample size	623	623	534	379	566

Notes: (1) the reference category is non-union voice only; (2) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%; (3) Non-union voice includes appointments to a JCC, other than through the union; briefing groups; regular meetings between the workforce and senior management; problem solving groups; the presence of non-union representatives where there are no union members; (4) reference category for union voice is non-union voice only.

between these two types of voice regime, although research on the impact of voice on employee perceptions of management points in the other direction (Bryson, 2000). This might occur, for instance, if unions were antagonistic to non-union voice and operated differently in its presence – for example, by diverting their energies to undermining it, rather than focusing attention on the needs of its members and the workplace. Alternatively, the presence of two voice channels may be cumbersome, leading to lower efficiency, increasing the rate of closure.

The association between non-union voice only and lower workplace closure may partly account for the increased incidence of this type of workplace arrangement by 1998, though the main reason for its increased incidence is its adoption by new workplaces (Millward et al, 2000: 121–6). The models confirm the descriptive findings that manufacturers with non-union voice only were less likely to close than those with 'dual channel' voice, and those with no worker voice at all, although this second finding is only on the margins of statistical significance in one of our models with controls. Among comparable workplaces with the mean characteristics of the estimation sample, a switch from 'dual channel' to non-union voice would reduce the likelihood of closure by between 18 and 28 per cent, depending on the model specification.[40]

40 The non-significance of the effect in Model 4 is accounted for by the reduction in the sample size, rather than the introduction of the workplace performance measures.

Workplace closure in private services

The descriptive analysis in Appendix Table A3 suggests that whereas worker voice played an important part in explaining workplace closure in private manufacturing, this was not the case in the private service sector. Closure rates did not vary very much across the range of voice indicators, although they were higher in the presence of three or more recognised unions, and a little higher where the union represented only manual workers. Closure rates also varied with bargaining arrangements, with joint bargaining associated with significantly higher closure rates than separate bargaining and single-union bargaining.

None of these differences remained significant when controlling for other factors.[41] One reason for this is the lower incidence of unionisation in the private service sector. Thus, for instance, only 5 per cent of private service workplaces had three or more unions (compared to 10 per cent of manufacturing workplaces), and only 1 per cent had joint negotiations (compared to 5 per cent in manufacturing). Consequently, it is difficult to estimate precisely the impact of these practices on closure in the private service sector.[42] The technical difficulty in deriving precise estimates is also exacerbated by the relatively low incidence of workplace closure in private services mentioned at the beginning of this section. Nevertheless, the explanatory power of the private service sector models is actually greater than that for private manufacturing.

However, this is by no means the whole story. As Appendix Table A6 shows, over one-third of private service sector workplaces had recognised unions, seven in ten had some form of non-union voice, and direct worker voice was present in two-thirds of cases. Why was it that voice effects on closure were largely absent in private services? Since the theory referred to above implies that workplace unionisation in a lowly-unionised environment might damage competitiveness more than being unionised in a highly-unionised environment, one might have expected unionised service sector workplaces to face higher chances of closure. One possibility is that workers are less able to push up wages in the service sector. Although our data indicate that unions in the service sector appeared to have bargaining power equivalent to that in the manufacturing sector,[43] there is some evidence to support

41 Appendix Table A6 presents models estimating the effect of union recognition on closure in private services to illustrate effects in the sector. These models are comparable to those for private manufacturing presented in Appendix Table A5. The models confirm our expectation that determinants of closure differ markedly across the sectors.

42 With few observations, estimates are subject to large standard errors so that even large coefficients do not reach statistical significance.

43 Where unions were recognised, mean workplace union density was almost identical across the two sectors (64 per cent in manufacturing and 63 per cent in services). Bargaining coverage was actually higher in unionised private sector workplaces (75 per cent against 69 per cent). This suggests that where they did exist, service sector unions had a similar potential to influence bargaining outcomes.

this contention from Hildreth (1999). Using individual-level data, he finds that during the first half of the 1990s, the union wage premium declined in the private service sector, but 'was maintained and may even have increased' (p29) in the production sector. If there is a larger wage differential in manufacturing arising from unionisation, this could explain the greater impact of unions on closure in manufacturing relative to services.

An alternative hypothesis is that private service sector workplaces are only unionised where employers can afford unionisation, that is, where they can command high rents. There is little support for this possibility, since the incidence of union recognition did not vary significantly with workplace market share.

One union-related effect is worthy of comment. Workplace closure probabilities rose where service sector workplaces commanded a low market share (whereas market share was not a significant factor in private manufacturing). Where workplaces with low market share recognised unions, their probability of closure was between 11 and 17 per cent higher than the closure probability for workplaces with the mean characteristics of the estimation sample that recognised unions but had a high market share (Table 2.8). This finding suggests that where excess profits are available, service sector employers can 'afford' unions without increasing the chances of workplace closure. Where the workplace is in a weaker market position, there is an increased likelihood that unions will threaten service sector workplace survival. However, as Table 2.8 also shows, workplace closure probabilities increased with low market share, irrespective of the presence of unions.[44]

Summary

On average, union recognition increased the probability of closure for manufacturing workplaces. However, the actual impact of unionisation depends on the nature of union representation. While the decision as to whether or not to recognise a union is important in determining the workplace's future, the precise nature of arrangements for engaging with unions is equally important. Management may be able to negate any union effects through the adoption of particular bargaining procedures. Two findings are of particular note. Firstly, manufacturers may benefit from the efforts of unions representing non-manual workers. Secondly, where unions negotiated with management over staffing levels or recruitment, the chances of closure were no different from those of non-unionised manufacturers. This

44 Also note that high industry-level union density is associated with increased probabilities of workplace closure in the private service sector, whereas it was not significant in private manufacturing. It is not obvious why this should be so.

Table 2.8: *The effect of union recognition in low and high market share private service sector workplaces*

	M1: union variable only	*M2: basic controls*	*M3: M2 + product market*	*M4: M3 + workplace performance*	*M5: M2 + employment change, 1989–90*
No union, low share	–0.012 (0.23)	0.108 (2.12)*	0.110 (1.74)	0.035 (0.46)	0.141 (258)**
No union, high share	–0.031 (0.48)	0.048 (0.65)	0.172 (1.60)	0.105 (0.89)	0.089 (1.00)
Union, low share	–0.002 (0.03)	0.112 (1.95)	0.173 (2.18)*	0.153 (1.80)	0.153 (2.18)*
Industry union density	–	0.004 (2.28)*	0.006 (2.70)**	0.003 (0.97)	.005 (2.61)**
Mean closure rate	0.152	0.152	0.153	0.158	0.148
Sample size	791	787	568	379	619

Notes: (1) the reference category is union recognition with high market share; (2) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%; (3) Models exclude log employment size in 1990 since the market share variable uses this information to proxy market share as employment share in the relevant 4-digit SIC. High market share is market share above –2.53 the log of employment share.

may be because unions moderate their wage claims where their role in bargaining over employment makes them more sensitive to the employment consequences of those claims.

Worker voice had no effect on workplace closure in private services.

2.6 Analyses of workplace closure in the public sector

At 7 per cent, the incidence of workplace closure during the 1990s was much lower in the public than the private sector. The nature of workplace closure is also qualitatively different in the public sector. Compared with the private sector, where the closure of a workplace indicates economic failure, sometimes of a whole enterprise, workplace closure in the public sector is a rather different phenomenon. Virtually all public sector workplaces (and all of those in our sample) belong to larger organisations, so that workplace closure is likely to be part of a larger picture of change within that organisation, rather than a winding-up of its affairs. Workplace closure in the public sector is more likely to involve a change of location or a transfer of business, rather than a discontinuation of the provision of services.

Furthermore, although the public sector was much more heavily unionised than the private sector throughout the 1990s, negotiations about

pay and employment conditions were conducted against a backdrop of spending limits and reviews, rather than what the market would bear. Consequently, theories regarding the impact of unions on economic viability that inform our understanding of workplace closure in the private sector have little relevance for the public sector.[45]

Nevertheless, an analysis of workplace closure in the public sector is appropriate for three reasons. Firstly, we are aware of no other studies which have tackled the issue before. Secondly, since our primary concern is the effect of worker voice on workplace closure, it would be odd to ignore the half (49 per cent) of all unionised workplaces that were in the public sector in 1990. Thirdly, worker voice is likely to have some effect on the operation of public sector workplaces because it is so pervasive. Whereas one-fifth of private sector workplaces had no worker voice, worker voice was present in every public sector workplace (Appendix Table A6). The nature of that voice also differed in the public sector. Dual channel voice was much more prevalent, and unionism was qualitatively different in the public sector. Public sector unionism was characterised by multi-unionism, separate bargaining arrangements, a high incidence of on-site union representation, high union density, and high collective bargaining coverage. These features of public sector unionism might lead one to suspect that at the beginning of the 1990s, public sector unionism was stronger than private sector unionism. However, this changed in the course of the 1990s, when public sector unionism declined in strength at a greater rate than private sector unionism (Millward et al, 2000: 180–3).

This analysis of workplace closure in the public sector is necessarily exploratory, since there is no clear theory to guide us. This can make it difficult to interpret results. However, as noted in Section 2.1, voice may have both positive and negative effects on employee performance, motivation and commitment, as well as organisational performance. These voice effects are just as pertinent in the public sector as they are in the private sector.

The modelling technique is identical to that described for the private sector analysis in the previous section. We present 'best fitting' models for the public sector, with five different specifications, described in Table 2.9. These are not directly comparable with the private sector models because different factors emerged as significant determinants of closure in the private sector.

Although the coefficient was positive throughout, union recognition was not significantly associated with workplace closure in the public sector.

45 Despite trends towards market-testing, contracting-out and public–private partnerships, it remains the case that public sector workplaces do not face the rigours of the marketplace in the way that private sector workplaces do. Many public-sector owned workplaces do not charge customers for their goods or services or, if they do, they often hold a monopoly position.

Table 2.9: *Model specifications for public sector closure analysis*

Model	*Controls used*
Model 1	No controls
Model 2	Industry-level union density; log employment size in 1990; % non-manual employees; region; six industry dummies
Model 3	As Model 2 plus age of workplace
Model 4	As Model 3 plus % female employees; % part-time workers
Model 5	As Model 4 plus if employment fell by at least 5% between 1989 and 1990

However, relative to single unionism, having three or more recognised unions increased the likelihood of closure, confirming descriptive analyses in Appendix Table A7. Without controls, the likelihood of closure among 'like' public sector workplaces with mean characteristics for the sample rose by 6 per cent if they had three or more recognised unions, compared to those with none or one recognised union. Once basic controls were introduced, the difference between no union and three or more unions became statistically insignificant. However, relative to non-unionism, single unionism was associated with a reduced closure probability of 2 per cent. This was also the only effect to emerge when we estimated the effect of alternative bargaining arrangements on closure. The type of worker covered by the union also mattered. In contrast to findings for the private sector (Table 2.3), unions representing non-manual workers only were associated with higher closure probabilities. Evaluated at the sample mean, the marginal increase in closure probabilities for a workplace with a non-manual union rose by between 1 and 2 per cent, depending on the model specification.[46] Once workforce composition controls were added, both non-manual *and* manual unions were found to increase the probability of closure by around 1 per cent for workplaces with mean characteristics.[47]

Descriptive analyses show that closure rates were particularly high in the public sector where management faced a strong worker voice, in the form of a closed shop, or worker behaviour constraining management's ability to organise staff (Appendix Table A7).[48] Formal agreements limiting manage-

46 The effect is significant at a 99 per cent confidence level.

47 The emergence of this negative effect of manual unions, which was also apparent when employment change in 1989–90 was introduced, was due to the addition of the new controls, not to the reduction in sample size which their introduction entailed.

48 The closed shop and worker limitation differences are statistically significant at a 99 per cent confidence level, whereas the formal agreement difference is significant at a 95 per cent confidence level.

Table 2.9: *The effect of worker limitations on workplace closure in the public sector*

	M1: limit dummy only	*M2: basic controls*	*M3: M2 + workplace age*	*M4: M3 + % female and % part-time*	*M5: M4 + employment change, 1989–90*
Worker limitations	0.074 (2.10)*	0.036 (2.54)*	0.027 (2.16)*	0.011 (1.81)	0.008 (1.35)
Mean closure rate	0.07	0.07	0.07	0.06	0.07
Sample size	614	614	600	494	407

Notes: (1) t-statistics for significance of marginal effects in parentheses. * = sig at 5%, ** = sig at 1%; (2) Full models are appended in Appendix Table A8; (3) Industry union density omitted from summary table because always non-significant.

ment ability to organise staff were also associated with higher closure rates. Although the closed shop effect was not significant when controlling for other factors, worker limitations on management's ability to organise work increased the chances of closure by between 1 and 3 per cent for workplaces with mean characteristics for the sample (Table 2.9).[49] These limitations – which include actions by union members, union representatives, non-union workers, and formal agreements between management and unions – might increase the chances of closure where management view a particular workforce as troublesome. Alternatively, managers facing potential closure may have been more sensitive to the opposition of workers at the time of interview, in which case the perception of worker limitations merely reflects the ongoing closure process. This might explain why the effect loses its significance once we account for declining employment in the year prior to interview (Model 5 in Table 2.9).

Non-union voice had no significant effect on public sector workplace closure, either in isolation or in combination with union voice.

49 Full models are appended in Appendix Table A9. Note that these models confirm that determinants of closure differ markedly across the public and private sectors. For instance, closure is associated with young workplaces in the public sector, whereas age is not significant in the private sector; closure probabilities are higher in the public sector where there is a higher percentage of female workers, and where there are fewer part-timers. Both factors are not significant in the private sector. Equally, some effects are similar, notably the lower probability of closure with size of workplace and employment growth in the preceding period.

Summary

On average, unionised public sector workplaces were no more likely to close than their non-unionised counterparts. Perhaps this is not surprising, since unionisation was pervasive in the public sector (88 per cent of public sector workplaces recognised unions in 1990). Nevertheless, worker voice did affect closure probabilities. Closure was more likely in the presence of non-manual unions and, in some models, with the presence of manual unions. Closure probabilities were also greater where unions were strong enough to limit management's ability to organise staff. It appears that public sector closures in the 1990s were more likely to occur in workplaces with three or more recognised unions.

Although these effects were statistically significant, they were small relative to the worker voice effects recorded in the private sector. This might be due to the smaller probability of workplace closure in the public sector.

2.7 Summary of findings on workplace closure

Broadly speaking, workplace closures during the period 1990 to 1998 were little affected by whether workplaces had union representation in 1990. In the private sector, workplace performance, market conditions, workforce composition and structural features of the workplace, such as size and ownership, were far more important. However, the impact of unions was clearly discernible in private sector manufacturing. Closure in this sector was more likely where there had been unions representing a section of the workforce, such as only manual workers, and where unions were excluded from negotiating with management about employment matters such as recruitment and staffing levels. Where representation and negotiating arrangements were comprehensive, the potential negative effects of unions were absent.

3 WORKPLACE EMPLOYMENT GROWTH

In this section, we turn to the analysis of employment growth over the period 1990–98. Although, in theory – as we show in Section 3.1 – employee voice may have both negative and positive effects on employment growth, a range of studies have identified a negative effect of unions on employment growth. Indeed, there has been a surprising degree of agreement about the magnitude of the effect across countries and across time, using different methodologies to analyse workplace-level data. For Britain, Blanchflower et al (1991) found that, *ceteris paribus*, employment in the typical union workplace grew at around three percentage points more slowly than in a typical non-union

workplace in the early 1980s.[50,51] They also report a 2.5 per cent per annum reduction for the period 1976–80 using WIRS80 (1991: 827, footnote 13).[52] Booth and McCulloch (1999) obtain very similar results for the late 1980s with WIRS90, although they confine their analyses to private sector workplaces. Long (1993), using private sector workplace-level data for Canada over the period 1980 to 1985, shows that union firms grew 4 per cent more slowly than non-union firms in both the manufacturing and non-manufacturing sectors. Using a panel of Californian manufacturing plants, Leonard (1992) finds average annual growth rates are 4 percentage points lower in union than non-union plants over the period 1974–1980. Wooden and Hawke (2000), using panel data for the private sector in Australia, found a negative union effect on employment of 2.5 per cent per annum for the period 1989–95.

Our analysis lends further weight to this body of evidence showing that, despite a decline in union strength during the 1990s, unions reduced employment growth by 3–4 per cent per annum in the private sector between 1990 and 1998. However, our analysis breaks new ground in three ways discussed in a little more detail later:

- Unlike previous analyses for Britain, we use workplace-level panel data.
- As with our workplace closure analyses, we present analyses for the private and public sectors separately, as well as for private manufacturing and private services.
- Previous analyses have confined their exploration of worker voice effects to union recognition, union density, and the existence of closed shops. We use other dimensions of unionism, such as bargaining structures and the number of recognised unions, plus measures of non-union voice.

50 The authors readily admit that, although they prefer to interpret their analysis of employment levels with lagged dependent variables as an employment growth equation, their results may also be interpreted as an autoregressive function of the level of employment.

51 These findings were disputed by Machin and Wadhwani (1991), who argued that any negative impact of unions on employment was confined to workplaces which introduced organisational change over the period 1980–84. Blanchflower et al responded to the criticism in an appendix to their paper, showing that if one used union density as the union measure, negative employment effects were apparent, irrespective of the presence of organisational change. However, the differences in opinion are due to Blanchflower et al's treatment of union density as exogenous, whereas Machin and Wadhwani treat it as endogenous and use an instrumental variables approach to allow for possible endogeneity bias. In any event, it seems likely that organisational change captures part of the transmission mechanism by which unionism can lead to employment decline – we test for this later in this section.

52 However, using firm-level panel data, Machin and Wadhwani (1991: 851) find employment grew more quickly (2.2 per cent per annum) in unionised firms during 1977–78, but grew more slowly in unionised firms during 1979–84 (1.8 per cent per annum). The authors conclude that 'there is no systematic link between unions and employment growth'.

3.1 Theory relating to employee influence over employment growth

There are at least three reasons for supposing that employment growth will be slower in union workplaces than non-union workplaces. Firstly, it is argued that by withholding labour supplies to raise wages, employees are more costly for union firms than for non-union firms. Consequently, union employers will tend to substitute capital for labour to a greater extent than will non-union firms, thus depressing employment growth.[53]

Secondly, unions may impose costs on downward workforce adjustment (through job security provisions and severance packages) which would make union firms more reluctant than non-union firms to expand their labour forces. The union wage effect may also discourage hiring by making new recruits more costly for union than non-union firms. This effect is also predicted by insider–outsider theory (Lindbeck and Snower, 1986, 1987) which maintains that employers, keen to avoid the costs of labour turnover, are prepared to offer experienced incumbent employees ('insiders') a wage premium above the market rate at which 'outsiders' offer themselves. This premium is offered to induce employees to remain at the workplace. However, by making a workplace more attractive to work in, insider (or union) bargaining power, may also lengthen average job tenure, in which case the overall effect on employment levels is ambiguous (since recruitment rates *and* turnover rates may be lower).[54]

Thirdly, it is argued that unions may adversely affect sales growth, thus inhibiting employment growth. This may occur where unions lower the incentive to invest in new capital since unions expropriate a portion of the rents arising from investment, thus lowering the returns to investment relative to non-union firms (Hirsch, 1992). Even if the will to invest is there, lower profitability in union firms will mean that there is less internally-generated capital available for reinvestment than in non-union firms.[55] Lower profitability in union firms also reduces the scope for price cutting in an effort to maintain sales (Voos and Mishel, 1986). Unions may also affect sales growth where unionised workplaces are viewed as unreliable suppliers, either because of work stoppages or the imposition of restrictive work rules and practices (Machin and Wadhwani, 1991).

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53 Long (1993), reviewing the literature, suggests that, although there is evidence of a strong relationship between the size of the union wage effect and employment growth, 'there is no conclusive evidence that this pattern reflects a capital substitution effect' (p 692).
55 A number of studies have identified union effects in reducing voluntary quits (for example, Fernie and Metcalf, 1995; Bryson and McKay, 1997) and dismissal rates (Cully et al, 1999: 128).
56 Empirical studies for the United States (Hirsch, 1990, 1992) and Britain (Denny and Nickell, 1991) suggest that unionised firms do make lower investments in capital than non-union firms. This implies that lower employment growth through capital substitution is unlikely to explain union effects on employment.

There are arguments to the contrary, indicating that the presence of unions may have no effects or even positive effects on the rate of employment growth. The first is that, although unions can raise wages, they can also raise productivity. They may do so directly by striking productivity-enhancing deals with employers. Indirect effects may also arise through the 'voice' effects discussed earlier (Freeman and Medoff, 1984) or their ability to improve skill levels by raising recruitment standards and encouraging employer-funded or industry-based training. Consequently, unit labour costs may be no higher, or even lower, in the presence of unions.

Secondly, it is usually assumed that unions and employers bargain over wages, whereas employers set employment unilaterally, conditional on the wage. This is known as the 'right to manage' model. In Britain, wages are set at discrete intervals whereas employment is adjusted continuously. Thus, whenever employment is changed, this change generally takes place in the context of a predetermined wage. This is consistent with the right to manage model, and so it has been treated as a 'stylised fact' in the British case (Nickell and Wadhwani, 1991; Machin, Manning and Meghir, 1991).[56] Fortunately, our data allow us to observe directly whether unions bargain over employment as well as wages. As Table 3.1 shows, they do so in around half of all cases, according to the reports of workplace managers.

This is important because, at least in theory, if unions and employers bargain simultaneously over wages and employment rather than over wages alone, the outcome is a wage–employment package conditional on their relative bargaining power (Leontief, 1946; McDonald and Solow, 1981). In these circumstances, employment outcomes will be ambiguous. This is because, where unions are absent, or the 'right to manage' scenario obtains, employers are likely to set employment with a predetermined wage. As such, they will choose an employment level which is profit maximising for a given wage (that is, employment will lie along the labour demand curve). However, where wages and employment are jointly determined, an efficient settlement may entail an employment level that is not 'on' the labour demand curve. How far it diverges from the demand curve depends, in part, on the weight unions place on employment.[57]

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56 Machin, Manning and Meghir (1991) construct a dynamic 'right to manage' model based on the insight that bargaining over wages occurs repeatedly, and that current employment decisions will affect future outcomes of wage negotiation. In the absence of unions, employers face costs adjusting employment and do so to maximise profits subject to a given time-path for wage adjustment. However, where unions bargain over wages, and wages are likely to be affected by past employment, the wage is endogenous with respect to employment growth. In other words, wages at t_1 are not independent of employment change over period $t_1 - t_2$.

57 There is some evidence that unions in the United States place relatively low weight on employment compared to wages (MaCurdy and Pencavel, 1986; Wessels, 1991), but we are aware of no such evidence for Britain.

Table 3.1: *Percentage of unionised workplaces where unions negotiated over employment in 1990*

	Private sector manufacturing	*Private sector services*	*Public sector*	*All*
No employment negotiations	60	64	28	45
Negotiate staffing levels	13	16	20	18
Negotiate recruitment	4	1	2	2
Negotiate staffing levels and recruitment	23	19	50	35
Weighted N	185	347	515	1049
Unweighted N	445	368	577	1392

Note: managers were asked whether negotiations took place with the largest bargaining group for manual workers and the largest bargaining group for non-manual workers. This does not mean to say that unions were successful in influencing outcomes. We combine the data for manuals and non-manuals in our measure to give us a workplace measure, so that where we identify negotiations over employment, this may relate to manual workers, non-manual workers or both.

Thirdly, as noted in Section 2.1, unions may operate in non-competitive product or labour markets, in which case employers can respond to their wage demands without necessarily affecting employment.

The literature indicates that employment growth is very heterogeneous, even within narrowly defined industrial sectors. Blanchflower and Burgess (1996) argue that 'it is unlikely that idiosyncratic plant-level wage changes can account for much of these large changes' across workplaces (p 18). They suggest that employment growth is better understood as the labour market consequence of product market competition, including product and process innovation, product life cycles, and firm entry and exit, all of which 'will influence the evolution of the firm's demand and output and hence employment'. Of course, employee voice has a role to play in this broader theoretical framework as well, since the cost of labour (and therefore firm entry rates), available skills, and management's ability to introduce innovative production processes are all subject to worker influence.

3.2 The data

The chosen data for our employment change analysis are the 1990–98 WIRS Panel. The survey traced a 63 per cent stratified random sample of the workplaces that responded to the WIRS90 survey. They were re-interviewed at the same time as the 1998 cross-section survey. The panel survey collected detailed information about 846 surviving workplaces employing at least 25 employees, including the size of their workforce in 1998.[58] Using information

58 Eighty-two per cent of eligible cases responded. For further information on the 1990–98 WIRS Panel see Millward et al, 2000: 248–55.

from these 846 establishments, we are able to examine which features and circumstances of the workplace in 1990 are statistically associated with a net change in the numbers employed over the following eight-year period.

The 1990–98 panel survey followed previous panel surveys that were either largely experimental, as in the case of the 1980–84 panel, or restricted to workplaces in industry and commerce, as in 1984–90. As well as being larger, the 1990–98 panel survey differed from its predecessors in using a specially designed interview schedule. Panel surveys conducted at earlier points in the series had simply used the questionnaire being employed in the main cross-section survey at the time. Consequently, our data set is unencumbered by the needs of a cross-sectional survey, and is therefore more suited to tracking change at the level of the workplace during the period.

The use of these data marks an important advance in the analysis of employment change in Britain. While panel analyses have been used in the United States (Leonard, 1992) and Australia (Wooden and Hawke, 2000), the employment change literature for Britain is largely confined to analyses of cross-sectional data, with change measures relying on retrospective data.[59] This presents three problems avoided with panel data. First, explanatory variables are collected at the end of the period in question, making it very difficult to make causal inferences. Secondly, recall data are subject to recall error.[60] Thirdly, as Fernie and Metcalf note in relation to their analyses for the period 1984–1990 (1995: 404):

> there is an inherent upward bias in the employment figures because workplaces that went out of business between 1984 and 1990 obviously cannot appear in the sample in 1990.

This is a particularly serious problem when independent variables of interest may influence workplace closure as well as employment growth. As Blanchflower et al (1991: 820–821) readily admit with regard to their use of the 1984 WIRS:

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59 Blanchflower and Burgess (1996, footnote 3) tried to use the WIRS 1984–90 panel data but were insufficiently confident of their ability to identify true panel cases. In a largely methodological paper, Machin, Manning and Meghir (1991) use firm-level panel data from the Datastream databank of companies quoted on the UK Stock Exchange for the period 1977–86. Machin and Wadhwani (1991) devote one page of their article to an analysis of firm-level panel data from the Datastream databank.

60 We use some recall data to measure workplace performance over the period 1989–1990. This includes a measure of employment growth over the period 1989–90. We also experimented with a banded employment levels variable for 1987 that was taken from the Census of Employment and used to stratify the sample. Using this administrative information to compute employment change between 1987 and 1990 produced results consistent with those generated with the continuous 1989–90 measure.

> The results in this paper should be seen strictly as an analysis of employment movements inside continuing establishments. It is a potentially serious weakness of our analysis that we are unable to model the selection issue.

We are able to overcome this problem by modelling the probability that workplaces sampled in 1990 survived to 1998. Through sample selection modelling discussed in Section 3.6 we are able to adjust our estimates of employment change in our 1990–98 panel of continuing workplaces to account for survival probabilities. By doing this, we are able to show the impact of particular workplace characteristics on employment change for all workplaces in our original 1990 sample, irrespective of their situation in 1998, and not just those that continued to operate with 25 or more employees.

The dependent variable

Our dependent variable is the annual rate of employment change over the 7.5 year period spanning the two survey interviews in 1990 and 1998.[61] This is obtained by dividing the 1998 employment level by the 1990 level, taking the 7.5th root, and subtracting 1 from the figure. This can be written as:

$$\sqrt[7.5]{\frac{E_{98}}{E_{90}}} - 1 \times 100$$

Some analysts have recently followed Davis and Haltiwanger (1992) in using an employment growth measure based on the change in employment as a percentage of the average of employment in two periods – in our case, 1990 and 1998. This is written as:

$$\frac{(E_{98} - E_{90})}{(E_{98} - E_{90})/2} \times 100$$

However, although this measure is superior to the conventional growth measure (change in employment as a percentage of employment in the first period) in that it is more normally distributed (Davis and Haltiwanger, 1992; Wooden and Hawke, 2000), it does not give an accurate per annum rate of growth. Our measure, on the other hand, accounts for the compound effect of taking an average annual growth rate from a 7.5 year period, and is also approximately normally distributed (Table 3.2).

Between 1990 and 1998, one-fifth (18 per cent) of private sector workplaces closed down, while around one in seven (15 per cent) survived to

61 The 7.5 year period is the median difference in the two survey interview dates.

Table 3.2: *Employment growth measures – descriptive statistics for the whole sample*

	$\frac{(E_{98}-E_{90})}{E_{98}} \times 100$	$\frac{(E_{98}-E_{90})}{(E_{98}-E_{90})/2} \times 100$	$\sqrt[7.5]{\frac{E_{98}}{E_{90}}} - 1 \times 100$
Mean	33.6	4.4	1.0
Median	3.3	3.3	0.4
Skewness (s.e.)	13.8 (0.08)	0.52 (0.08)	2.6 (0.08)
Kurtosis (s.e.)	211.4 (0.17)	2.3 (0.17)	17.7 (0.17)
Minimum	–97	–188	–37
Maximum	4028	191	64

employ between 1 and 24 employees in 1998. The remaining two-thirds continued to operate with 25 or more employees. Using our preferred measure, employment in this last category of private sector workplaces – those having at least 25 employees in both 1990 and 1998 – grew at a very modest rate of one third of one per cent per annum, on average (Table 3.3). It is perhaps surprising to note that those in manufacturing grew at a slightly faster rate than those engaged in service activities: 0.46 per cent per annum, compared with 0.3 per cent. The well-documented decline in manufacturing employment occurred because the number of new entrants to the sector was smaller and less numerous than those leaving it through closure. The number of manufacturing jobs lost through closures was almost treble that created by new manufacturing workplaces over the 1990s. In contrast, in the services sector, roughly two-thirds more jobs were created through start-ups than were lost through closures.[62]

3.3 Descriptive analyses of employment growth in the private sector, 1990–98[63]

This section presents descriptive information on employment growth rates in private sector workplaces surviving the period 1990–98 with at least 25 employees. Appendix Table A9 shows the correlation between mean growth rates and their 1990 characteristics grouped as follows:

- Measures of employee voice;
- Workplace characteristics;
- Workforce characteristics;

62 These figures are based on the author's own calculations using WIRS90 and WERS98 data for workplaces with 25 or more employees.

63 All analyses are weighted to account for the probability of sample selection.

Table 3.3: *Change in workplace employment per annum, by sector, 1990–98*

Change in workplace employment (% per annum)	*All workplaces*	*All private sector*	*Private manufacturing*	*Private services*	*Public sector*
Mean	1.00	0.34	0.46	0.30	1.48
Median	0.44	0.00	0.48	–0.24	0.85

Source: WIRS 90 and WERS 98; workplaces with 25 or more employees

- Nature of product market; and
- Workplace performance.[64]

Below we comment on some important findings using terms already familiar from our discussion of workplace closure.

Measures of voice

The descriptive analysis indicates that employment change in the private sector varied markedly with worker voice, with union voice generally associated with lower growth.

Union and non-union voice: employment fell in the presence of union voice, with the fall most rapid where union and non-union voice were present together (–1.84 per cent per annum). Where non-union voice was present without union voice, employment grew. Although this might indicate positive economic benefits deriving from non-union voice, employment grew most rapidly where there was no worker voice present.

Representative and direct voice: the association between employment decline and representative worker voice extended to non-union representative voice in the form of joint consultative committees. It was non-union *direct* voice (briefing groups, regular workforce meetings and problem-solving groups) that underlay the less adverse non-union voice effect. Where direct and representative voice existed in combination, employment fell a little over the period.

Union presence: employment fell by 1.75 per cent per annum among workplaces with recognised unions, whereas employment grew by 1.44 per

64 Appendix Table A10 and our discussion is not exhaustive: it does not include our 11-category region variable, local unemployment and vacancy rates, or disaggregated standard industrial classifications, all of which have been used in the modelling and are discussed in the section presenting multivariate results.

cent per annum among non-unionised workplaces. This effect was more pronounced in the presence of a closed shop, on-site union representation, higher union density and higher collective bargaining coverage, and where management were constrained by workers in their ability to organise work. This suggests a union effect stemming from union bargaining power and organisational strength.[65] A closer look at union density and bargaining coverage shows that the links were not linear. Substantial negative employment growth is only apparent where union density exceeds 50 per cent, and the effect tails off with 100 per cent membership, suggesting a qualitatively different employer–union relationship where all workers are members. Where bargaining coverage was between 1 and 19 per cent of the workforce, growth rates were no different from zero coverage. Above this threshold, workplaces with higher coverage had experienced employment decline, but the effect was not linear.

Because we have a dedicated panel survey in 1998 which tracks workplace change in the period 1990–98, *inter alia*, we can observe changes in union status. Although the number of workplaces involved is small, private sector workplaces derecognising their union(s) between 1990 and 1998 had a small positive annual growth rate, in contrast to the negative growth rate experienced by other workplaces with union recognition in 1990. Conversely, the small number newly recognising unions had smaller positive growth rates than workplaces which remained non-unionised throughout.[66]

The *type* of union was associated with differing employment growth rates. Workplaces recognising unions representing only non-manual workers experienced declining employment at a rate of 3.08 per cent per annum, compared with rates of –1.95 per cent where they recognised unions containing manual and non-manual workers, and –1.27 per cent where they recognised unions representing manual workers only. Employment declined most rapidly where the only unions present represented only non-manual workers: in these workplaces, employment fell by 4.26 per cent per annum.

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65 Of course, even though our measures date from the start of the employment change period we are analysing, one could argue that workers might respond to job insecurity through increased (or decreased) unionisation, whereupon measures such as union density and on-site representation are endogenous. This would be the case if employment decline in the period just prior to 1990 resulted in workers responding by setting up a union, joining the union, or appointing an on-site representative. To check this, we looked at the association between union measures in 1990 and employment change over the period 1989–90. With the exception of union density above 89 per cent, none of the union measures was associated with employment decline in that period.

66 The unweighted number of private sector workplaces derecognising unions over the period was 36, while the unweighted number which began recognising unions was 16.

There was little difference in employment growth rates among private sector workplaces located in low and high union density industries.

Bargaining arrangements: the rate at which employment fell increased with the number of unions recognised for pay bargaining, and with the number of bargaining units management negotiated with. If fragmented bargaining was strengthening the hand of complementary workers, one would have expected single-table bargaining to moderate the multi-union effect, but it did not. On the contrary, employment fell more quickly in multi-union workplaces with joint bargaining than it did where unions negotiated separately.

Following on from our comments in Section 3.1, it does indeed appear to be the case that union effects differ where they bargain over employment levels as well as wages. The rate of employment decline is arrested somewhat where unions negotiate over staffing levels, or staffing levels and recruitment.

Workplace characteristics

Our descriptive analysis confirms the common finding in the literature that employment growth rates are lower in larger workplaces and firms (Caves, 1998; Blanchflower, Millward and Oswald, 1991; Wooden and Hawke, 2000; Leonard, 1992; Long, 1993). Since unionisation rates are higher in larger workplaces, it is important to control for this effect in our multivariate analyses.

The association between larger workplaces and lower growth is sometimes viewed as evidence of the autoregressive nature of employment change, with a tendency for reversion to the mean. In fact, in line with previous analyses of WIRS (Blanchflower and Burgess, 1996) and some American analyses (Davis and Haltiwanger, 1992), our data are better characterised by persistence than mean reversion. Workplaces growing over the period 1987–90 continued to grow in the period 1990–98, while those shrinking in the first period did so in the second. This supports Blanchflower and Burgess' (1996:10) contention that 'establishments will typically continue to grow or decline rather than fluctuate around a particular employment level'.

Firm-level data suggest firms grow quickly early in their lives, with growth rates then declining with age (Caves, 1998; Troske, 1996). Since our workplaces were in existence for at least three years before the first interview in 1990, the growth rates we observe do not include the initial growth spurt that many will have experienced. Nevertheless, there is some evidence of a faster growth in the 1990s among workplaces aged under five years at the time of the first survey in 1990.

Following Blanchflower and Burgess (1996), we account for the possibility that workplaces belonging to larger organisations may experience greater

job turnover than single independent workplaces as the firm reallocates a given set of jobs between its establishments. The net effect of this in the 1990s appears to be a slightly lower rate of employment growth among branches of larger organisations than that experienced by single independent workplaces, but a much higher rate of growth in employment at head offices.

Two measures of performance-related pay, profit sharing and share ownership schemes are included in our analyses because previous analyses of WIRS suggest these forms of contingent pay affect employment change (Fernie and Metcalf, 1995). These schemes may improve workplace performance through enhanced incentives (Weitzman and Kruse, 1990), thereby facilitating employment growth. Weitzman also points out that if contingent pay schemes permit downward wage adjustment, when the firm faces difficult periods it can avoid lay-offs, thus maintaining employment levels. In fact, these schemes appear to have had little effect on employment change in Britain in the 1990s.

Workforce characteristics

Although the use of short-term or fixed-term contracts can assist workplaces to adjust to economic downturn without cutting the number of permanent staff, users of such contracts had lower employment growth than those who relied on permanent contracts. It could be that users of flexible labour prefer to handle expansion as well as contraction through changes in the number of non-permanent posts. Employment growth rates were higher among workplaces employing mainly non-manual workers, mainly full-time workers, and a mix of male and female staff.

Nature of the product market

Workplaces with a diversified range of products or services had higher employment growth rates. This supports the notion that those with diversified output can cope better in a trade cycle downturn if they can switch away from less profitable products.[67] Those with a larger geographical market to operate in also seem to fare better in employment terms than those whose fortunes are tied to a specific locality. Although workplaces dominating their market may have larger rents available to employ more staff, growth rates were lowest where the workplace was a monopolist. This is consistent with the standard theory of the firm, where profit-maximising monopolists restrict output (and employment) below the levels that would obtain in a competitive market.

67 Blanchflower, Millward and Oswald (1991) find evidence to support this contention in their analysis of employment growth in the early 1980s.

Workplace performance

Although workplaces which were doing particularly badly in 1990 – those operating 'much below capacity' and those with financial performance 'a lot below' similar workplaces in the same industry – experienced employment decline over the 1990s, those doing particularly well did not experience strong employment growth.

3.4 Multivariate analyses of employment growth in the private sector, 1990–98[68]

Our descriptive findings are intriguing since they uncover a union effect which was largely absent from our analyses of workplace closure. Whereas unions, and worker voice in general, had little effect on workplace closure in the private sector as a whole, union voice – and, in particular, unions with substantial bargaining power – was associated with lower employment growth among continuing workplaces. These findings are consistent with the notion that unions will raise wages at the expense of potential new workers, but not to the point where the firm is sufficiently unprofitable to go out of business. However, since worker voice and other workplace characteristics are associated with employment growth rates, it is necessary to control for these other factors to establish whether there are independent voice effects.

Our employment growth variable is continuous, running from –37.21 to +64.22 per cent per annum in our whole sample, and from –31.92 to +51.73 in the private sector. To estimate influences on this variable we estimate a set of linear regression models that account for sample design in the way described in Section 2.4. The coefficients for independent variables can be interpreted directly as the marginal effects, that is, the per annum percentage change in employment growth associated with that variable.[69] Negative signs represent an annual decline in employment, whereas positive signs indicate positive growth.

In Section 3.6 we also present models that adjust for sample survival using a two-stage Heckman selection procedure. We discuss this procedure in that section.

Table 3.4 shows the basic model specifications for our analysis of private sector employment growth, to which we add our voice measures. All variables

68 Once again, all analyses are weighted to account for the probability of sample selection.
69 Of course, these annual percentage changes are the average changes over the 7.5 year period. In reality, firm-level data suggest firms grow quickly early in their lives, with growth rates then declining with age (Caves, 1998; Troske, 1996). Since our workplaces were in existence for at least three years prior to the first interview in 1990, the growth rates we observe do not include the initial growth spurt that many will have experienced.

Table 3.4: *Basic model specifications for private sector employment growth analysis*

Model	*Controls used*
Model 1	No controls
Model 2	Employment size in 1990; employment change, 1989–90; % non-manual employees; whether workplace is single independent workplace or belongs to larger organisation; whether non-executive share ownership scheme; whether profit-related pay; region; travel-to-work unemployment rate; travel-to-work vacancy rate; two-digit Standard Industrial Classification (1980)

are as measured in 1990, with the exception of employment change over 1989–90. We have commented on the rationale for the inclusion of most of these variables in the preceding section. We use industry dummies to account for the fact that unions are most heavily represented in declining industries where employment may be declining for exogenous technical reasons, rather than through the presence of unions. Some have justified the use of region dummies to account for higher rates of unionisation in areas of low income which may, in itself, act as a constraint on jobs growth (Blanchflower, Millward and Oswald, 1991). We also incorporate local labour market conditions, which may capture constraints on growth associated with local labour demand.

The equation can be written as follows:

$$G_{i9098} = X'_{i90}\beta + G_{i8990} + U_{90} + V_{90} + \varepsilon,$$

where G_{i9098} denotes employment growth per annum at workplace i in the period 1990–98. X'_{i90} is a vector of observable attributes affecting employment adjustment at the workplace, measured in 1990 (including some performance measures covering the period 1989–90) with β a vector of coefficients to be estimated. G_{i8990} is a lagged dependent variable for employment growth over the period 1989–90. U_{90} and V_{90} are measures of unemployment and vacancy rates for the travel-to-work area in which the workplace is located, measured in 1990. Finally, ε is the error term.

As noted in our closure analyses, these models are predictive in the sense that they use information collected in 1990 to predict workplace employment growth subsequently. It is therefore reasonable to make causal inferences about the variance in growth rates using these 1990 predictors. However, we also report results from some models incorporating change variables for the period 1990–98. Since we do not know the sequence of events linking changes in independent variables to changes in employment, it is unwise to make

causal inferences using these models. Instead, they may be thought of as 'descriptive' in the sense that they seek to 'unpack' processes accompanying employment change.

Results

Union recognition: we begin our statistical investigation of worker voice effects on employment growth with five models testing the effect of union recognition in 1990 on employment growth during 1990–98. The full models are presented in Appendix Table A10. The first model containing the union recognition dummy without controls shows union recognition was associated with a 3.2 per cent per annum reduction in employment growth over the period, as indicated in our descriptive analysis. This becomes 4.0 per cent when industry and regional dummies are added in the second model. The figure falls marginally to 3.9 per cent when local labour market controls are added in Model 3, and remains at this level when further workplace-level controls are added. The fifth model incorporates workplace age and employment change over the period 1989–90. Missing information on these variables brings the sample size down from 558 to 482. In this fully specified model, the presence of recognised unions depressed the employment growth rate by 4.2 per cent per annum.[70]

We tested the sensitivity of these results to whether the effect of union recognition differed with:

- other features of workplace unionism;
- industry;
- workplace age;
- capital investment and organisational change;
- product market circumstances;
- workplace performance; and
- changes in recognition status.

70 Another way of establishing the effect of union recognition on employment growth is to split the sample into workplaces with recognised unions and those without, then generate predicted mean employment growth rates for each subsample using their respective models. We find that the estimated mean employment growth rate among unionised workplaces is –1.61 per cent per annum, compared with +1.49 per cent among non-unionised workplaces. These rates are very similar to the raw rates presented in the descriptive analyses (Appendix Table A10). An advantage of this approach is that it allows the coefficients on independent variables to vary across the two types of workplace. As Appendix Table A12 shows, determinants of employment change differ markedly across the two sectors, resulting in greater explanatory power for the two models than for the whole private sector model. In particular, regional and industry effects are very different; and the vacancy rate and share ownership schemes are both positive and significant in the non-union sector only.

The union recognition effect was not significantly affected by the incorporation of other worker voice related measures such as the existence of a closed shop or on-site union representation.[71] It is also possible that unions engaging in restrictive working practices might help to maintain artificially high employment levels. A negative union effect might therefore represent the outcome of removing such restrictions as unions became weaker in the 1990s. If this were the case, one would expect the effect to be confined to workplaces in which unions were limiting management's ability to organise work in 1990. But, in practice, the negative union effect on employment growth over the 1990s was also apparent in workplaces where recognised unions were not limiting work organisation at the start of the period.[72]

Workplace unionisation is correlated with industry-level unionisation, which may have an independent effect on employment growth in a sector. When added to the fully specified model (Model 5 in Appendix Table A10), industry-level union density was negative and significant, but the workplace-level union recognition effect remained unchanged.[73,74]

Highly unionised sectors may be subject to employment decline for exogenous technological reasons since unionisation is more prevalent in traditional, declining industries. To see where these union effects were most in evidence, we analysed employment growth in unionised and non-unionised workplaces separately (Appendix Table A11). We found big differences in growth rates

71 In each case, these other variables were negative but non-significant.

72 In WIRS90, managers were asked: 'What limits the way management can organise the work here?' Respondents chose from a card of options. Worker limitations related to opposition from groups of ordinary union members, workers who were not union members, shop stewards or representatives, and formal agreements with unions. If managers reported limitations associated with one or more of these responses, we said worker limitations on the organisation of work were present. In the fully specified model, an interaction between union recognition and worker limitations was positive but not significant (2.16, t=1.05); the worker limitation main effect was negative and significant (–3.18, t=1.97); and the union recognition main effect was negative and significant (–3.98, t=3.34).

73 Employment growth fell by 0.7 per cent per annum with a 10 per cent increase in industry-level union density (t=2.27).

74 We might expect the union recognition effect to be more pronounced in lowly unionised industries if a wage premium paid in unionised workplaces made them particularly uncompetitive where most competitors did not face unions. Therefore, we interacted union recognition and a dummy identifying workplaces located in industries with high union density (above 29 per cent). To our surprise, we found the workplace union recognition effect was most pronounced in workplaces in high density industries. We investigated industry-level union density effects further by adding the variable to our separate models for unionised and non-unionised workplaces. Among workplaces with union recognition, high industry-level union density was associated with lower employment growth whereas, among non-unionised workplaces, higher industry-level unionisation was associated with positive employment growth. This last finding indicates that non-unionised workplaces benefited from the high unionisation of their competitors.

between unionised and non-unionised workplaces *within* industries. Compared with similar workplaces in retail distribution, employment growth was significantly slower in food, drink and tobacco; textiles; leather, footwear and clothing; timber, furniture, paper and printing, and transport, *but only among unionised workplaces*. In all but textiles, the corresponding effect among non-unionised workplaces was positive, but not statistically significant. Employment growth was significantly higher in three manufacturing sectors (chemicals and manufactured fibres; metal goods; and mechanical engineering) compared to retail distribution, but only where the workplace was non-unionised. There were also four sectors (banking, finance and insurance; business services; wholesale distribution; and energy and water) where employment growth was significantly faster than in retail distribution among non-unionised workplaces, but significantly slower among unionised workplaces. This is very strong evidence that the effect of unions is not simply an industry effect, such as a decline in employment associated with traditional, heavily unionised industries.

Older workplaces are more likely to be unionised, with some suggesting that the 'golden age' for union recognition was the 1940s and 1950s (Millward et al, 2000). This raises the possibility that the union effect on employment growth is really an age effect arising from capital depreciation. Categorising younger workplaces as those in existence for 20 years or less in 1990, and older workplaces as those in existence for 21 years or more, there were no significant differences in the union effect across the two age-groups. Union recognition lowered employment growth in older and younger workplaces by around 3 per cent per annum.

Regardless of workplace age, unionised workplaces may be subject to lower employment growth through a loss of competitiveness associated with capital depreciation if, as discussed in Section 2.1, unions inhibit the reinvestment of capital. But this did not explain the negative association between union recognition and employment growth. The negative union effect was present in workplaces that had introduced new plant, machinery and equipment over the period 1987–90, as well as in those that had not.[75]

75 In WIRS90, managers were asked: 'During the last three years have there been here any of the following types of change directly affecting the jobs or working practices of any section or sections of the workforce…the introduction of new plant, machinery or equipment (excluding routine replacement)?' We distinguished between workplaces with and without capital reinvestment using this measure. An interaction between union recognition and capital reinvestment was negative but not statistically significant, and the union recognition main effect was a 3–4 per cent per annum reduction in employment growth depending on the model specification. Furthermore, the union effect did not differ significantly across workplaces with and without capital reinvestment when we ran split models for the two groups. Very similar results were obtained using a definition of capital reinvestment based solely on investment in microelectronic technology.

Employment change may also come through organisational changes not associated with capital reinvestment, such as the removal of restrictive working practices discussed above. Earlier research indicated that lower employment growth in unionised workplaces in the first half of the 1980s was confined to workplaces that underwent organisational change (Machin and Wadhwani, 1991). However, the union effect in the 1990s is independent of organisational change.[76]

Where employers operate in less competitive markets, they can command excess profits, in which case unions' rent-seeking behaviour may be accommodated without it being detrimental to employment growth. In fact, the number of competitors in the market had no significant effect on employment growth, and interactions between unionisation and the number of competitors were also non-significant. Product diversification was significant: where workplaces produced a single product or service, or relied on a single product or service for at least 25 per cent of their sales, employment growth per annum was lower than in workplaces with diversified output, by 2.7 per cent and 3.4 per cent respectively. This confirms that workplaces capable of switching production towards more profitable lines during downturns in demand are better able to maintain employment levels. However, interactions between product diversification and unionisation were not significant.

We used two measures of workplace performance to test whether union effects differed across high-performing and low-performing workplaces. Both capacity utilisation and financial performance in 1990 had no significant effect on subsequent employment growth, and interactions with unionisation were not significant. This finding is at odds with WIRS analyses for the period 1980–90.[77] It is possible that workplaces that were performing well in the

76 In WIRS90, managers were asked: 'During the last three years have there been here any of the following types of change directly affecting the jobs or working practices of any section or sections of the workforce…substantial changes in work organisation or working practices not involving new plant, machinery or equipment?' We distinguished between workplaces with and without organisational change using this measure. In the fully specified model, an interaction between union recognition and organisational change was negative but not statistically significant (–1.12, t=0.60); the organisational change main effect was positive but not significant (1.20, t=0.83); and the union recognition main effect was negative and significant (–4.16, t=2.79). Running separate models on workplaces with and without organisational change, we find strong negative union effects on employment growth for both groups. Among workplaces which had experienced organisational change, the union recognition effect was –5.3 (t=3.1), and among those without organisational change it was –3.5 (t=2.6).

77 Running analyses for the whole economy, Blanchflower, Millward and Oswald (1991) found strong positive associations between employment growth in the early 1980s and good performance, as measured by operating at full capacity, higher product demand, and above average financial performance. Estimating employment change in the private sector over the period 1987–1990 using WIRS90, Booth and McCulloch (1999) found a positive association between employment growth and an increase in the value of sales, and a positive association between employment growth and operating at full capacity. However, these analyses were unweighted.

late 1980s chose to expand their employment, whereas those performing well in the 1990s were doing so through profit-maximising methods which did not entail employment expansion. For example, they may have preferred to squeeze labour costs still further and invest surplus in capital, or return it to shareholders.[78] Whatever the reason, although workplace performance affects workplaces' subsequent fortunes, it does so through the process of workplace closure, rather than employment growth.

Finally, we explored the effects of derecognition and new recognition. We found that the growth rates of workplaces derecognising their union(s) were not significantly different from the growth rates of those that remained non-union throughout. Both had significantly higher growth rates than those remaining unionised.[79]

In the remainder of this section, we turn to other measures of worker voice and comment on their effects using the same control variables as those used for the union recognition Model 5 in Appendix Table A10. The commentary is confined to those worker voice measures with significant effects.[80]

Union type: compared to similar private sector workplaces without recognised unions, those with recognised unions all experienced slower employment growth, whatever combination of manual and non-manual unions they had, though some effects were only on the margins of statistical significance (Model 1, Appendix Table A12). However, the model confirms the descriptive findings in showing that unions representing only non-manual workers had the greatest impact. The annual rate of employment growth was 10.8 per cent lower among workplaces only recognising unions representing non-manual workers, relative to non-unionised workplaces, *ceteris paribus*. It seems that although workplaces recognising non-manual unions had lower closure rates than other unionised workplaces, they also had lower growth rates.

78 There has been some debate about non-expansionary economic growth, that is, economic growth which does not entail employment growth. This may be associated with more widespread demands from shareholders for quick and profitable returns on investments (Burchell et al, 1999: 5–9).

79 Under the model, the predicted growth rate for workplaces that had derecognised was 0.58 per cent per annum. This compares to 1.60 per cent among workplaces that had been non-union since 1990, 0.66 per cent among those newly recognising unions, and –4.73 per cent among those unionised in both 1990 and 1998.

80 Multi-unionism and bargaining arrangements appeared to be significantly associated with employment growth in our descriptive analyses, but this was not the case once other factors were controlled for.

Collective bargaining coverage: if union recognition has a general, negative effect on employment, one might also expect the magnitude of the effect to be conditional upon the strength of the union at the workplace. A commonly used measure of strength is the proportion of employees at the workplace whose pay is set through collective bargaining. The multivariate analysis confirms the descriptive findings: where bargaining coverage was between 1 and 19 per cent of the workforce, growth rates were no different from workplaces in which no workers were covered (Model 2, Appendix Table A12). Above this threshold, workplaces with higher coverage experienced lower employment growth, but the effect did not increase significantly with higher coverage above the 20 per cent threshold. It would seem that provided a substantial proportion of workers have their pay set through pay bargaining, unionisation can bring about lower employment growth. The union penalty does not rise with the proportion of workers covered once this threshold is exceeded.

Workplace-level negotiations over employment: union effects on employment differed according to whether unions were involved in negotiating over employment as well as wages. *Ceteris paribus*, where unions negotiated wages but not employment, employment declined by 5.0 per cent per annum relative to non-unionised workplaces (Model 3, Appendix Table A12). This is consistent with the hypothesis that managers, faced with setting employment with a predetermined wage, set lower employment levels than would otherwise be the case, due to the union wage premium. However, where unions negotiated over staffing levels, growth rates were not significantly different from those experienced in non-unionised workplaces.[81] This finding is consistent with the notion that unions curb their wage demands when able to exercise some control over the level of employment at the workplace. However, where unions negotiated over recruitment, employment fell by 3.85 per cent per annum relative to growth among non-unionised workplaces. This finding is more consistent with unions using their 'insider' power to restrict the supply of labour to maintain current members' terms and conditions at the expense of potential workers. Where increased job tenure arising from worker satisfaction with conditions does not offset this behaviour it will result in declining employment over the longer term. Where unions negotiated both staffing levels *and* recruitment, workplace employment declined by 3.51 per cent per annum relative to non-unionised workplaces with similar characteristics. This

81 Employment rises by 1.85 per cent per annum where unions negotiate staffing levels, relative to employment change in similar non-unionised workplaces. However, the difference is not statistically significant.

might be because the recruitment effect dominates the staffing levels effect. Alternatively, negotiation over both recruitment and staffing levels may signify union bargaining strength. If, as other research suggests, unions attach less weight to employment than wages, this strength would translate into a higher wage premium at the expense of employment growth.[82]

Workplace-level union density: if the negative effect of unions on employment growth is due to their ability to push up wages at the expense of employment, one might anticipate the effect to increase with union bargaining power. Other research has identified such a relationship using union density as a proxy for bargaining power.[83] However, we find the relationship between union density and employment growth is u-shaped: the negative effect of union density on employment growth rises until density reaches 89 per cent, whereupon it declines again (Model 4, Appendix Table A12). At very low (1–24 per cent) and very high (100 per cent) density levels, employment growth does not differ from workplaces in which there are no union members. The union effect is strongest in workplaces with between 75 and 89 per cent of their workforce in union membership: employment growth was 5.5 per cent per annum lower among this group of workplaces, relative to employment growth in workplaces with no union members. As in the case of low bargaining coverage, where there is low union density, unions may have little leverage over employers (and employees), whereupon they have little influence over employment-related matters. The fact that unions also have no negative effect on employment where all workers are unionised cannot be explained by the absence of bargaining power. There are two possible explanations. It may signal a qualitatively different relationship between union and employer, one in which the union is actively supported by the employer, with both sides working in concert, balancing the needs of labour with the needs of capital. Alternatively, unions may only achieve full member-

82 We use data on whether unions negotiated over employment in 1990 and 1998 to identify workplaces where unions began negotiation over employment, and those where they ceased negotiation over employment. Employment growth rose when unions ceased negotiation over employment levels. This might arise if the cessation of negotiation over employment arose from a decline in union bargaining power, leading to increased managerial freedom to deploy labour as deemed appropriate. Alternatively, unions may only seek to negotiate over employment in bad times, that is, when employment is declining. Switches in negotiating status with regard to recruitment were not significantly associated with employment growth.

83 Using a continuous measure, Blanchflower, Millward and Oswald (1991) found employment fell with higher union density and, when incorporated alongside the union recognition dummy, the density variable dominated. Studies for other countries also find a negative effect of workplace-level union density on employment growth (see, for example, Wooden and Hawke, 2000).

ship where employers can afford to concede it, namely in organisations with the market power to deliver better wages for workers without affecting normal profits.

Union and non-union voice: union voice was associated with lower employment growth. In contrast to our descriptive findings, the effect was greatest where union voice was present in isolation (Model 5, Appendix Table A12). In contrast, there was no difference in the rate of employment growth between workplaces without worker voice and those with non-union voice only. This is clear evidence that the negative effects of worker voice on employment growth are specific to *union* voice. This is consistent with the possibility that the union effect comes through collective bargaining, although other research has also indicated that union voice may be less effective as *voice*, that is, as an effective means of communication between workers and employers (Bryson, 2000).

Summary

On average, workplace union recognition reduced annual employment growth in the private sector by 3–4 per cent in the 1990s, *ceteris paribus*. The employment effect is still apparent once we account for workplace organisational and technical change, the concentration of unions in declining industries, and the age of unionised workplaces. Non-union worker voice had no significant effect, suggesting that the union effect arose through wage bargaining, or because union voice is less effective than non-union voice in communicating with management.

The union effect was only apparent where they had a substantial presence at the workplace, as signalled by bargaining coverage or union density. Below certain thresholds, there was no union effect. This suggests unions required a certain degree of bargaining strength to affect employment growth. However, the effect did not rise with union strength above these coverage and density thresholds. Indeed, where there was full union membership, union effects were absent, perhaps pointing to a qualitatively different relationship with employers. Union effects on growth also varied according to the nature of workers covered by the union and whether the union negotiated over employment issues. Doubt is cast over the theory that union wage effects are less likely to inhibit growth where market conditions are propitious, by the finding that union effects did not differ significantly according to the competitive environment or workplace performance.

3.5 Analyses of employment growth in private manufacturing and private services

We are only aware of one study that analyses employment growth separately for private manufacturing and private services. In this study for Canada, Long (1993) found unions had a similar negative effect on employment across the two sectors. This surprised him since he anticipated higher unionisation in the manufacturing sector would limit the damage to competitiveness wrought by a union wage premium, for reasons similar to those outlined with respect to workplace closure in Section 2.5. A cursory glance at the descriptive information in Appendix Table A9 suggests that in our sample, union effects on employment growth were apparent in manufacturing and services, but they appear more pronounced in the service sector, a finding that conforms to the theory. However, as Appendix Table A9 illustrates, since other workplace characteristics are also associated with employment growth, we use multivariate techniques to establish whether there are any independent voice effects in either of the sectors. The manufacturing and service sector models only differ with respect to the industry dummies they contain.

Employment growth in private manufacturing

Union recognition: the average employment growth rate in manufacturing over the period 1990–98 was 0.5 per cent per annum. However, non-unionised manufacturers grew by an average of 1.4 per cent per annum between 1990 and 1998, whereas unionised workplaces shrank by 0.7 per cent per annum. This is reflected in our model without controls (Model 1 in Appendix Table A13) where unionisation depressed employment growth by 2.3 per cent per annum. With the introduction of controls, the negative effect of unionisation rises to –3.4 per cent per annum, and is more precisely specified.[84]

Switches in the union status of manufacturing workplaces did not alter the impact of union status at the start of the period. Workplaces derecognising their union(s) since 1990 experienced an annual decline in employment of 4.1 per cent relative to workplaces that remained non-unionised throughout. Although those who started recognising unions over the period experienced an employment decline of 1.93 per cent per annum relative to workplaces remaining non-unionised throughout, this was not a statistically significant difference.

The union recognition effect in Model 2 of Appendix Table A13 was not affected by the addition of a closed shop dummy or worker limitations on management's ability to organise work for non-managerial staff (both of

84 The effect is significant at a 95 per cent confidence level, compared with the 90 per cent confidence level for the model without controls.

which had negative but non-significant effects on employment growth).[85] Although the union effect was much more pronounced where there was no on-site representation, only 6 per cent of unionised private manufacturing workplaces had no on-site representative in 1990.[86] This finding is consistent with the hypothesis that, where on-site representatives are present, the more positive effects of worker voice stressed by Freeman and Medoff (1984) come to the fore, although they do not offset the negative effects of unions associated with their rent-seeking behaviour.

Earlier studies for Canada and the United States have found that the negative effect of unionisation on employment growth in manufacturing is confined to larger workplaces and firms, although there is no obvious explanation for this finding (Long, 1993; Leonard, 1992). We split our private manufacturing sample according to whether or not the workplace had at least 410 workers, the median number of workers in our private manufacturing sample. We found no evidence of a differential union effect across small and large manufacturing workplaces.[87]

Union recognition effects remained negative and significant in the presence of product market and workplace performance variables.[88] Consistent with the notion that the rent-seeking behaviour of unions need not affect employment growth where the employer has access to excess profits, there was a

85 When added to the fully specified model (Model 2 in Appendix Table A14), industry-level union density was significantly associated with positive employment growth, but the workplace-level union recognition effect remained unchanged.

86 The effect of union recognition without on-site representation was to reduce employment growth by 9.5 per cent per annum relative to similar workplaces without union recognition. Where the union had an on-site representative, the effect was smaller, though still large at 3.2 per cent per annum. The first effect was significant at a 99 per cent confidence level, and the second was significant at a 5 per cent confidence level. Put another way, annual employment growth rates in manufacturing were 6.4 per cent higher in unionised workplaces with on-site representation than they were among unionised workplaces without on-site representation.

87 In fact, workplaces below median size had a negative but non-significant union coefficient, whereas those above median size had a positive non-significant coefficient.

88 Manufacturing workplaces with a monopoly position in their market place had lower rates of employment growth than those competing with six or more competitors (–3.31 per cent per annum, t=2.11). This is consistent with the standard theory of the firm, whereby profit-maximising monopolists restrict output and employment below levels that would be seen in a competitive market. Having financial performance above average for the industry was associated with lower growth rates than average performance (–3.68 per annum, t=3.30). It may be that there is no simple relationship between having a good market position, or performing well, and using that position to expand employment. Output may grow without employment through capital investment, of course, or else workplaces may choose to return surplus to shareholders. Alternatively, our subjective measures of market position and workplace performance may have limitations.

positive significant interaction between union recognition and the workplace having above average financial performance for the industry.[89]

In the remainder of this section we turn to other measures of worker voice and comment on their effects using the same control variables as those used for the union recognition Model 2 in Appendix Table A13. The commentary is confined to those worker voice measures with significant effects.[90]

Collective bargaining coverage: the lower growth rate associated with unionisation is confined to manufacturing workplaces with at least 80 per cent of their workers covered by collective bargaining (Model 3, Appendix Table A13). Below this threshold, although having some workers whose pay was set by collective bargaining lowered growth rates, the effects were not statistically significant relative to workplaces with no collective bargaining coverage.

Workplace-level negotiations over employment: the pattern of union effects on employment differed according to whether unions negotiated over employment. *Ceteris paribus*, where unions negotiated over wages but not employment in 1990, employment declined by 3.8 per cent per annum relative to 'like' workplaces without unions (model 4, Appendix Table A13). Where they negotiated over staffing levels or recruitment, growth rates were not significantly different from those in non-unionised workplaces. However, negotiation over staffing levels *and* recruitment resulted in an employment decline of 4.8 per cent per annum.

Workplace-level union density: in contrast to the whole private sector model (Model 4, Appendix Table A12), there is evidence that employment growth declined most rapidly with low and high union density (Model 5, Appendix Table A13). However, the results are not as precisely determined as they are for the private sector as a whole.

Number of recognised unions: there was a big employment penalty attached to having three or more unions: employment declined by 7.40 per cent per annum in these workplaces compared to similar non-union workplaces

89 The coefficient is 4.58 (t=2.32). However, the overall net effect of union recognition in manufacturing workplaces performing above average was negative: the effect is the product of the interaction (+4.58), the union recognition main effect (–5.2, t=2.70) and the above average performance main effect (–5.0, t=3.56), giving an overall net effect of –5.6.

90 Voice measures which appeared significant in the descriptive analyses in Appendix Table A10 but were not significant on introducing control variables included our union/non-union voice measure, our representative/direct voice measure, joint versus separate bargaining, and number of bargaining units.

(Model 6, Appendix Table A13). Although employment declined in manufacturing workplaces with one or two unions, employment growth was not significantly different from growth in comparable non-union workplaces once other factors had been controlled for.

Employment growth in private services

Union recognition: according to our descriptive analysis (Appendix Table A9) non-unionised workplaces in the private service sector grew by an average of 1.4 per cent per annum between 1990 and 1998, whereas unionised workplaces shrank by 2.4 per cent per annum. This 3.8 per cent deficit is indicated in our model without controls presented as Model 1 in Appendix Table A14. The effect is significant at a 99 per cent level of confidence. With the introduction of controls in Model 2, the negative effect of unionisation rises to –4.7 per cent per annum.

In contrast to private manufacturing, switches in union status were important. There was no significant difference between growth rates of private service sector workplaces that had derecognised unions and those that were non-union throughout.[91] This might imply that derecognitions occurred early on in the 1990s, so that workplaces were non-union for most of the period. Alternatively, derecognition may signal the demise of already weak unions which may have little impact at the workplace even before derecognition.

The union recognition effect in Model 2 of Appendix Table A14 was largely unaffected by the addition of a closed shop dummy, on-site union representation, industry-level union density, or worker limitations on management's ability to organise work for non-managerial staff, all of which were statistically non-significant themselves.[92]

Long (1993) found that unions in Canada were only associated with slower employment growth in private services among larger workplaces. In contrast, when we split our private services' sample into smaller and larger workplaces (the division being made at the median employment size of 142 employees) we found that the union recognition effect was only statistically significant among smaller workplaces. Among these smaller workplaces, unionised workplaces grew 5.4 per cent per annum more slowly than similar non-unionised workplaces. Among larger private sector workplaces, although the union coefficient was negative, it was not statistically significant (–1.75, t=1.03).

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91 The predicted growth rates under the model were 1.7 and 1.6 per cent per annum respectively.

92 The union recognition dummy remained statistically significant throughout, ranging in size from –4.8 with the closed shop dummy to –3.6 with the on-site union representative dummy.

Union recognition effects remained negative and significant in the presence of product market and workplace performance variables. There was only one significant union interaction with product market characteristics. Among workplaces reliant on a single service for at least 25 per cent of sales, employment grew 5.8 per cent per annum more slowly where that workplace was unionised. However, if it was unionised and had a diverse range of services, its growth rate was actually 3.0 per cent per annum faster than the non-unionised workplace without diversified services.

In the remainder of this section we turn to other measures of worker voice and comment on their effects using the same control variables as those used for the union recognition Model 2 in Appendix Table A14. The models are directly comparable to those for private manufacturing, with the exception of the industry dummies. The commentary is confined to those worker voice measures with significant effects.

Collective bargaining coverage: unions had a negative effect on employment growth rates in private services at all levels of bargaining coverage above 19 per cent (Model 3, Appendix Table A14). This suggests a more pervasive effect than that noted for the private manufacturing sector, where effects were confined to workplaces with at least 80 per cent of their workers covered by collective bargaining (Model 3, Appendix Table A13).

Workplace-level negotiations over employment: as in private manufacturing, the pattern of union effects on employment differed according to whether unions negotiated over employment at workplace-level. *Ceteris paribus*, where unions negotiated over wages but not employment in 1990, employment declined by 6.96 per cent per annum relative to 'like' workplaces without unions (Model 4, Appendix Table A14). Where they negotiated over staffing levels only, growth rates were not significantly different from those in non-unionised workplaces. Where there was negotiation over staffing levels *and* recruitment there was a weak negative employment growth effect.[93]

Workplace-level union density: in contrast to private manufacturing, employment growth declined most rapidly where a majority, but by no means all workers, were union members (Model 5, Appendix Table A14).

93 In an alternative model, we used a simplified variable which distinguishes workplaces with recognised unions which do not negotiate over staffing or recruitment, from those negotiating over staffing, recruitment or both. Where there was no negotiation over staffing or recruitment, employment growth rates were 6.1 per cent per annum lower than in similar non-unionised workplaces. Where there was negotiation over staffing levels or recruitment (or both) the employment growth rate was 1.4 per cent per annum lower, but this was not statistically significant.

Union and non-union voice: union voice was associated with lower employment growth, whether in isolation or in combination with non-union voice. However, the effect was much larger in the absence of non-union voice (Model 6, Appendix Table A14). Growth rates among workplaces with non-union voice only were not significantly different from growth rates where there was no union voice at all.

Union type: finally, there is evidence that the union effect differed with the type of worker covered by the union. It seems that unions representing only manual workers did not significantly affect employment growth (Model 7, Appendix Table A14). Workplaces with non-manual unions experienced growth rates of 4.7 per cent per annum less than workplaces without non-manual unions.

Summary

In both private services and private manufacturing, non-union worker voice had no significant effect on employment growth. Both sectors experienced lower growth in the presence of recognised unions. The effect was a little more pronounced in private services, with unionised workplaces experiencing annual growth rates 4–5 per cent lower than comparable non-union workplaces, whereas the average effect in manufacturing was 3 per cent.

It was not simply the magnitude of the union employment effect that differed across the two sectors. The pattern of union effects also differed, and in ways that are not always easily interpreted with the theoretical framework outlined at the start of Section 3. In both sectors, union effects were not all pervasive. In private manufacturing, they were confined to workplaces with high bargaining coverage, three or more recognised unions, and instances in which unions bargained over staffing levels and recruitment, or neither. In private services, the effect was confined to smaller workplaces, and unions representing non-manual workers.

3.6 Accounting for workplace survival in the analysis of private sector employment growth

In this section we take forward our analysis of union recognition effects on employment growth in the private sector as a whole. We want to extrapolate from our results to discuss the impact of worker voice on employment growth in the population of workplaces as a whole. However, we might draw the wrong conclusions if we rely on models that analyse employment change among that subset of workplaces that survived in our sample for the period 1990–98. This is because worker voice can affect workplace survival, as well

as employment growth among surviving workplaces. In other words, selection into the sample in 1998 is not a random process, and may be related to worker voice. Consequently, failure to take account of this selection process could result in biased estimates of workers' impact on employment change. For example, we would be underestimating the overall impact of union recognition on employment growth if we focused solely on continuing workplaces, if union recognition also significantly reduced the likelihood of workplace survival, and thus survival in the sample.

We adopt a procedure that adjusts results based solely on continuing workplaces for the likelihood of workplace survival. The procedure involves estimating workplace survival first. This model identifies influences on workplace survival. It also generates a selection term based on the likelihood of each 1990 workplace surviving into the sample in 1998. This selection term is then carried forward into a second stage model estimating employment change over the period 1990–98. These second stage results relating to employment change are 'selection adjusted', since the procedure eliminates any bias in the estimates caused by tendencies for unmeasured characteristics, which influence workplace survival, to be correlated with unmeasured characteristics which influence employment growth.

Results from our preferred model are presented in Appendix Table A15.[94] The lower half of the table headed 'Survive' shows the estimates of sample survival. The dependent variable is a 0–1 discrete variable in which 1 is survival into the panel population for 1998, and 0 is non-survival arising through workplace closure or shrinkage below the 25-employee threshold for inclusion in the panel. It confirms that union recognition in 1990 does indeed lower survival probabilities significantly (t=2.10). The top half of the table

94 For a description of the variable names see Appendix Table A2. We use maximum likelihood estimation weighted for the probability of sample selection. The technique relies on being able to construct survival and employment growth equations which are independent of one another, something which is quite difficult to do given the expectation that factors influencing survival should also influence employment growth. We use industry-level union density to identify the equations. We argue that industry-level union density can be expected to have an effect on workplace survival, over and above the effect of workplace-level unionisation, because it captures the probability of closure arising from location in industries which are in decline for exogenous technical reasons. However, there is no logical reason for the inclusion of industry-level union density when seeking to explain employment growth conditional on survival, since this should be accounted for by workplace-level unionisation. As it turns out, industry-level unionisation is not statistically significant for survival, although it has the correct sign. (It does prove to be statistically significant at a 95 per cent confidence level when running the procedure with unweighted data using Heckman's two-step efficient estimator.) Nevertheless, there is strong confirmation that the selection procedure is required statistically, since the Wald test of independence across the two equations is highly significant. The LAMBDA summarising the estimated magnitude of the unmeasured influences on growth is also highly significant.

contains the estimates for employment growth per annum. Note that the estimates are based on 872 workplaces, of which 314 are censored, that is, non-survivors. We find that, having adjusted for sample selection, private sector workplaces with union recognition grew at an annual rate that was 4.4 per cent slower than like workplaces without union recognition. This compares with 3.9 per cent per annum for the equivalent unadjusted estimates. The union effect rises a little once we account for sample selection.

3.7 Employment growth in the public sector

The public sector accounts for roughly one-third of all employment in Britain. For this reason alone, analysis of employment change in the sector is merited. However, there are no studies of employment growth in the sector for Britain. Indeed, Wooden and Hawke's (2000) panel analysis for Australia contains the only analysis of public sector employment growth that we are aware of.

Workers can influence employment change in the public sector through negotiation over wages and employment in much the same way as occurs in the private sector, but the scope for influence may be more limited, despite the higher incidence of negotiation over employment (Table 3.1) and recognition for pay bargaining (Appendix Table A6). Centralised wage determination through national collective bargaining and Pay Review Bodies limits the scope for worker influence over pay at workplace-level in large parts of the public sector (Millward et al, 2000: 193–196; Forth and Millward, 2000: 18–19). More fundamentally, perhaps the politics of resource allocation is a more appropriate framework for thinking about employment change in the public sector than, say, the theory of rent-sharing, which seems more applicable in the private sector. Staffing levels in the public sector are set within predetermined cash limits, with resources allocated according to the political priorities of central and local government. Employment growth is only likely to occur when improving the service is a high political priority, as in the case of the health service in the 1990s. Although public sector managers can contribute to debate during negotiations over budget setting, the decision-making process is highly centralised so that management scope for radically altering staff allocations is heavily prescribed by predetermined cash limits. That said, *ceteris paribus*, resources are targeted at 'best performers', as signalled by the culture of league tables. Thus, to the extent that workers influence workplace performance, they can affect resource allocation which, in the heavily labour-intensive public sector, often means employment growth.

Table 3.5 shows the basic model specifications for our analysis of public sector employment growth, to which we add our voice measures. All variables are as measured in 1990. Model 2 is similar to the one used for the private

Table 3.5: *Basic model specifications for public sector employment growth analysis*

Model	*Controls used*
Model 1	No controls
Model 2	Employment size in 1990; % non-manual employees; years workplace has been at current address; region; travel-to-work unemployment rate; travel-to-work vacancy rate; six industry dummies based on two-digit Standard Industrial Classification (1980)

sector, but we drop those variables which are only meaningful in the private sector (share ownership and profit-related pay), and employment change in 1989–90, which remains negative and non-significant throughout. We also add in the age of the workplace, as proxied by the years the workplace has been located at the current address.[95]

Union recognition and union strength: across the public sector, employment grew at a rate of 1.5 per cent per annum, well above the rate for the private sector (0.34 per cent). The 12 per cent of public sector workplaces without a recognised union grew at more than twice the rate at which unionised workplaces grew (2.9 per cent per annum, versus 1.3 per cent). However, this difference was not statistically different on entering control variables. The union recognition effect remained non-significant with the introduction of other voice variables, such as worker limitations on management's ability to organise work (itself negative and non-significant), and the closed shop. However, the presence of a closed shop in 1990 was associated with stronger employment growth: workplaces with a closed shop grew by 4.1 per cent more than 'like' workplaces without a closed shop. Another measure of organisational strength – the presence of an on-site representative – was associated with lower employment growth: those with an on-site union representative and union recognition grew by 2.1 per cent per annum less than 'like' workplaces without recognition and on-site representation.[96] Other measures of union strength, such as bargaining coverage and union density, were not significantly associated with employment growth.[97]

Changes in workplace union status arising from derecognition and new recognition were not associated with employment growth.

95 Four observations with employment growth of more than four standard deviations from the mean were excluded from analyses.

96 The effect was only significant at a 90 per cent confidence level. The pure union recognition effect remained insignificant.

97 Union recognition and union density were not significant determinants of employment growth in the Australian public services in the first half of the 1990s (Wooden and Hawke, 2000).

Bargaining arrangements: single-table bargaining was much more common in the public than the private sector, occurring in 13 per cent of public sector workplaces (Appendix Table A6). It was associated with lower employment growth than other forms of bargaining (Appendix Table A17 contains the full model). Relative to 'like' workplaces, those with single-table bargaining grew around 3 per cent more slowly per annum. This effect was associated with single-table bargaining per se, not multi-unionism, which was not a significant factor.

Summary

In general, worker voice was not associated with employment growth in the public sector. No consistent story emerges when analysing union strength: the closed shop was associated with faster growth, on-site union representation with slower growth, while other measures were not significant.

4. CONCLUSION

For the first time in Britain, we have estimated the effect of different worker voice measures on workplace closure and employment growth using panel data. Also for the first time, we estimate closure and growth rates across the three broad sectors of the economy: private manufacturing, private services, and the public sector. What did we find?

In general, worker voice had little effect on workplace closure in the private sector as a whole, a finding consistent with Machin's (1995) analysis for the 1980s. Workplace performance, market conditions, workforce composition and structural features of the workplace, such as size and ownership, were more important. However, union voice – and, in particular, unions with substantial bargaining power – was associated with lower employment growth among continuing workplaces, the growth rate being roughly 3–4 per cent lower than similar non-unionised workplaces. The employment effect is still apparent once we account for workplace organisational and technical change, the concentration of unions in declining industries, and the age of unionised workplaces. The findings are consistent with the notion that unions will raise wages at the expense of potential new workers, but not to the point where the firm is sufficiently unprofitable to go out of business. Non-union worker voice had no significant effect, suggesting that the union effect arose through collective bargaining.

Union recognition did reduce the likelihood of workplace survival broadly defined to include both closure and shrinkage below our 25-employee threshold for inclusion in the panel in 1998. Once this is taken into account, the union effect on employment growth rises a little.

Union effects differed markedly across the three broad sectors of the economy: private manufacturing, private services and the public sector.

On average, unions increased the probability of closure in private manufacturing, the average impact being to increase the chances of closure by 15 per cent relative to similar workplaces that were not unionised. However, the effect varied with the nature of union representation. Unions representing only manual workers at the workplace were the only ones that increased the chances of closure. This effect can be mitigated by broadening the occupational scope of union representation at the workplace. Having a recognised union representing non-manual workers reduced the likelihood of closure, while those representing the broad spectrum of occupations, both manual and non-manual, were neutral in their impact. Chances of closure were only higher where there was a single union: multi-unionism had no effect. Again, this suggests that it is unions representing a narrow range of occupations that increase the chances of plant closure in manufacturing, perhaps through the pursuit of sectional interests to the detriment of the plant as a whole. The scope of bargaining was also important in determining closure chances. Where unions had no role in determining staffing levels or recruitment the likelihood of closure was higher. But where managements did allow unions a role in determining these aspects of employment the chances of closure were no different from those of non-unionised plants. This may be because unions become more sensitive to the employment consequences of their wage claims where management involve them in decisions over employment. Or it may be that an involvement in the broader set of issues affecting the future of the plant engenders a more constructive relationship between unions and management.

Unionisation reduced employment growth rates by 3 per cent per annum in private manufacturing workplaces relative to non-unionised workplaces. The effect was only apparent where at least 80 per cent of workers had their pay set through collective bargaining. Below this threshold there was no union effect. This suggests unions required a certain degree of bargaining strength to affect employment growth in manufacturing.

Worker voice had no effect on workplace closure in private services. However, the annual growth rate of unionised workplaces in private services was 4–5 per cent less than comparable non-unionised workplaces. This effect was not apparent where bargaining coverage was low and among unions representing manual workers. Furthermore, union effects were confined to unions negotiating over wages but not employment. Where they negotiated over staffing levels, growth rates were not significantly different from those in non-unionised workplaces. This suggests unions modify their wage claims where management involves them in decisions over employment. Non-union worker voice had no effect on employment growth in private services.

In the highly unionised public sector, closure probabilities were greater where workers were able to limit management's ability to organise work, and where there were unions representing non-manual workers at the workplace. However, public sector workplaces with a single union were less likely to close than workplaces without unions. Employment growth rates were not generally affected by worker voice in the public sector. However, public sector workplaces with single-table bargaining grew at a rate of 3 per cent per annum less than other comparable workplaces.

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Appendix

Table A1: *Closure, shrinkage and survival rates in the private sector in 1998, by characteristics in 1990*

	Closure	*Shrinkage*	*Survival*
Measures of voice			
Union and non-union voice:			
Union voice only (union rec or choose JCC rep)	0.20	0.08	0.72
Non-union voice only (non-union appointment to JCC, briefing group, regular workforce meetings, problem solving group, or presence of non-union reps where no union members)	0.15	0.14	0.71
Union and non-union voice	0.20	0.18	0.62
None	0.20	0.16	0.64
Representative and direct voice:			
Representative voice only (union rec or functioning JCC)	0.17	0.12	0.71
Direct voice only (briefing group, regular workforce meetings, problem solving group)	0.15	0.16	0.70
Representative and direct voice	0.20	0.15	0.65
None	0.20	0.16	0.64
Joint consultative committee	0.18	0.09	0.73
Functioning JCC (meets at least once a month)	0.18	0.08	0.74
No JCC	0.18	0.16	0.65
Management ability to organise work of non-managerial staff limited by workers (union members, representatives, or non-union workers, or formal agreement)	0.19	0.22	0.59
Management ability to organise not limited	0.18	0.14	0.68
Measures of union presence:			
Union recognition	0.20	0.16	0.64
No recognised union	0.17	0.14	0.69
Union members, no recognition	0.20	0.10	0.71
No recognition, no members	0.16	0.15	0.68
1 recognised union	0.19	0.15	0.66
2 recognised unions	0.16	0.26	0.58

3+ recognised unions	0.30	0.04	0.66
Recognised union, manual members only	0.26	0.08	0.65
Recognised union, non-manual members only	0.15	0.27	0.58
Recognised union, both manual and non-manual members	0.20	0.09	0.71
Closed shop	0.20	0.13	0.67
Pre-entry closed shop	0.14	0.16	0.70
No closed shop	0.18	0.15	0.67
Union chooses JCC reps	0.27	0.02	0.71
Union representative at workplace	0.22	0.10	0.68
No on-site union representative	0.17	0.17	0.66
Full-time on-site union representative	0.17	0.16	0.68
On-site union representative, not full-time	0.22	0.10	0.68
Recognition, but no on-site representation	0.17	0.28	0.55
External union representation only	0.23	0.42	0.35
Recognition, but no representation on or off-site	0.14	0.15	0.72
Union density, zero	0.16	0.15	0.68
Union density 0.01–24%	0.15	0.12	0.73
Union density 25–49%	0.33	0.04	0.64
Union density 50–74%	0.15	0.22	0.63
Union density 75–89%	0.22	0.15	0.63
Union density 90–99%	0.26	0.09	0.66
Union density 100%	0.18	0.26	0.56
Don't know workplace union density	0.18	0.16	0.66
Joint bargaining (ie single-table with multi-unions)	0.34	0.06	0.60
Separate bargaining	0.20	0.18	0.62
Only a single recognised union	0.19	0.15	0.66
N bargaining units:			
0	0.17	0.14	0.69
1	0.20	0.14	0.66
2	0.18	0.24	0.58
3+	0.22	0.12	0.67
Bargaining over employment where recognition:			
No bargaining over employment	0.20	0.15	0.65
Bargaining over staffing levels	0.20	0.20	0.60
Bargaining over recruitment	0.41	0.00	0.59
Bargaining over staff levels and recruitment	0.17	0.16	0.67
Union formal agreement limits management ability to organise non-managerial employees	0.19	0.22	0.59
Management not limited by formal agreement	0.18	0.14	0.68
Industry-level union density:			
Under 36 per cent	0.18	0.13	0.69
More than or equal to 36 per cent	0.18	0.20	0.62
Workplace characteristics			
N employees, 1990			
25–49	0.18	0.24	0.58

50–99	0.20	0.06	0.75
100–199	0.15	0.06	0.78
200–499	0.18	0.03	0.78
500–999	0.13	0.01	0.86
1000+	0.12	0.04	0.84
N employees, 1987			
25–49	0.17	0.23	0.61
50–99	0.24	0.07	0.69
100–199	0.15	0.04	0.81
200–499	0.16	0.03	0.81
500–999	0.11	0.03	0.87
1000+	0.11	0.01	0.89
Manufacturing/extraction	0.25	0.12	0.63
Services	0.15	0.16	0.69
Single workplace	0.15	0.15	0.70
Branch	0.20	0.15	0.65
HQ	0.13	0.16	0.71
Admin office or HQ	0.17	0.12	0.71
Sells goods/services	0.17	0.16	0.67
UK-owned	0.19	0.15	0.66
Foreign-owned	0.12	0.10	0.78
Ownership missing	0.23	0.16	0.61
Age, < 5 yrs	0.20	0.10	0.70
Age, 5–9 yrs	0.18	0.14	0.69
Age, 10–20 yrs	0.19	0.13	0.69
Age, 21+ yrs	0.18	0.17	0.65
Age, DK/NA	0.12	0.37	0.51
Workforce characteristics			
Uses short-term or fixed term contracts	0.09	0.10	0.81
Doesn't use short-term or fixed-term contracts	0.19	0.15	0.65
Percentage non-manual:			
<50%	0.21	0.13	0.66
>=50%	0.14	0.18	0.68
Percentage part-time:			
0%	0.26	0.13	0.61
1–24%	0.19	0.16	0.65
25+%	0.12	0.12	0.76
DK	0.07	0.32	0.61
Percentage female:			
0–24%	0.22	0.11	0.66
25–74%	0.17	0.17	0.66
75+%	0.13	0.18	0.69
DK	0.16	0.13	0.70
Nature of product market			
Number of competitors:			
None	0.12	0.13	0.75
<6	0.18	0.13	0.69

6+	0.19	0.17	0.61
DK/NA	0.18	0.09	0.73
Product diversity:			
Single product	0.23	0.10	0.67
Single product/service does 25%+ sales	0.16	0.18	0.66
Diversified range	0.10	0.23	0.67
DK/NA	0.16	0.13	0.70
Location of market:			
Local	0.13	0.21	0.67
Regional	0.24	0.15	0.61
National	0.18	0.13	0.69
International	0.20	0.13	0.67
DK/NA	0.22	0.08	0.69
Workplace performance			
Financial performance relative to others in the industry:			
A lot better	0.09	0.15	0.76
A little better	0.14	0.15	0.70
Average	0.25	0.15	0.60
A little below	0.20	0.20	0.59
A lot below	0.16	0.05	0.79
DK/NA	0.21	0.14	0.65
Capacity utilisation:			
Full	0.16	0.16	0.68
Below capacity	0.20	0.15	0.65
Much below capacity	0.41	0.11	0.48
DK/NA	0.16	0.15	0.69
Trend in value of sales, 89–90:			
Rose	0.16	0.16	0.68
Fell	0.26	0.12	0.62
Stable	0.25	0.14	0.61
DK/NA	0.16	0.15	0.69
Employment change, 89–90:			
<5%+	0.26	0.13	0.61
>=5%+	0.12	0.15	0.73
Stable	0.19	0.12	0.69
Missing	0.18	0.30	0.52
Employment change, 87–90:			
<5%+	0.25	0.15	0.60
>=5%+	0.15	0.12	0.73
Stable	0.16	0.13	0.71
Missing	0.19	0.21	0.60

Table A2: *Workplace closure in the private sector*

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Union recognition	0.124	0.096	0.141	0.232	0.072
	(1.08)	(0.67)	(0.92)	(1.21)	(0.47)
Industry-level union density (%)		0.032	0.032	0.047	0.000
		(2.46)*	(2.08)*	(2.01)*	(0.01)
Log number employees in 1990		–0.161	–0.157	–0.172	–0.153
		(2.36)*	(1.98)*	(1.80)	(2.07)*
% of employees non-manual		–0.004	–0.002	–0.004	–0.003
		(1.55)	(0.74)	(0.95)	(1.27)
Single independent workplace		–0.424	–0.603	–0.297	–0.454
		(2.61)**	(3.46)**	(0.72)	(2.64)**
North		–0.073	0.141	0.004	–0.159
		(0.29)	(0.52)	(0.01)	(0.58)
North West		–0.265	–0.216	–0.386	–0.226
		(1.22)	(0.88)	(1.32)	(0.97)
Yorks and Humberside		–0.610	–0.355	–0.279	–0.590
		(2.43)*	(1.36)	(0.82)	(2.25)*
W Midlands		–0.300	–0.099	0.032	–0.297
		(1.28)	(0.38)	(0.10)	(1.13)
E Midlands		–0.349	–0.226	–0.151	–0.255
		(1.25)	(0.74)	(0.42)	(0.89)
East Anglia		0.244	0.475	0.118	0.302
		(0.69)	(1.15)	(0.24)	(0.78)
South West		–0.340	–0.185	–0.864	–0.390
		(1.28)	(0.64)	(2.08)*	(1.34)
Greater London		0.106	0.220	0.145	0.024
		(0.50)	(0.96)	(0.46)	(0.10)
Wales		–0.267	–0.020	–0.162	–0.226
		(0.76)	(0.06)	(0.36)	(0.62)
Scotland		–0.450	–0.386	–0.374	–0.444
		(1.87)	(1.47)	(1.13)	(1.73)
Metals and Mineral Products		–0.410	–0.706	–0.501	–0.502
		(1.01)	(1.62)	1.547	(1.21)
Chemicals and Manufactured Fibres		–0.293	–0.941	0.251	–0.953
		(0.51)	(1.34)	(0.21)	(1.56)
Metal Goods		0.566	0.514	0.731	0.279
		(1.16)	(0.98)	(0.85)	(0.54)
Mechanical Engineering		0.379	0.092	0.842	–0.271
		(0.73)	(0.16)	(0.86)	(0.48)
Electrical and Instrument Engineering		1.085	0.869	1.617	0.189
		(1.83)	(1.33)	(1.41)	(0.28)
Vehicles and Transport Equipment		0.368	0.361	0.335	0.046
		(0.67)	(0.57)	(0.40)	(0.08)
Food, Drink and Tobacco		0.632	0.548	1.479	–0.145
		(1.25)	(0.99)	(1.55)	(0.27)
Textiles		1.076	0.611	1.783	0.055
		(1.52)	(0.81)	(1.38)	(0.07)

Leather, Footwear and Clothing		1.653	1.505	2.271	0.840
		(2.78)**	(2.24)*	(2.02)*	(1.28)
Timber and Furniture, Paper		0.693	0.470	0.523	0.291
and Printing		(1.59)	(0.98)	(0.63)	(0.62)
Rubber, Plastics and Other		0.791	0.606	(0.74)	–0.044
Manufacturing		(1.20)	(0.85)	(1.29)	(0.06)
Energy and Water					0.815
					(1.41)
Construction		0.317	0.071	1.424	–0.151
		(0.74)	(0.15)	(1.65)	(0.33)
Wholesale Distribution		1.046	0.686	1.926	0.037
		(1.79)	(1.05)	(1.68)	(0.06)
Retail Distribution		0.318	0.153	0.976	–0.609
		(0.53)	(0.23)	(0.84)	(0.88)
Hotels, Catering, Repairs		0.609	0.261	1.266	–0.800
		(0.77)	(0.30)	(0.84)	(0.84)
Transport		0.073	–0.430	0.286	0.093
		(0.19)	(0.97)	(0.43)	(0.23)
Post and Telecommunications		–0.919	–1.136	–1.357	
		(2.02)*	(2.17)*	(1.82)	
Banking, Finance, Insurance		–1.102	–1.758	–1.101	–0.949
		(2.97)**	(3.76)**	(1.99)*	(1.80)
Business Services		0.818	0.553	1.642	–0.358
		(1.22)	(0.73)	(1.22)	(0.45)
School Education		–0.235	–0.297		–0.159
		(0.50)	(0.59)		(0.30)
Other Education		–0.168	–0.514		–0.358
		(0.22)	(0.62)		(0.43)
Medical Services		–1.996	–2.290		–2.114
		(4.52)**	(4.77)**		(4.64)**
Employment rose 5%+, 1989–90					–0.256
					(1.74)
Uses short-term/fixed-term contracts			–0.297	–0.569	
			(1.37)	(2.59)**	
No good/service accounts for			–0.580	–0.662	
25%+ sales			(3.10)**	(2.78)**	
No competitors			–0.739	–0.866	
			(2.95)**	(3.06)**	
Financial performance better				–0.668	
than average				(4.06)**	
Operating considerably below				0.535	
capacity				(1.91)	
Constant	–0.959	–1.152	–0.913	–1.603	0.413
	(12.09)**	(1.34)	(0.96)	(1.00)	(0.40)
Observations	1417	1413	1132	776	1223

Note: reference categories: South East; Other Services.
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A3: *Closure rates in the private sector, by worker voice in 1990*

	All	*Manufacturing*	*Services*
Union and non-union voice:			
Union voice only (union rec or choose JCC rep)	0.20	0.21	0.18
Non-union voice only (non-union appointment to JCC, briefing group, regular workforce meetings, problem solving group, or presence of non-union reps where no union members)	0.15	0.18	0.14
Union and non-union voice	0.20	0.33	0.16
None	0.20	0.31	0.16
Representative and direct voice:			
Representative voice only (union rec or functioning JCC)	0.17	0.20	0.15
Direct voice only (briefing group, regular workforce meetings, problem solving group)	0.15	0.12	0.15
Representative and direct voice	0.20	0.31	0.15
None	0.20	0.31	0.16
Joint consultative committee	0.18	0.26	0.13
Functioning JCC (meets at least once a month)	0.18	0.26	0.13
No JCC	0.18	0.24	0.16
Management ability to organise work of non-managerial staff limited by workers (union members, representatives, or non-union workers, or formal agreement)	0.19	0.28	0.13
Management ability to organise not limited	0.18	0.24	0.15
Measures of union presence:			
Union recognition	0.20	0.28	0.16
No recognised union	0.17	0.23	0.15
Union members, no recognition	0.20	0.31	0.13
No recognition, no members	0.16	0.20	0.15
1 recognised union	0.19	0.33	0.13
2 recognised unions	0.16	0.21	0.14
3+ recognised unions	0.30	0.24	0.34
Recognised union, manual members only	0.26	0.29	0.23
Recognised union, non-manual members only	0.15	0.16	0.15
Recognised union, both manual and non-manual members	0.20	0.22	0.19
Closed shop	0.20	0.24	0.16
Pre-entry closed shop	0.14	0.19	0.00
No closed shop	0.18	0.25	0.15
Union chooses JCC reps	0.27	0.25	0.29
Union representative at workplace	0.22	0.27	0.17
No on-site union representative	0.17	0.24	0.15
Full-time on-site union representative	0.17	0.18	0.16

On-site union representative, not full-time	0.22	0.27	0.18
Recognition, but no on-site representation	0.17	0.24	0.14
External union representation only	0.23	0.66	0.22
Recognition, but no representation on or off-site	0.14	0.39	0.07
Union density, zero	0.16	0.20	0.15
Union density 0.01–24%	0.15	0.25	0.11
Union density 25–49%	0.33	0.39	0.27
Union density 50–74%	0.15	0.25	0.10
Union density 75–89%	0.22	0.24	0.21
Union density 90–99%	0.26	0.31	0.23
Union density 100%	0.18	0.68	0.09
Don't know workplace union density	0.18	0.23	0.15
Joint bargaining (ie single-table with multi-unions)	0.34	0.34	0.35
Separate bargaining	0.20	0.18	0.21
Only a single recognised union	0.19	0.33	0.13
N bargaining units:			
0	0.17	0.23	0.15
1	0.20	0.33	0.14
2	0.18	0.16	0.20
3+	0.22	0.21	0.22
Bargaining over employment where recognition:			
No bargaining over employment	0.20	0.31	0.15
Bargaining over staffing levels	0.20	0.28	0.17
Bargaining over recruitment	0.41	0.27	0.71
Bargaining over staff levels and recruitment	0.17	0.21	0.15
Union formal agreement limits management ability to organise non-managerial employees	0.19	0.26	0.18
Management not limited by formal agreement	0.18	0.25	0.15
Industry-level union density:			
Under 36 per cent	0.18	0.26	0.15
More than or equal to 36 per cent	0.18	0.22	0.16

Table A4: *Workplace closure in the private manufacturing sector*

	(1)	(2)	(3)	(4)	(5)
Union recognition	0.168	0.486	0.439	0.362	0.497
	(0.92)	(2.11)*	(1.78)	(1.20)	(2.08)*
Industry-level union density (%)		–0.028	–0.025	–0.062	–0.024
		(1.45)	(1.33)	(2.59)**	(1.13)
Log number employees in 1990		–0.194	–0.188	–0.197	–0.195
		(1.70)	(1.57)	(1.47)	(1.60)
% of employees non-manual		–0.002	0.001	0.001	0.000
		(0.39)	(0.10)	(0.13)	(0.01)
Single independent workplace		–0.158	–0.354	–0.453	–0.144
		(0.70)	(1.48)	(0.64)	(0.62)
North		0.321	0.594	0.794	0.386
		(0.72)	(1.25)	(1.36)	(0.84)
North West		–0.376	–0.325	–0.148	–0.334
		(1.04)	(0.83)	(0.31)	(0.90)
Yorks and Humberside		–0.548	–0.335	–0.211	–0.530
		(1.37)	(0.82)	(0.35)	(1.30)
W Midlands		0.060	0.192	0.740	0.105
		(0.18)	(0.55)	(1.70)	(0.30)
E Midlands		–0.574	–0.458	–0.122	–0.518
		(1.51)	(1.11)	(0.26)	(1.32)
East Anglia		0.195	–0.186	0.710	0.105
		(0.40)	(0.35)	(1.12)	(0.21)
South West		–0.089	0.115	–0.065	–0.040
		(0.20)	(0.24)	(0.10)	(0.09)
Greater London		–0.024	–0.088	–0.027	–0.106
		(0.06)	(0.20)	(0.05)	(0.25)
Wales		–0.582	–0.329	–1.879	–0.541
		(1.03)	(0.57)	(3.53)**	(0.96)
Scotland		–1.146	–1.042	–0.353	–1.582
		(3.06)**	(2.65)**	(0.78)	(3.53)**
Chemicals and Manufactured Fibres		–0.844	–1.129	–0.906	–0.852
		(1.73)	(1.92)	(0.97)	(1.63)
Metal Goods		0.513	0.763	0.473	0.493
		(1.14)	(1.63)	(0.81)	(1.03)
Mechanical Engineering		–0.116	–0.064	–0.514	–0.122
		(0.30)	(0.16)	(1.05)	(0.28)
Electrical/Instrument Engineering		0.208	0.314	–0.119	0.257
		(0.42)	(0.64)	(0.19)	(0.46)
Vehicles and Transport Equipment		0.496	0.758	0.026	0.433
		(1.11)	(1.45)	(0.04)	(0.92)
Food, Drink and Tobacco		0.285	0.574	0.419	0.121
		(0.74)	(1.39)	(0.81)	(0.29)
Leather, Footwear and Clothing		0.974	1.192	0.642	1.070
		(2.22)*	(2.59)**	(1.13)	(2.20)*
Timber/Furniture, Paper/Printing		0.535	0.659	0.041	0.579
		(1.63)	(1.92)	(0.10)	(1.62)

Rubber, Plastics and Other Manuf		–0.132	0.027	–0.656	–0.068
		(0.25)	(0.05)	(1.12)	(0.12)
Uses short-term/fixed-term contracts			–0.345	–0.387	
			(1.06)	(1.16)	
Employment rose 5%+, 1989–90					–0.056
					(0.25)
No good/service accounts for 25%+ sales			–0.495	–0.711	
			(1.92)	(2.25)*	
No competitors			–0.578	–0.376	
			(1.58)	(0.89)	
Financial performance better than average				–1.004	
				(3.84)**	
Operating considerably below capacity				–0.157	
				(0.50)	
Constant	–0.755	0.764	0.611	2.322	0.585
	(5.44)**	(0.83)	(0.65)	(1.94)	(0.58)
Observations	626	626	536	381	569

Note: reference categories: South East; Metal and Mineral Products and Textiles
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A5: *Workplace closure in the private service sector*

	(1)	(2)	(3)	(4)	(5)
Union recognition	0.058	–0.104	0.005	0.334	–0.183
	(0.38)	(0.54)	(0.02)	(1.28)	(0.87)
Industry-level union density (%)		0.020	0.028	0.018	0.024
		(2.13)*	(2.66)**	(1.09)	(2.41)*
Log 1990 employment		–0.184	–0.136	–0.227	–0.185
		(2.04)*	(1.26)	(1.55)	(1.84)
% of employees non-manual		–0.004	–0.002	–0.004	–0.005
		(1.56)	(0.72)	(0.96)	(1.45)
Single independent workplace		–0.597	–0.794	–0.089	–0.721
		(2.56)*	(3.14)**	(0.14)	(2.80)**
North		–0.249	–0.023	–0.343	–0.429
		(0.78)	(0.07)	(0.77)	(1.14)
North West		–0.273	–0.179	–0.577	–0.265
		(0.99)	(0.55)	(1.58)	(0.86)
Yorks and Humberside		–0.690	–0.432	–0.235	–0.679
		(2.06)*	(1.20)	(0.56)	(1.96)
Midlands		–0.556	–0.476	–0.415	–0.582
		(1.64)	(1.14)	(0.84)	(1.51)
East Anglia		0.314	0.738	–0.239	0.401
		(0.71)	(1.51)	(0.36)	(0.79)
South West		–0.461	–0.362	–1.567	–0.695
		(1.42)	(1.00)	(2.41)*	(1.91)
Greater London		0.140	0.323	0.210	0.062
		(0.57)	(1.20)	(0.56)	(0.22)
Wales		–0.097	0.074	0.033	–0.113
		(0.22)	(0.16)	(0.06)	(0.26)
Scotland		–0.229	–0.115	–0.388	–0.123
		(0.82)	(0.37)	(0.94)	(0.42)
Energy and Water		0.456	0.236	0.967	0.079
		(0.76)	(0.35)	(0.86)	(0.12)
Construction		0.252	0.126	1.319	0.025
		(0.74)	(0.32)	(1.98)*	(0.07)
Wholesale Distribution		0.699	0.603	1.046	0.526
		(2.55)*	(1.95)	(2.73)**	(1.85)
Retail Distribution		–0.061	0.029	0.080	–0.103
		(0.23)	(0.10)	(0.23)	(0.36)
Transport		0.119	–0.415	0.331	–0.013
		(0.27)	(0.81)	(0.44)	(0.03)
Post and Telecommunications		–0.536	–1.052	–0.417	–0.825
		(0.86)	(1.51)	(0.34)	(1.18)
Banking, Finance and Insurance		–0.865	–1.641	–0.837	–1.285
		(1.79)	(2.85)**	(1.00)	(2.19)*
Business Services		0.331	0.370	0.662	0.332
		(1.11)	(1.09)	(1.42)	(0.98)
School Education		–0.068	–0.212		–0.539
		(0.12)	(0.34)		(0.92)

Other Education		–0.159	–0.476		–0.314
		(0.19)	(0.52)		(0.32)
Medical Services		–2.016	–2.296		–2.281
		(4.34)**	(4.56)**		(4.55)**
Uses short-term/fixed-term contracts			–0.332	–0.939	
			(1.10)	(2.59)**	
Employment rose 5%+ 1989–90					–0.471
					(2.46)*
No service accounts for 25%+ sales			–0.716	–0.538	
			(2.44)*	(1.51)	
No competitors			–0.800	–1.032	
			(2.41)*	(2.60)**	
Financial performance above average for industry				–0.538	
				(2.34)*	
Operating considerably below capacity				1.311	
				(3.09)**	
Constant	–1.048	–0.377	–0.728	–0.087	–0.120
	(10.77)**	(0.77)	(1.36)	(0.12)	(0.21)
Observations	791	787	596	395	654

Note: Reference categories: South East; Other Services
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A6: *Incidence of worker voice by broad sector in 1990*

	Private manufacturing	*Private services*	*Public sector*
Measures of voice			
Union and non-union voice:			
Union voice only (union rec. or choose JCC rep)	0.17	0.06	0.16
Non-union voice only (non-union appointment to JCC, briefing group, regular workforce meetings, problem solving group, or presence of non-union reps where no union members)	0.37	0.43	0.11
Union and non-union voice	0.27	0.29	0.72
None	0.19	0.20	0.00
Representative and direct voice:			
Representative voice only (union rec. or functioning JCC)	0.22	0.11	0.16
Direct voice only (briefing group, regular workforce meetings, problem solving group)	0.22	0.32	0.09
Representative and direct voice	0.36	0.36	0.74
None	0.19	0.20	0.00
Measures of union presence:			
Union recognition	0.44	0.36	0.88
1 recognised union	0.22	0.22	0.12
2 recognised unions	0.11	0.08	0.34
3+ recognised unions	0.10	0.05	0.43
Recognised union, manual members only	0.34	0.15	0.48
Recognised union, non-manual members only	0.09	0.17	0.75
Recognised union, both manual and non-manual members	0.17	0.13	0.30
Closed shop	0.07	0.03	0.04
Union representative at workplace	0.39	0.20	0.58
Joint bargaining (ie. single-table with multi-unions)	0.05	0.01	0.13
Separate bargaining	0.16	0.13	0.63
Only a single recognised union	0.22	0.22	0.12
Mean workplace-level union density	0.33	0.26	0.77
Mean workplace-level collective bargaining coverage	0.30	0.27	0.66

Table A7: *Closure rates in the public sector, by worker voice in 1990*

	Closure	*Shrinkage*	*Survival*
Union and non-union voice:			
Union voice only (union rec or choose JCC rep)	0.04	0.12	0.84
Non-union voice only (non-union appointment to JCC, briefing group, regular workforce meetings, problem solving group, or presence of non-union reps where no union members)	0.01	0.00	0.99
Union and non-union voice	0.08	0.11	0.81
None	0.18	0.00	0.82
Joint consultative committee	0.08	0.08	0.85
Functioning JCC (meets at least once a month)	0.08	0.08	0.82
No JCC	0.06	0.12	0.82
Management ability to organise work of non-managerial staff limited by workers (union members, representatives, or non-union workers, or formal agreement)	0.12	0.10	0.78
Management ability to organise not limited	0.04	0.10	0.86
Measures of union presence:			
Union recognition	0.07	0.11	0.81
No recognised union	0.01	0.00	0.99
1 recognised union	0.01	0.22	0.77
2 recognised unions	0.11	0.08	0.81
3+ recognised unions	0.06	0.11	0.83
Recognised union, manual members only	0.09	0.12	0.80
Recognised union, non-manual members only	0.09	0.09	0.82
Recognised union, both manual and non-manual members	0.07	0.05	0.88
Closed shop	0.24	0.14	0.63
No closed shop	0.06	0.10	0.84
Union chooses JCC reps	0.06	0.09	0.85
Union representative at workplace	0.07	0.08	0.85
No on-site union representative	0.06	0.13	0.81
Full-time on-site union representative	0.04	0.17	0.78
Union density, zero	0.11	0.00	0.89
Union density 0.01–24%	0.07	0.00	0.93
Union density 25–49%	0.10	0.06	0.83
Union density 50–74%	0.01	0.14	0.85
Union density 75–89%	0.09	0.04	0.87
Union density 90–99%	0.02	0.11	0.86
Union density 100%	0.09	0.10	0.81
Don't know workplace union density	0.09	0.17	0.74
Joint bargaining (ie single-table with multi-unions)	0.08	0.14	0.78

Separate bargaining	0.08	0.09	0.83
Only a single recognised union	0.01	0.22	0.77
N bargaining units:			
0	0.01	0.00	0.99
1	0.05	0.19	0.76
2	0.11	0.08	0.82
3+	0.05	0.10	0.85
Union formal agreement limits management ability to organise non-managerial employees	0.11	0.11	0.77
Management not limited by formal agreement	0.05	0.10	0.86

Table A8: *Workplace closure in the public sector*

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Worker limitations on management	0.519 (2.09)*	0.753 (2.53)*	0.627 (2.16)*	0.597 (1.81)	0.459 (1.35)
Industry-level union density (%)		–0.011 (0.75)	–0.009 (0.58)	0.004 (0.16)	0.009 (0.41)
Log employment in 1990		–0.019 (0.18)	0.001 (0.01)	0.266 (2.30)*	0.357 (2.73)**
% non-manuals		–0.008 (1.98)*	–0.008 (1.93)	–0.010 (1.66)	–0.009 (1.50)
North		–0.714 (1.15)	–0.738 (1.20)	–0.630 (1.05)	–0.623 (0.88)
North West		–0.187 (0.39)	–0.075 (0.16)	–0.270 (0.60)	–0.134 (0.32)
Yorks and Humberside		–1.024 (2.10)*	–0.960 (1.98)*	–0.971 (1.96)	–0.973 (1.94)
Midlands		–1.245 (2.43)*	–1.273 (2.40)*	–2.803 (4.20)**	–2.699 (3.89)**
East Anglia		–0.577 (0.93)	–0.585 (0.95)	–0.763 (1.14)	–0.877 (1.20)
South West		–0.394 (0.86)	–0.469 (1.03)	–0.449 (0.93)	–0.152 (0.33)
Greater London		0.211 (0.46)	0.264 (0.57)	0.009 (0.02)	–0.001 (0.00)
Wales		–1.462 (2.32)*	–1.267 (2.15)*	–0.948 (1.98)*	–1.111 (1.76)
Scotland		–0.196 (0.41)	–0.209 (0.43)	–0.464 (0.84)	–0.416 (0.74)
Education		0.117 (0.26)	0.196 (0.43)	–0.220 (0.36)	–0.251 (0.42)
Central government		2.076 (3.88)**	2.125 (3.84)**	2.065 (3.27)**	1.954 (3.36)**
Local government		1.897 (3.55)**	1.884 (3.57)**	1.662 (2.43)*	1.454 (2.33)*
Medical services		1.837 (3.52)**	1.890 (3.46)**	1.098 (1.46)	0.914 (1.28)
Other public sector services		1.673 (4.17)**	1.798 (4.27)**	1.480 (2.61)**	1.591 (2.82)**
Operating at address 5–9 years			–1.052 (2.22)*	–1.304 (2.37)*	–1.198 (2.05)*
Operating at address 10–20 years			–0.625 (1.55)	–0.638 (1.21)	–0.813 (1.50)
Operating at address over 20 yrs			–0.449 (1.15)	–0.375 (0.82)	–0.175 (0.37)
% of employees female				0.026 (3.27)**	0.024 (3.05)**
None of workforce work part-time				1.793	1.706

				(3.81)**	(3.21)**
25%+ workforce work part-time				–0.174	–0.026
				(0.37)	(0.05)
Employment fell 5%+ in 1989–90					0.703
					(2.15)*
Constant	–1.700	–1.832	–1.555	–4.597	–5.335
	(10.48)**	(1.98)*	(1.70)	(3.55)**	(3.55)**
Observations	614	614	600	494	407

Note: Reference categories: South East; Other public sector industries (largely Post and Telecommunications, Transport); Operating at address for under 5 years; 1–24% workforce work part-time.
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A9: *Employment growth per annum in the private sector, 1990–1998, by 1990 characteristics*

	All	*Manufacturing*	*Services*
Whole sector	0.34	0.46	0.30
Measures of voice			
Union and non-union voice:			
Union voice only (union rec or choose JCC rep)	–1.49	0.26	–2.96
Non-union voice only (non-union appointment to JCC, briefing group, regular workforce meetings, problem solving group, or presence of non-union reps where no union members)	1.08	1.25	1.04
Union and non-union voice	–1.84	–1.17	–2.20
None	2.37	2.22	2.41
Representative and direct voice:			
Representative voice only (union rec or functioning JCC)	–1.35	0.45	–2.42
Direct voice only (briefing group, regular workforce meetings, problem solving group)	1.04	.059	1.15
Representative and direct voice	–0.58	–0.18	–0.78
None	2.37	2.22	2.41
Joint consultative committee	–0.46	–0.42	–0.48
Functioning JCC (meets at least once a month)	–0.40	–0.43	–0.39
No JCC	0.62	0.83	0.54
Management ability to organise work of non-managerial staff limited by workers (union members, representatives, or non-union workers, or formal agreement)	–2.28	–2.28	–2.28
Management ability to organise not limited	0.63	0.81	0.56
Measures of union presence			
Union recognition	–1.75	–0.71	–2.40
No recognised union	1.44	1.53	1.41
Derecognition by 1998	0.34	–0.99	1.23
New recognition by 1998	0.06	2.44	–0.62
1 recognised union	–1.17	–0.40	–1.56
2 recognised unions	–1.42	1.15	–3.08
3+ recognised unions	–3.88	–3.48	–4.26
Types of union at workplace:			
Manuals-only union	–0.51	0.29	–1.52
Non-manuals only union	–4.26	12.83	–4.57
Manuals and non-manuals union	–1.41	–0.70	–1.68
Manuals only and non-manuals only	–1.33	–1.74	–0.80
Manuals only and manual/non-manual	–1.54	–1.70	–3.22
Non-manuals only and manual/non-manual	–3.06	–3.18	–3.03
All 3 types of union	–3.84	–3.75	–3.87

Any recognised union with manual members only	–1.27	–0.75	–1.90
Any recognised union with non-manual members only	–3.08	–1.97	–3.50
Any recognised union with both manual and non-manual members	–1.95	–1.49	–2.17
Closed shop	–2.48	–2.99	–1.98
No closed shop	0.45	0.71	0.36
Union chooses JCC reps	–2.67	–2.52	–2.84
Union representative at workplace	–1.70	–0.39	–2.90
No on-site union representative	1.06	1.15	1.03
Union density:			
0%	1.57	0.69	1.79
1–24%	–0.25	0.94	–0.64
25–49%	–0.22	2.20	–1.87
50–74%	–1.68	0.81	–3.54
75–89%	–2.08	–0.62	–3.75
90–99%	–2.24	2.00	–2.37
100%	–0.92	–13.57	–0.55
Joint bargaining (ie single-table with multi-unions)	–3.03	–2.17	–4.69
Separate bargaining	–2.34	–0.74	–3.43
Only a single recognised union	–1.17	–0.40	–1.56
N bargaining units:			
0	1.44	1.53	1.41
1	–1.34	–0.69	–1.72
2	–1.62	1.10	–4.11
3+	–3.23	–4.18	–2.79
Collective bargaining coverage:			
0%	1.44	1.52	1.41
1–19%	1.40	11.30	1.04
20–49%	–2.80	–1.44	–2.91
50–79%	–1.23	–0.31	–2.34
80–99%	–2.54	–1.83	–3.19
100%	–2.13	–0.24	–2.62
Bargaining over employment where recognition:			
No bargaining over employment	–1.94	–0.01	–2.93
Bargaining over staffing levels	–1.36	–3.63	–0.74
Bargaining over recruitment	–1.92	–0.50	–4.31
Bargaining over staff levels and recruitment	–1.17	–0.87	–1.45
Industry-level union density:			
Under 25 per cent	0.52	–1.20	–0.49
More than or equal to 25 per cent	0.16	1.15	0.85
Workplace characteristics			
N employees, 1990:			
25–49	1.32	–0.12	1.57
50–99	0.65	2.71	–0.44
100–199	–0.56	–0.48	–0.60

200–499	–2.30	–1.75	–2.69
500–999	–5.47	–5.89	–4.94
1000+	–4.41	–5.97	–1.31
Manufacturing/extraction	0.46	NA	NA
Services	0.30	NA	NA
Single workplace	0.98	0.98	0.99
Branch	–0.44	–0.20	–0.52
HQ	6.48	8.72	6.17
Admin office or HQ	3.94	0.28	3.67
Sells goods/services	0.04	6.11	–0.01
UK-owned	0.15	0.30	0.10
Foreign-owned	2.64	1.73	3.38
Ownership missing	–2.13	–5.27	–1.52
Age, < 5 yrs	1.55	0.73	1.74
Age, 5–9 yrs	–0.11	0.44	–0.44
Age, 10–20 yrs	0.49	1.17	0.27
Age, 21+ yrs	0.00	0.00	–0.00
Non-executive share ownership scheme	0.20	0.66	0.01
No non-executive share ownership scheme	0.38	0.40	0.37
Profit sharing scheme	0.44	0.59	0.40
No profit sharing scheme	0.24	0.39	0.17
Workforce characteristics			
Uses short-term or fixed term contracts	–0.28	2.02	–0.96
Doesn't use short-term or fixed term contracts	0.52	0.26	0.62
Percentage non-manual			
<50%	–0.04	0.32	–0.28
>=50%	0.83	1.16	0.79
Percentage part-time:			
0%	1.53	2.27	1.12
1–24%	0.01	0.01	–0.00
25+%	0.56	–9.32	0.63
Percentage female:			
0–24%	–0.05	0.17	–0.21
25–74%	1.23	2.02	1.00
75+%	–0.16	–2.34	0.01
Nature of product market			
Number of competitors:			
None	–1.43	–0.01	–1.84
<6	0.43	–0.02	0.72
6+	–0.05	0.59	–0.27
Don't know	0.18	0.17	0.18
Product diversity:			
Single product	–0.25	–0.27	–0.25
Single product/service does 25%+ sales	–0.62	–0.00	–0.91
Diversified range	2.11	1.72	2.32
DK/NA	2.72	3.80	2.54

Location of market:			
Local	–0.78	–2.19	–0.72
Regional	–0.00	–0.88	0.14
National	0.63	0.29	1.00
International	0.88	0.46	1.50
Workplace performance			
Financial performance relative to others in the industry:			
A lot better	0.03	–1.03	0.34
A little better	–0.68	–1.56	–0.43
Average	0.25	2.61	–1.06
A little below	–0.18	1.09	–4.43
A lot below	–2.24	–2.20	–2.27
Capacity utilisation:			
Full	–0.06	–0.90	0.17
Below capacity	0.14	–0.19	0.26
Much below capacity	–1.89	–1.31	–2.21
Trend in value of sales, 89–90:			
Rose	0.06	–0.00	0.01
Fell	0.92	–0.67	1.97
Stable	–1.21	–1.54	–1.05
Employment change, 89–90:			
<5%+	0.32	0.93	–0.00
>=5%+	1.81	1.83	1.80
Stable	–1.15	–0.93	–1.26
Missing	–1.20	–0.24	–1.44
Employment change, 87–90:			
<5%+	–0.50	–0.19	–0.78
>=5%+	1.52	2.08	1.32
Stable	0.59	–1.58	–1.17
Missing	–0.70	–1.56	–0.53

Table A10: *Employment growth in the private sector*

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Union recognition	–3.188	–3.964	–3.861	–3.871	–4.171
	(4.40)**	(3.64)**	(3.55)**	(3.69)**	(3.59)**
North		2.463	2.779	1.502	2.088
		(1.83)	(1.48)	(0.76)	(1.01)
North West		–0.343	–0.457	–1.270	0.000
		(0.24)	(0.24)	(0.67)	(0.00)
Yorks and Humberside		1.544	1.778	0.974	1.753
		(1.29)	(1.22)	(0.65)	(1.21)
West Midlands		1.925	2.356	1.623	3.775
		(1.02)	(1.21)	(0.84)	(1.76)
East Midlands		0.194	0.233	–0.434	–1.034
		(0.10)	(0.12)	(0.21)	(0.55)
East Anglia		–0.248	–0.460	–0.942	–1.309
		(0.19)	(0.35)	(0.67)	(0.84)
South West		1.075	0.619	0.052	–0.564
		(0.62)	(0.36)	(0.03)	(0.32)
Greater London		2.173	2.344	1.782	2.326
		(1.51)	(1.63)	(1.39)	(1.65)
Wales		1.245	0.881	–0.395	0.739
		(0.89)	(0.52)	(0.21)	(0.36)
Scotland		0.589	0.731	–0.635	0.510
		(0.46)	(0.45)	(0.34)	(0.28)
Metals and Mineral Products		2.272	2.399	1.972	2.531
		(1.63)	(1.62)	(1.33)	(1.55)
Chemicals and Manufactured Fibres		2.578	2.749	2.887	3.307
		(1.29)	(1.40)	(1.47)	(1.90)
Metal Goods		6.526	6.727	6.081	5.866
		(2.54)*	(2.55)*	(2.34)*	(2.46)*
Mechanical Engineering		1.035	1.408	1.369	1.364
		(0.67)	(0.91)	(0.84)	(0.90)
Electrical & Instrument Engineering		0.875	0.753	1.067	1.677
		(0.68)	(0.56)	(0.76)	(1.26)
Vehicles & Transport Equipment		–2.525	–2.491	–1.889	–2.370
		(2.19)*	(2.17)*	(0.93)	(1.26)
Food, Drink, Tobacco		0.026	–0.240	–0.296	–0.755
		(0.01)	(0.06)	(0.07)	(0.17)
Textiles		–1.372	–1.511	–1.841	–1.293
		(1.21)	(1.27)	(1.44)	(0.51)
Leather, Footwear, Clothing		–0.725	–0.646	–1.751	0.122
		(0.55)	(0.50)	(1.17)	(0.08)
Timber/Furniture, Paper/Printing		1.291	1.422	0.976	2.251
		(0.53)	(0.58)	(0.47)	(0.97)
Rubber, Plastics & Other		–1.876	–1.890	–2.487	–1.856
Manufacturing		(1.04)	(1.09)	(1.38)	(1.13)
Energy and Water		–5.694	–5.598	–5.402	–4.410
		(2.31)*	(2.22)*	(2.73)**	(2.24)*
Construction		–1.152	–0.897	–2.178	–1.518
		(0.81)	(0.62)	(1.28)	(0.77)
Wholesale Distribution		2.893	3.024	2.443	2.937
		(1.38)	(1.46)	(1.16)	(1.36)

Hotels, Catering & Repairs		–2.693	–2.752	–3.259	–3.215
		(1.78)	(1.86)	(2.20)*	(2.19)*
Transport		–1.303	–1.378	–2.107	–2.109
		(0.91)	(0.91)	(1.32)	(1.31)
Post and Telecommunications		–0.966	–0.977	–1.005	–1.054
		(0.58)	(0.59)	(0.62)	(0.74)
Banking, Finance and Insurance		3.143	3.255	3.489	6.205
		(0.79)	(0.81)	(1.06)	(1.60)
Business Services		0.911	0.998	0.848	1.794
		(0.64)	(0.72)	(0.60)	(1.27)
Higher Education		–1.262	–0.982	–0.294	0.018
		(0.85)	(0.69)	(0.18)	(0.01)
School Education		1.994	2.190	2.082	2.504
		(1.28)	(1.35)	(1.13)	(1.41)
Other Education		–2.872	–2.874	–1.408	–2.064
		(2.14)*	(2.12)*	(0.93)	(1.22)
Medical Services		0.056	–0.518	–0.504	0.715
		(0.03)	(0.25)	(0.24)	(0.34)
Other Services		–0.772	–0.830	–0.467	–0.798
		(0.78)	(0.83)	(0.43)	(0.71)
% unemployed in TTWA, 1990			–0.138	–0.065	–0.261
			(0.70)	(0.33)	(1.30)
Vacancy rate in LLMA, 1990			1.654	2.365	2.418
			(1.46)	(1.82)	(1.98)*
Number employed in 1990				–0.003	–0.003
				(4.09)**	(3.88)**
% non-manuals				–0.026	–0.028
				(1.75)	(1.80)
Single independent workplace				0.254	0.325
				(0.32)	(0.41)
Head office				5.472	4.933
				(1.85)	(1.63)
Non-executive share option scheme				0.737	0.659
				(1.21)	(0.96)
Profit sharing scheme				–0.236	–0.157
				(0.36)	(0.22)
Employment change, 1989–90					0.031
					(1.19)
At address for 5–9 years					–1.719
					(1.11)
At address for 10–20 years					0.674
					(0.46)
At address for over 20 years					0.193
					(0.14)
Constant	1.437	0.485	–0.490	0.464	0.611
	(2.59)**	(0.47)	(0.29)	(0.24)	(0.28)
Observations	558	558	558	558	482
R-squared	0.05	0.16	0.17	0.21	0.27

Note: Reference categories: South East, Retail Distribution; branch of larger organisation; at address for under 5 years.
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A11: *Employment growth in unionised and non-unionised private sector workplaces*

	Unionised	*Non-unionised*
Employment change, 1989–90	–0.029	0.061
	(1.53)	(1.68)
At address 5–9 years	0.240	–1.384
	(0.12)	(0.81)
At address 10–20 years	2.666	–0.600
	(1.49)	(0.36)
At address over 20 years	2.323	0.821
	(1.56)	(0.53)
Number of employees in 1990	–0.003	–0.011
	(4.59)**	(4.81)**
% non-manuals	–0.019	–0.015
	(1.21)	(0.91)
Single independent workplace	1.037	–0.154
	(1.16)	(0.19)
Head office	–0.226	2.169
	(0.08)	(0.97)
North	–0.193	3.517
	(0.09)	(1.44)
North West	2.279	–0.510
	(1.42)	(0.22)
Yorks and Humberside	3.675	0.078
	(2.54)*	(0.05)
West Midlands	–1.980	6.253
	(1.19)	(2.98)**
East Midlands	0.376	–0.625
	(0.15)	(0.37)
East Anglia	0.416	–1.697
	(0.26)	(0.83)
South West	–0.271	1.669
	(0.17)	(0.81)
Greater London	0.995	3.142
	(0.69)	(2.18)*
Wales	2.048	3.305
	(0.92)	(1.15)
Scotland	–0.973	1.005
	(0.55)	(0.52)
% economically active unemployed in TTWA	0.155	–0.309
	(0.69)	(1.30)
Jobcentre vacancies as % eco. Active in LLMA	0.016	4.830
	(0.02)	(2.97)**
Non-executive share option scheme	–1.011	1.716
	(1.52)	(2.48)*
Profit sharing scheme	0.872	0.717
	(1.14)	(0.97)
Metals and mineral products	–2.060	1.778
	(1.25)	(0.67)
Chemicals and Manufactured Fibres	0.249	4.342
	(0.15)	(2.16)*

Metal Goods	–2.893	12.931
	(1.56)	(6.92)**
Mechanical Engineering	0.123	3.741
	(0.04)	(2.67)**
Electrical and Instrument Engineering	–0.604	1.590
	(0.41)	(1.13)
Vehicles and Transport Equipment	–0.328	–1.468
	(0.18)	(0.84)
Food, Drink and Tobacco	–5.702	1.966
	(2.44)*	(0.30)
Textiles	–3.416	–3.146
	(2.12)*	(1.44)
Leather, Footwear and Clothing	–3.173	2.708
	(2.31)*	(1.62)
Timber and Furniture, Paper and Printing	–4.379	6.703
	(2.72)**	(1.53)
Rubber, Plastics, and Other Manufacturing	–2.922	–1.655
	(1.20)	(1.01)
Energy and Water	–5.162	27.846
	(2.11)*	(2.06)*
Construction	–0.064	1.147
	(0.04)	(0.54)
Wholesale Distribution	–6.594	8.067
	(3.55)**	(3.41)**
Hotels, Catering, Repairs	6.520	–2.728
	(4.07)**	(2.15)*
Transport	–8.521	2.740
	(3.85)**	(1.62)
Post and Telecommunications	–6.000	0.000
	(3.49)**	(.)
Banking, Finance and Insurance	–2.216	18.713
	(1.07)	(7.27)**
Business Services	–4.618	4.229
	(2.13)*	(3.18)**
Higher Education	5.909	3.651
	(2.61)**	(2.22)*
School Education	–1.475	4.111
	(0.67)	(1.45)
Other Education	0.000	0.324
	(.)	(0.15)
Medical Services	–1.173	–0.503
	(0.64)	(0.20)
Other Services	–4.337	1.339
	(3.06)**	(0.97)
Constant	–1.624	–4.396
	(0.75)	(1.54)
Observations	278	204
R-squared	0.45	0.51

Note: Reference categories: at address under 5 years; branch of larger organisation; South East; Retail Distribution.
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A12: *Employment growth in the private sector using different worker voice measures*

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Employees in 1990	–0.004	–0.003	–0.004	–0.004	–0.003
	(4.52)**	(3.88)**	(4.31)**	(4.11)**	(4.09)**
% non-manuals	–0.014	–0.028	–0.027	–0.037	–0.024
	(0.95)	(1.81)	(1.79)	(2.15)*	(1.68)
Single independent workplace	0.507	0.069	0.317	0.641	0.351
	(0.62)	(0.09)	(0.41)	(0.80)	(0.44)
Head office	3.816	4.821	4.968	4.922	4.861
	(1.47)	(1.64)	(1.67)	(1.72)	(1.67)
North	2.241	1.970	2.274	1.693	2.281
	(1.12)	(0.96)	(1.11)	(0.78)	(1.06)
North West	–0.068	–0.074	0.274	0.224	–0.334
	(0.04)	(0.04)	(0.15)	(0.12)	(0.18)
Yorkshire and Humberside	1.695	1.429	2.125	1.471	1.668
	(1.22)	(1.02)	(1.56)	(1.00)	(1.17)
West Midlands	3.918	3.899	4.256	3.807	3.838
	(1.80)	(1.91)	(2.08)*	(1.67)	(1.89)
East Midlands	–0.895	–1.075	–0.903	–1.490	–1.328
	(0.48)	(0.58)	(0.53)	(0.76)	(0.74)
East Anglia	0.276	–1.106	–0.873	–2.186	–1.307
	(0.16)	(0.68)	(0.57)	(1.33)	(0.88)
South West	–0.088	–0.528	–0.217	–0.661	–0.415
	(0.05)	(0.30)	(0.13)	(0.34)	(0.24)
Greater London	2.738	2.276	2.674	2.393	1.962
	(2.00)*	(1.69)	(1.97)*	(1.75)	(1.42)
Wales	1.351	0.520	0.310	–0.114	0.893
	(0.69)	(0.25)	(0.15)	(0.05)	(0.43)
Scotland	1.215	0.265	0.993	0.168	0.621
	(0.74)	(0.15)	(0.56)	(0.09)	(0.34)
% unemployed in TTWA	–0.263	–0.241	–0.293	–0.255	–0.293
	(1.38)	(1.21)	(1.47)	(1.24)	(1.50)
Vacancy rate in LLMA	2.285	2.624	2.522	2.234	2.223
	(1.89)	(2.07)*	(2.13)*	(1.74)	(1.82)
Non-executive share scheme	0.600	0.359	0.554	0.616	0.671
	(0.86)	(0.50)	(0.83)	(0.86)	(1.01)
Profit sharing scheme	–0.169	–0.182	0.000	–0.308	0.002
	(0.24)	(0.26)	(0.00)	(0.43)	(0.00)
Metal & Mineral Products	2.124	1.891	3.094	2.243	3.086
	(1.19)	(1.08)	(1.81)	(1.38)	(1.78)
Chemicals & Manuf. Fibres	2.932	3.359	3.696	3.633	3.066
	(1.63)	(1.93)	(1.97)*	(2.02)*	(1.63)
Metal Goods	5.672	6.153	6.112	5.724	7.267
	(2.17)*	(2.45)*	(2.69)**	(2.27)*	(3.02)**
Mechanical Engineering	1.236	1.544	0.894	2.723	1.237
	(0.85)	(1.03)	(0.64)	(1.49)	(0.77)
Elec. & Instrument Eng.	1.340	1.962	1.651	1.397	1.441
	(1.04)	(1.36)	(1.21)	(1.04)	(0.97)
Vehicles & Trans. Equipment	–2.182	–2.479	–2.800	–2.392	–2.456
	(1.19)	(1.36)	(1.60)	(1.18)	(1.38)

Food, Drink & Tobacco	–0.524	–0.882	–1.117	–0.705	–1.384
	(0.12)	(0.20)	(0.25)	(0.13)	(0.32)
Textiles	–1.093	–1.409	–2.086	–3.256	–1.423
	(0.45)	(0.53)	(0.87)	(1.00)	(0.66)
Leather Footwear & Clothing	0.119	0.268	0.202	–0.229	1.000
	(0.08)	(0.17)	(0.13)	(0.12)	(0.63)
Timber/Furniture, Paper/Print.	1.695	2.158	1.650	2.567	2.003
	(0.68)	(0.91)	(0.69)	(1.02)	(0.87)
Rubber, Plastics, Other Manuf	–1.815	–1.942	–2.038	–2.587	–1.552
	(1.08)	(1.23)	(1.23)	(1.53)	(0.99)
Energy and Water	–3.416	–3.526	–3.979	–5.132	–5.275
	(1.36)	(1.65)	(1.84)	(2.60)**	(2.87)**
Construction	–1.465	–1.663	–1.505	–2.762	–2.035
	(0.77)	(0.83)	(0.76)	(1.60)	(0.99)
Wholesale Distribution	2.730	3.107	2.787	2.676	2.986
	(1.24)	(1.47)	(1.29)	(1.21)	(1.36)
Hotels, Catering & Repairs	–3.043	–3.478	–3.798	–3.631	–3.054
	(2.14)*	(2.70)**	(3.02)**	(2.73)**	(2.11)*
Transport	–1.938	–1.831	–2.304	–1.573	–2.868
	(1.15)	(1.13)	(1.44)	(0.94)	(1.65)
Post and Telecommunications	–0.456	0.153	–0.411	–1.711	–1.961
	(0.21)	(0.08)	(0.28)	(0.84)	(1.37)
Banking, Finance & Insurance	8.727	7.113	6.392	7.943	5.857
	(2.42)*	(1.75)	(1.69)	(1.87)	(1.57)
Business Services	1.236	1.784	1.502	2.157	1.893
	(0.85)	(1.26)	(1.08)	(1.52)	(1.37)
Higher Education	–0.302	0.045	–0.057	–0.602	0.624
	(0.19)	(0.03)	(0.04)	(0.36)	(0.40)
School Education	2.785	2.111	2.615	2.647	2.270
	(1.39)	(1.05)	(1.48)	(1.44)	(1.23)
Other Education	–2.246	–2.298	–2.371	–2.576	–1.506
	(1.35)	(1.37)	(1.46)	(1.51)	(0.88)
Medical Services	–0.085	0.415	0.177	0.416	0.563
	(0.04)	(0.20)	(0.08)	(0.19)	(0.27)
Other services	–1.073	–0.845	–0.981	–2.115	–0.768
	(0.93)	(0.69)	(0.88)	(1.76)	(0.64)
Employment change, 1989–90	0.038	0.028	0.036	0.032	0.035
	(1.43)	(1.05)	(1.35)	(1.15)	(1.37)
At address 5–9 yrs	–1.461	–1.737	–1.878	–1.448	–1.964
	(0.92)	(1.07)	(1.23)	(0.88)	(1.30)
At address 10–20 yrs	0.452	0.700	0.562	1.692	0.534
	(0.31)	(0.48)	(0.39)	(1.08)	(0.38)
At address 21+ years	0.107	0.219	0.103	0.454	0.153
	(0.08)	(0.15)	(0.07)	(0.32)	(0.12)
Union voice only					–6.951
					(3.57)**
Dual channel voice					–4.282
					(2.80)**
Non-union voice only					–1.442
					(1.18)
Voice, don't know type					–8.933
					(1.44)

1–24% union density				–1.231	
				(0.85)	
25–49% union density				–3.385	
				(2.01)*	
50–74% union density				–4.075	
				(2.84)**	
75–89% union density				–5.521	
				(2.84)**	
90–99% union density				–2.556	
				(1.79)	
100% union density				–0.533	
				(0.26)	
Union, no employment negs.			–5.026		
			(4.02)**		
Union, neg. staffing levels			1.849		
			(0.70)		
Union, neg. recruitment			–3.851		
			(2.31)*		
Union, neg. levels and rec.			–3.506		
			(2.88)**		
100% col. barg. coverage		–5.297			
		(2.81)**			
80–99% col. barg. coverage		–3.925			
		(2.62)**			
50–79% col. barg. coverage		–3.433			
		(2.62)**			
20–49% col. barg. coverage		–5.551			
		(2.40)*			
1–19% col. barg. Coverage		–0.368			
		(0.11)			
Manual only union	–3.202				
	(1.63)				
Non-manual only union	–10.759				
	(3.42)**				
Man/non-man union	–3.355				
	(2.84)**				
M and NM only unions	–2.799				
	(1.85)				
M and M+NM unions	–3.372				
	(1.82)				
NM and M+NM unions	–5.627				
	(2.07)*				
All 3 types of union present	–4.054				
	(2.11)*				
Constant	–0.089	0.578	0.650	1.099	1.900
	(0.04)	(0.25)	(0.30)	(0.49)	(0.78)
Observations	482	481	482	453	482
R-squared	0.29	0.28	0.29	0.29	0.28

Note: Reference categories: branch of larger organisation; South East; Retail Distribution; at address < 5 yrs. Then for voice measures: (1) no recognised union; (2) no collective bargaining coverage; (3) no recognised union; (4) no union members; (5) no worker voice.
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A13: *Employment growth in private manufacturing*

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Number employees		–0.004	–0.004	–0.004	–0.004	–0.003
in 1990		(3.76)**	(3.82)**	(3.67)**	(3.15)**	(2.76)**
% non-manuals		–0.001	–0.008	0.001	–0.018	0.006
		(0.02)	(0.28)	(0.03)	(0.63)	(0.22)
Single independent		–0.106	–0.033	0.209	1.078	–0.162
estab		(0.08)	(0.03)	(0.16)	(0.78)	(0.13)
Head office		7.433	7.478	7.603	–11.812	7.557
		(1.15)	(1.21)	(1.20)	(3.79)**	(1.26)
North		8.010	7.152	8.801	10.467	9.294
		(1.87)	(1.75)	(2.14)*	(2.40)*	(2.31)*
North West		5.775	5.546	5.701	6.084	5.417
		(2.32)*	(2.34)*	(2.28)*	(2.32)*	(2.30)*
Yorks and Humberside		6.897	5.921	6.962	8.193	6.468
		(3.32)**	(3.06)**	(3.40)**	(3.95)**	(3.26)**
West Midlands		12.412	12.369	12.551	13.971	12.516
		(4.62)**	(4.69)**	(4.61)**	(5.10)**	(4.74)**
East Midlands		5.051	4.431	5.031	4.884	4.778
		(2.00)*	(1.70)	(2.06)*	(1.81)	(1.89)
East Anglia		7.331	7.685	7.653	8.182	7.692
		(3.77)**	(3.97)**	(4.09)**	(3.81)**	(3.84)**
South West		6.445	6.919	6.503	8.070	5.743
		(2.72)**	(2.73)**	(2.73)**	(4.00)**	(2.56)*
Greater London		3.426	2.998	3.704	4.214	3.206
		(1.71)	(1.51)	(1.94)	(2.57)*	(1.65)
Wales		5.913	5.992	5.554	7.224	6.078
		(2.72)**	(2.70)**	(2.54)*	(2.44)*	(2.83)**
Scotland		6.978	5.773	7.263	7.592	7.392
		(3.23)**	(2.84)**	(3.34)**	(3.39)**	(3.46)**
% unemployed in TTWA		–0.153	–0.037	–0.173	–0.372	–0.046
		(0.49)	(0.12)	(0.56)	(1.07)	(0.16)
Vacancy rate in LLMA		1.622	1.724	1.841	–0.194	2.480
		(1.00)	(1.15)	(1.09)	(0.11)	(1.57)
Non-exec share scheme		0.439	0.718	0.351	–0.454	1.249
		(0.39)	(0.64)	(0.33)	(0.44)	(1.14)
Profit sharing scheme		0.404	0.505	0.354	0.723	–0.236
		(0.44)	(0.56)	(0.41)	(0.88)	(0.27)
Metals & Mineral Prods.		3.371	2.042	3.340	0.984	3.884
		(1.21)	(0.70)	(0.99)	(0.38)	(1.67)
Chemicals & Manu. Fibres		4.971	3.927	4.854	5.677	5.846
		(1.61)	(1.18)	(1.34)	(2.16)*	(2.11)*
Metal Goods		5.937	6.044	5.907	6.043	7.446
		(1.94)	(1.71)	(1.69)	(1.98)*	(2.55)*
Mechanical Engineering		2.777	2.219	2.120	5.771	4.132
		(0.97)	(0.69)	(0.66)	(2.24)*	(1.68)
Elec. & Instr. Eng.		4.106	3.540	3.856	4.420	5.446
		(1.49)	(1.16)	(1.20)	(1.77)	(2.18)*
Vehicles & Trans. Equip.		2.175	1.888	1.947	2.999	4.411
		(0.64)	(0.53)	(0.51)	(0.84)	(1.35)
Food, Drink, Tobacco		2.436	2.238	1.890	6.088	4.370
		(0.57)	(0.51)	(0.41)	(1.30)	(1.06)
Leather, Footwear,		2.299	0.886	2.029	3.209	2.712
Clothes		(0.75)	(0.25)	(0.58)	(0.99)	(1.01)

Timber etc.		3.387	2.623	3.143	2.105	4.067
		(1.13)	(0.80)	(0.96)	(0.77)	(1.41)
Rubber etc.		–0.380	–1.684	–0.407	–0.146	0.583
		(0.14)	(0.54)	(0.13)	(0.06)	(0.24)
Employment change, 89–90		0.040	0.031	0.050	–0.038	0.038
		(1.25)	(0.98)	(1.68)	(1.23)	(1.27)
5–9 yrs at address		–2.518	–1.178	–2.502	–0.691	–1.352
		(0.95)	(0.46)	(0.98)	(0.25)	(0.49)
10–20 yrs at address		0.640	1.298	0.992	1.744	0.938
		(0.25)	(0.53)	(0.40)	(0.60)	(0.36)
21+ yrs at address		0.428	1.186	1.034	–0.360	1.442
		(0.18)	(0.52)	(0.45)	(0.14)	(0.60)
Union recognition	–2.235	–3.377				
	(1.72)	(2.23)*				
1 recognised union						–2.228
						(1.43)
2 recognised unions						–2.276
						(1.14)
3 recognised unions						–7.398
						(3.31)**
1–24% union density					–2.715	
					(1.09)	
25–49% union density					1.694	
					(1.03)	
50–74% union density					0.020	
					(0.01)	
75–89% union density					–1.942	
					(0.96)	
90–100% union density					–1.642	
					(0.82)	
Union, no emp negs				–3.782		
				(2.47)*		
Union neg staffing level				–0.308		
				(0.10)		
Union neg recruitment				–1.075		
				(0.47)		
Union neg stf and rec				–4.802		
				(2.31)*		
100% col barg coverage			–5.603			
			(2.55)*			
80–99% col barg coverage			–4.194			
			(1.84)			
50–79% col barg coverage			–2.032			
			(1.29)			
1–49% col barg coverage			–2.025			
			(1.05)			
Constant	1.527	–7.184	–7.614	–7.514	–6.277	–10.646
	(1.34)	(1.83)	(1.90)	(1.83)	(1.92)	(2.88)**
Observations	248	224	224	224	184	224
R-squared	0.03	0.40	0.42	0.42	0.50	0.44

Note: Reference categories: branch of larger organisation; South East; Textiles; at address less than 5 years. Voice reference category is no recognised union in Models (1), (2)< (4), (6). In M(3) ref is no coverage. In M(5) reference is no union members.
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%

Table A14: *Employment growth in private services*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
N employees '90		–0.004	–0.004	–0.004	–0.004	–0.004	–0.004
		(2.72)**	(2.45)*	(3.08)**	(2.18)*	(2.75)**	(2.76)**
% non-manual		–0.037	–0.043	–0.038	–0.025	–0.033	–0.029
		(2.21)*	(2.53)*	(2.33)*	(1.47)	(2.13)*	(1.71)
Single estab		0.804	0.466	0.586	0.845	0.645	1.095
		(0.77)	(0.44)	(0.58)	(0.79)	(0.63)	(0.95)
HQ		4.792	4.878	4.715	0.282	4.553	4.738
		(1.50)	(1.60)	(1.55)	(0.09)	(1.53)	(1.52)
North		–0.141	–0.356	–0.250	0.305	0.430	0.092
		(0.06)	(0.14)	(0.10)	(0.13)	(0.16)	(0.04)
North West		–2.161	–2.339	–2.114	–2.095	–2.712	–1.789
		(0.89)	(0.94)	(0.88)	(0.92)	(1.12)	(0.73)
Yorks/Humber		–0.746	–0.979	–0.561	0.060	–0.840	–0.715
		(0.42)	(0.58)	(0.32)	(0.03)	(0.50)	(0.41)
W Mids		–1.256	–0.855	–0.455	–1.874	–0.858	–1.488
		(0.50)	(0.39)	(0.20)	(0.73)	(0.39)	(0.54)
E Mids		–3.057	–3.192	–2.591	–3.359	–3.417	–2.669
		(1.23)	(1.33)	(1.07)	(1.90)	(1.58)	(1.14)
E Anglia		–3.346	–3.357	–2.785	–2.931	–3.365	–2.995
		(1.93)	(1.78)	(1.67)	(1.78)	(2.14)*	(1.80)
South West		–3.195	–3.457	–2.598	–1.545	–2.394	–3.753
		(1.62)	(1.79)	(1.41)	(0.80)	(1.23)	(1.81)
Gtr London		1.181	1.129	1.702	0.455	0.789	1.107
		(0.75)	(0.75)	(1.13)	(0.31)	(0.51)	(0.74)
Wales		2.130	–0.558	1.232	2.895	2.827	0.003
		(0.44)	(0.10)	(0.23)	(0.71)	(0.49)	(0.00)
Scotland		–1.969	–2.279	–1.475	0.060	–1.841	–1.718
		(0.87)	(1.00)	(0.67)	(0.03)	(0.82)	(0.79)
% unemp		–0.196	–0.189	–0.185	–0.334	–0.226	–0.230
		(0.78)	(0.76)	(0.74)	(1.47)	(0.93)	(0.92)
% vacancies		2.807	3.148	3.103	2.425	2.674	2.603
		(1.78)	(1.89)	(2.03)*	(1.60)	(1.70)	(1.55)
Share scheme		0.205	–0.282	0.185	0.060	0.265	–0.124
		(0.26)	(0.34)	(0.24)	(0.08)	(0.35)	(0.15)
Profit share		0.267	0.336	0.451	–0.403	0.501	0.276
		(0.31)	(0.40)	(0.54)	(0.48)	(0.59)	(0.32)
Energy & Water		–1.370	–1.309	–0.820	–2.078	–2.765	2.559
		(0.54)	(0.46)	(0.29)	(0.83)	(1.15)	(0.72)
Construction		–1.501	–1.732	–1.388	–1.327	–2.025	–1.732
		(0.71)	(0.82)	(0.67)	(0.66)	(0.91)	(0.84)
Whole. Dist.		3.445	3.631	3.376	3.707	3.720	3.024
		(1.75)	(1.90)	(1.70)	(1.68)	(1.80)	(1.43)
Hotels etc		–2.782	–3.260	–3.549	–3.092	–2.615	–2.438
		(1.85)	(2.42)*	(2.67)**	(2.26)*	(1.77)	(1.72)
Transport		–1.253	–1.293	–1.676	–0.463	–2.323	–0.900
		(0.71)	(0.72)	(0.96)	(0.28)	(1.23)	(0.46)

Post & Tel.		–0.263	0.283	0.986	–0.613	–1.324	2.767
		(0.15)	(0.10)	(0.51)	(0.24)	(0.70)	(1.04)
Banking etc		7.335	8.094	7.875	3.095	6.990	7.674
		(1.88)	(1.91)	(2.10)*	(1.15)	(1.84)	(1.91)
Business		1.863	1.880	1.544	1.305	2.070	1.728
		(1.25)	(1.28)	(1.06)	(0.87)	(1.41)	(1.13)
Higher educ		0.019	0.008	–0.248	–0.750	1.097	–0.331
		(0.01)	(0.00)	(0.12)	(0.41)	(0.58)	(0.17)
School educ		2.464	2.593	2.977	1.836	2.115	2.617
		(1.46)	(1.42)	(1.75)	(1.07)	(1.14)	(1.52)
Other educ		–1.752	–2.037	–2.005	–1.675	–0.811	–2.145
		(0.81)	(0.94)	(0.96)	(0.74)	(0.37)	(1.00)
Medical		0.737	0.709	–0.183	–3.714	0.546	1.130
		(0.32)	(0.31)	(0.08)	(1.23)	(0.25)	(0.48)
Other serv.		–0.295	–0.425	–0.632	–2.104	–0.009	–0.798
		(0.23)	(0.32)	(0.54)	(1.35)	(0.01)	(0.62)
Emp chg 89–90		0.033	0.027	0.037	0.094	0.036	0.033
		(1.03)	(0.82)	(1.10)	(2.45)*	(1.14)	(0.97)
Age 5–9 yrs		–2.299	–2.437	–2.366	–5.182	–2.748	–1.911
		(1.30)	(1.30)	(1.37)	(2.71)**	(1.62)	(1.04)
Age 10–20 yr		0.691	0.828	0.578	–0.492	0.295	0.811
		(0.41)	(0.49)	(0.35)	(0.28)	(0.18)	(0.47)
Age 21+ yr		–0.058	–0.093	–0.329	–1.884	–0.257	–0.187
		(0.04)	(0.05)	(0.20)	(1.06)	(0.17)	(0.11)
Recog union	–3.814	–4.649					
	(4.29)**	(3.22)**					
Manual union							–0.793
							(0.32)
NM union							–4.667
							(1.97)*
M+NM union							–2.454
							(1.91)
Union voice						–8.734	
						(3.41)**	
Dual channel						–4.769	
						(2.55)*	
Non-union						–1.786	
						(1.24)	
Voice, DK						1.184	
						(0.49)	
1–24% dens					0.134		
					(0.08)		
25–49% dens					–4.593		
					(2.44)*		
50–74% dens					–6.963		
					(2.84)**		
75–89% dens					–4.750		
					(1.73)		
90–99% dens					–1.074		
					(0.64)		

100% density					2.422		
					(1.01)		
No emp neg				–6.068			
				(3.75)**			
Neg staff				3.018			
				(0.86)			
Neg recruit				–8.569			
				(3.87)**			
Neg both				–2.580			
				(1.84)			
100% cover			–5.076				
			(2.08)*				
80–99% cover			–4.135				
			(1.97)*				
50–79% cover			–4.625				
			(2.22)*				
20–49% cover			–7.482				
			(2.56)*				
1–19% cover			–0.143				
			(0.05)				
Constant	1.411	2.042	2.402	1.902	4.082	3.578	1.566
	(2.23)*	(0.84)	(0.88)	(0.80)	(1.56)	(1.31)	(0.60)
Observations	310	258	257	258	197	258	258
R-squared	0.06	0.30	0.31	0.32	0.34	0.32	0.28

Note: Reference categories: branch of larger organisation; South East; Retail Distribution; age under 5 years. For voice measures: (1) no recognition (2) no recognition (3) no bargaining coverage (4) no recognition (5) no union members (6) no worker voice (7) each union type dummy is evaluated against no having that sort of union at the workplace. Note: there was only one case in which a unionised private sector service workplace negotiated over recruitment but not staffing levels, so the coefficient should be ignored.

Absolute value of t-statistics in parentheses

* significant at 5%; ** significant at 1%

Table A15: *Selection adjusted estimates of employment growth in the private sector, 1990–1998*

Heckman selection model
(regression model with sample selection)

Number of obs = 872
Censored obs = 314
Uncensored obs = 558

Wald chi2(42) = 175.89
Log likelihood = –1919.689 Prob > chi2 = 0.0000

	Coef.	*Robust Std. Err.*	*z*	*P>|z|*	*[95% Conf.*	*Interval]*
empgpa						
unionrec	–4.36291	1.468378	–2.971	0.003	–7.240878	–1.484942
xaallemp	0.0022557	0.0010325	2.185	0.029	0.000232	0.0042793
pcnman	0.0030598	0.0165265	0.185	0.853	–0.0293316	0.0354512
lxbsin_1	0.6661478	0.9917225	0.672	0.502	–1.277592	2.609888
lxbsin_3	3.403587	2.322865	1.465	0.143	–1.149144	7.956318
north	2.995093	2.295249	1.305	0.192	–1.503512	7.493698
nwest	2.461774	2.129872	1.156	0.248	–1.712698	6.636246
yandh	4.430638	1.851207	2.393	0.017	0.8023391	8.058937
wmids	5.19324	2.33264	2.226	0.026	0.6213496	9.76513
emids	0.0729959	1.937477	0.038	0.970	–3.72439	3.870381
eastang	–2.82794	2.014707	–1.404	0.160	–6.776693	1.120812
swest	1.495072	2.029545	0.737	0.461	–2.482763	5.472908
gtrlon	2.495453	1.458133	1.711	0.087	–0.3624341	5.353341
wales	1.926769	2.171255	0.887	0.375	–2.328812	6.182351
scotland	2.869087	2.273895	1.262	0.207	–1.587665	7.32584
uttwa	–0.1572378	0.2340242	–0.672	0.502	–0.6159168	0.3014413
vacancy	1.625502	0.8974568	1.811	0.070	–0.1334805	3.384485
xshare	0.709736	0.5557327	1.277	0.202	–0.37948	1.798952
xprofit	–0.2759869	0.5532013	–0.499	0.618	–1.360242	0.8082678
lxbsi_1	4.655586	1.632452	2.852	0.004	1.456039	7.855133
lxbsi_2	4.674	1.955575	2.390	0.017	0.8411443	8.506856
lxbsi_3	2.476628	2.41961	1.024	0.306	–2.26572	7.218976
lxbsi_4	0.1316017	1.802672	0.073	0.942	–3.40157	3.664774
lxbsi_5	0.5234148	1.684532	0.311	0.756	–2.778206	3.825036
lxbsi_6	–4.292558	1.875445	–2.289	0.022	–7.968362	–0.6167539
lxbsi_7	–6.490438	4.606192	–1.409	0.159	–15.51841	2.537532
lxbsi_8	–1.979814	1.9688	–1.006	0.315	–5.838591	1.878962
lxbsi_9	–1.262834	2.06151	–0.613	0.540	–5.303319	2.777652
lxbsi_10	–1.937816	2.790693	–0.694	0.487	–7.407474	3.531843
lxbsi_11	–5.095829	1.853387	–2.749	0.006	–8.728401	–1.463258
lxbsi_12	–8.164625	3.360924	–2.429	0.015	–14.75192	–1.577334
lxbsi_13	–1.092976	2.078235	–0.526	0.599	–5.166242	2.98029
lxbsi_14	1.613595	2.085323	0.774	0.439	–2.473563	5.700752
lxbsi_15	0.9535411	1.28213	0.744	0.457	–1.559387	3.466469
lxbsi_16	–1.851661	1.862248	–0.994	0.320	–5.5016	1.798278
lxbsi_17	–3.647711	2.677951	–1.362	0.173	–8.896399	1.600976
lxbsi_18	–3.625907	2.271474	–1.596	0.110	–8.077915	0.826101

lxbsi_19	–2.960453	3.137604	–0.944	0.345	–9.110044	3.189137
lxbsi_20	0.4660452	1.68764	0.276	0.782	–2.841667	3.773758
lxbsi_23	2.58376	1.785791	1.447	0.148	–0.9163257	6.083846
lxbsi_24	4.471855	2.122782	2.107	0.035	0.3112798	8.632431
lxbsi_25	–1.433627	1.306651	–1.097	0.273	–3.994617	1.127362
lxbsi_26	0.656911	2.031952	0.323	0.746	–3.325642	4.639464
_cons	–7.720522	2.073011	–3.724	0.000	–11.78355	–3.657495
survive						
unionrec	–0.2170981	0.1032634	–2.102	0.036	–0.4194907	–0.0147055
induden2	–0.0065557	0.0050637	–1.295	0.195	–0.0164805	0.003369
lgemp90	0.6964611	0.0610813	11.402	0.000	0.5767441	0.8161782
pcnman	0.0024801	0.0014928	1.661	0.097	–0.0004458	0.005406
single	0.1636449	0.1030671	1.588	0.112	–0.038363	0.3656528
north	0.0547008	0.2305712	0.237	0.812	–0.3972104	0.5066121
nwest	0.3578048	0.181459	1.972	0.049	0.0021518	0.7134578
yandh	0.3602587	0.1763587	2.043	0.041	0.014602	0.7059154
wmids	0.5068414	0.2066328	2.453	0.014	0.1018486	0.9118342
emids	0.1592128	0.1895604	0.840	0.401	–0.2123187	0.5307443
eastang	–0.4663819	0.2968815	–1.571	0.116	–1.048259	0.1154952
swest	0.1556087	0.1680387	0.926	0.354	–0.1737411	0.4849585
gtrlon	0.170864	0.1709238	1.000	0.317	–0.1641405	0.5058685
wales	–0.0249386	0.1880248	–0.133	0.894	–0.3934605	0.3435833
scotland	0.2347649	0.2105447	1.115	0.265	–0.1778951	0.647425
uttwa	0.0066332	0.0220552	0.301	0.764	–0.0365942	0.0498607
lxbsic_1	–0.8941497	0.3176854	–2.815	0.005	–1.516802	–0.2714978
lxbsic_2	0.2794264	0.1740542	1.605	0.108	–0.0617135	0.6205663
lxbsic_3	–0.6793125	0.1991858	–3.410	0.001	–1.06971	–0.2889155
lxbsic_4	–0.7376363	0.2070303	–3.563	0.000	–1.143408	–0.3318644
lxbsic_5	–0.1031124	0.1928424	–0.535	0.593	–0.4810766	0.2748519
lxbsic_6	–0.1949818	0.2190706	–0.890	0.373	–0.6243524	0.2343888
lxbsic_7	–0.3677549	0.2089097	–1.760	0.078	–0.7772104	0.0417006
lxbsic_8	–0.2862309	0.2195168	–1.304	0.192	–0.716476	0.1440142
_cons	–2.672011	0.3879788	–6.887	0.000	–3.432435	–1.911586
/athrho	2.055116	0.6237078	3.295	0.001	0.8326709	3.277561
/lnsigma	2.177178	0.1220226	17.842	0.000	1.938018	2.416338
rho	0.9677215	0.0396148	0.68190750.9971584			
sigma	8.821376	1.076407	6.94497211.20475			
lambda	8.536636	1.36051	5.87008511.20319			

Wald test of indep. eqns. (rho = 0): chi2(1) = 10.86 Prob > chi2 = 0.0010

Key to variable names:

UNIONREC	Union recognition
INDUDEN2	Industry-level union density
XAALLEMP	Number of employees at workplace in 1990
LGEMP90	Log of 1990 workplace employment

PCNMAN	% of employees non-manual
XSHARE	Non-executive share ownership scheme
XPROFIT	Profit-related pay scheme
Ixbsin_1	Single independent workplace
Ixbsin_3	Head office
SINGLE	Single independent workplace
VACANCY	Vacancies at Jobcentres as % of economically active in the local labour market area
UTTWA	% persons unemployed out of economically active in travel-to-work area
NORTH	North
NWEST	North West
YANDH	Yorkshire and Humberside
WMIDS	West Midlands
EMIDS	East Midlands
EASTANG	East Anglia
SWEST	South West
GTRLON	Greater London
WALES	Wales
SCOTLAND	Scotland
Ixbsi_1	Metals & mineral products
Ixbsi_2	Chemicals and manufd fibres
Ixbsi_3	Metal goods
Ixbsi_4	Mechanical engineering
Ixbsi_5	Electrical & instrument engineering
Ixbsi_6	Vehicles and transport equipment
Ixbsi_7	Food, drink & tobacco
Ixbsi_8	Textiles
Ixbsi_9	Leather, footwear & clothing
Ixbsi_10	Timber & furniture, paper & printing
Ixbsi_11	Rubber, plastics & other manufg
Ixbsi_12	Energy & water
Ixbsi_13	Construction
Ixbsi_14	Wholesale distribution
Ixbsi_15	Retail distribution
Ixbsi_16	Hotels, catering, repairs
Ixbsi_17	Transport
Ixbsi_18	Post and telecommunications
Ixbsi_19	Banking, finance, insurance
Ixbsi_20	Business services
Ixbsi_21	Central government
Ixbsi_22	Local government
Ixbsi_23	Higher education
Ixbsi_24	School education
Ixbsi_25	Other education
Ixbsi_26	Medical services
Ixbsi_27	Other services
Ixbsic_1	Energy and water supply industries
Ixbsic_2	Extraction of minerals/ores; manuf of metals, minerals & chems
Ixbsic_3	Metal goods, engineering & vehicles industries
Ixbsic_4	Other manufacturing industries
Ixbsic_5	Construction
Ixbsic_6	Distribution, hotels & catering, repairs
Ixbsic_7	Transport and communications
Ixbsic_8	Banking, finance, insurance, bus. services & leasing
Ixbsic_9	Other services

Table A16: *Employment growth per annum in the public sector, 1990–98, by 1990 characteristics*

	Public sector	*Private sector*
Whole sector	1.48	0.34
Measures of voice		
Union and non-union voice:		
Union voice only (union rec or choose JCC rep)	–0.27	–1.49
Non-union voice only (non-union appointment to JCC, briefing group, regular workforce meetings, problem solving group, or presence of non-union reps where no union members)	3.07	1.08
Union and non-union voice	1.58	–1.84
None	–7.62	2.37
Representative and direct voice:		
Representative voice only (union rec or functioning JCC)	–0.65	–1.35
Direct voice only (briefing group, regular workforce meetings, problem solving group)	2.72	1.04
Representative and direct voice	1.75	–0.58
None	–7.62	2.37
Joint consultative committee	1.87	–0.46
Functioning JCC (meets at least once a month)	2.08	–0.40
No JCC	1.12	0.62
Management ability to organise work of non-managerial staff limited by workers (union members, representatives, or non-union workers, or formal agreement)	0.53	–2.28
Management ability to organise not limited	1.81	0.63
Measures of union presence:		
Union recognition	1.26	–1.75
No recognised union	2.89	1.44
Derecognition by 1998	3.57	0.34
New recognition by 1998	2.51	0.06
1 recognised union	1.20	–1.17
2 recognised unions	2.40	–1.42
3+ recognised unions	0.16	–3.88
Types of union at workplace:		
Manuals-only union	3.13	–0.51
Non-manuals only union	3.24	–4.26
Manuals and non-manuals union	–0.07	–1.41
Manuals only and non-manuals only	1.01	–1.33
Manuals only and manual/non-manual	0.76	–1.54
Non-manuals only and manual/non-manual	0.34	–3.06
All 3 types of union	–0.38	–3.84

Any recognised union with manual members only	0.90	–1.27
Any recognised union with non-manual members only	1.32	–3.08
Any recognised union with both manual and non-manual members	0.16	–1.95
Closed shop	2.80	–2.48
No closed shop	1.44	0.45
Union chooses JCC reps	1.21	–2.67
Union representative at workplace	0.40	–1.70
No on-site union representative	3.14	1.06
Union density:		
0%	2.87	1.57
1–24%	–1.32	–0.25
25–49%	1.33	–0.22
50–74%	2.08	–1.68
75–89%	2.59	–2.08
90–99%	–0.62	–2.24
100%	2.06	–0.92
Joint bargaining (ie single-table with multi-unions)	–0.32	–3.03
Separate bargaining	1.66	–2.34
Only a single recognised union	1.20	–1.17
N bargaining units:		
0	2.89	1.44
1	0.92	–1.34
2	1.87	–1.62
3+	0.73	–3.23
Collective bargaining coverage:		
0%	1.99	1.44
1–19%	4.81	1.40
20–49%	–0.22	–2.80
50–79%	3.64	–1.23
80–99%	0.62	–2.54
100%	0.49	–2.13
Bargaining over employment where recognition:		
No bargaining over employment	1.19	–1.94
Bargaining over staffing levels	2.73	–1.36
Bargaining over recruitment	0.63	–1.92
Bargaining over staff levels and recruitment	0.78	–1.17
Workplace characteristics		
N employees, 1990:		
25–49	2.05	1.32
50–99	3.49	0.65
100–199	–2.14	–0.56
200–499	–0.32	–2.30
500–999	–4.53	–5.47
1000+	–2.21	–4.41
Education sector	1.79	NA

Local government	4.13	NA
Central government	6.18	NA
Public sector medical services	7.38	NA
Other public services	–0.48	NA
Other public sector	0.29	NA
Single workplace	5.02	0.98
Branch	1.52	–0.44
HQ	–2.02	6.48
Admin office or HQ	2.57	3.94
Sells goods/services	1.40	0.04
Age, < 5 yrs	1.50	1.55
Age, 5–9 yrs	–1.47	–0.11
Age, 10–20 yrs	1.28	0.49
Age, 21+ yrs	1.84	0.00
Workforce characteristics		
Uses short-term or fixed term contracts	0.02	–0.28
Doesn't use short-term or fixed term contracts	2.77	0.52
Percentage non-manual:		
<50%	0.34	–0.04
>=50%	2.01	0.83
Percentage part-time:		
0%	1.35	1.53
1–24%	2.60	0.01
25+%	0.59	0.56
Percentage female:		
0–24%	0.82	–0.05
25–74%	2.03	1.23
75+%	1.38	–0.16
Employment change, 89–90:		
<5%+	0.89	0.32
>=5%+	2.76	1.81
Stable	1.05	–1.15
Missing	2.01	–1.20
Employment change, 87–90:		
<5%+	0.58	–0.50
>=5%+	0.99	1.52
Stable	2.37	0.59
Missing	1.55	–0.70

Table A17: *Employment growth per annum in the public sector*

No negotiations with unions	2.739	(1.50)
Separate bargaining arrangements	2.814	(2.20)*
Single union	3.668	(2.05)*
Log employment level in 1990	–2.530	(5.57)**
At current address for 5–9 years	–3.432	(1.29)
At current address for 10–20 years	–1.087	(0.52)
At current address for 21+ years	–0.753	(0.36)
% non-manual workers	0.024	(1.17)
North	2.016	(0.72)
North West	2.445	(1.04)
Yorkshire and Humberside	2.955	(1.32)
West Midlands	3.649	(2.05)*
East Midlands	3.178	(0.91)
East Anglia	1.581	(0.81)
South West	2.103	(1.34)
Greater London	–0.498	(0.38)
Wales	–0.260	(0.12)
Scotland	4.130	(1.49)
% unemployed in TTWA	–0.471	(1.35)
Vacancy ratio in LLMA	1.701	(0.86)
Education sector	–1.441	(0.67)
Central government	3.778	(1.18)
Local government	–0.711	(0.29)
Medical services	2.097	(0.84)
Other services	–2.977	(1.39)
Constant	8.909	(2.11)*
Observations	276	
R-squared	0.29	

Note: Reference categories are: single-table bargaining; at current address for under 5 years; South East; Other public sector (largely consisting of post and telecommunications and transport).
Absolute value of t-statistics in parentheses
* significant at 5%; ** significant at 1%