CENTRE for ECONOMIC PERFORMANCE

CEP Discussion Paper No 867

May 2008

A Tale of Two Countries: Unions, Closures and Growth in Britain and Norway

Alex Bryson and Harald Dale-Olsen

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Abstract
Using linked private sector employer-employee panel data for Britain and Norway we explore the effects of unionization on workplace closure and employment growth over the period 1997-2004. Unions prolonged the life of low-wage workplaces in Britain, whereas Norwegian unions increased (reduced) closure hazards in high (low) waged workplaces. Contrary to earlier studies, unions had no effect on workplace growth in Britain. In Norway, union workplaces experienced 4 percent per annum lower growth. However, the estimation of a dynamic panel data model for Norway indicates positive long-term causal effects of union density on employment.

Keywords: Unions, closure, employment growth, comparative, system-GMM
JEL classificationss: J51

This paper was produced as part of the Centre's Labour Markets Programme. The Centre for Economic Performance is financed by the Economic and Social Research Council.

Acknowledgements
We thank the Norwegian Research Council for funding (grant No. 173591/S20). We also thank Erling Barth, Stephen Pischke, John Van Reenen, and participants at the LSE/CEP labour market research seminar, the IFS seminar series and the ESRC funded PSI/CEP funded workshop "The Survival and Growth of Firms" for helpful comments and suggestions. Alex Bryson thanks the sponsors of the Workplace Employment Relations Survey (Department for Business Enterprise and Regulatory Reform, Acas, ESRC and PSI) and the UK Data Archive for access to the WERS data.

Alex Bryson is the Manpower Research Fellow with the Centre for Economic Performance, LSE and a Principal Research Fellow, Policy Studies Institute, London, e-mail: brysona@psi.org.uk, Harald Dale-Olsen is a Senior Researcher at the Institute for Social Research, Norway.

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

ISBN 978-0-85328-263-1

1. Introduction

Britain and Norway are both advanced European industrial economies but they differ along a number of dimensions. According to Esping-Andersen's (1999) classification, Britain is a typical liberal regime, while Norway is squarely located in the social-democratic tradition. Wage dispersion in Britain is high and widening due, in part, to relatively low and diminishing unionisation (Card, Lemieux and Riddell, 2003; Bryson and Forth, 2006). Norway, on the other hand, is characterised by very low wage dispersion, high levels of unionisation and a high level of coordination in wage setting.[1] Thus Britain and Norway are near-opposites in terms of what unions do and how they are traditionally treated. This paper exploits these differences in the nature of unionization in Britain and Norway to further understanding of union effects on the workplace, an understanding that, until recently, was based almost exclusively on studies for Anglo-American countries. We do so by assessing the impact of unionisation on workplace closure and growth from 1997 to 2004.

Several authors have noted the diminishing role of unions in the British economy during the 1980s and 1990s (Millward et al., 2000; Brown et al, 1998, 2000), where firm decisions are increasingly taken without their involvement (Cully et al., 1999:110, 207; Brown et al., 2000: 616-19). During the period we consider, private sector unionization continued to decline (Kersley et al., 2006; Table 1). Where unions remained in place they had less impact than in the past (Menezes-Filho, 1997; Bryson and Wilkinson, 2002; Blanchflower and Bryson, 2008).[2]. For instance, the union wage premium, which traditionally hovers around 10 percent, has been nearly halved since the 1990s (Blanchflower and Bryson, 2003; Blanchflower and Bryson, 2007). However, the rate of union decline may have levelled off recently, at least in some industries. In 1999 the Labour government strengthened unions' position by introducing the Employment Relations Act, which mandates union recognition if the majority of the workforce wants it. This may have contributed to a diminution in the rate of union decline and even some evidence of a net growth in union recognition (Gall, 2004; Blanden et al. 2007). But the overall impression is that, whereas union decline has slowed it has not been reversed: there have been no major changes in union fortunes over the last decade (Bryson, 2007).

Compared to Britain there has been little change in Norwegian unionisation which remains at a high level relative to other European countries. Union density in Norway remained

[1] In Wallerstein (1999)'s ranking of wage setting centralisation Norway ranks at the top, while the UK ranks third from the bottom (above Canada and the USA).

[2] A firm recognising unions in 1984 could expect to see its profitability drop by 41 percent, while this negative impact had become negligible by 1990 (Menezes-Filho, 1997).

unchanged between the 1950s and mid-1990s (around 57%), and then the following decade brought only a small reduction to 52 percent (Stokke et al., 2003; Nergaard and Stokke, 2005, 2007). This level of union density is considerably lower than in the other Nordic countries. Nergaard and Stokke (2007) attribute this to the fact that unemployment and social insurance in Norway are provided independent of union membership. Employer associations and worker unions gained influence after the Norwegian recession during the late 1980s, and the cooperation between employer associations and worker unions delivered low nominal wage growth during the period 1988-97 (Stokke et al., 2003:178; Nergaard and Stokke, 2005).[3] Over the period we consider closure and growth, over 70 percent of the private sector workplaces had union workers and union agreements, though there was a downward drift in unionization (Table 1). The union membership wage premium in the private sector was small but unchanged.[4] There are two main changes which affected coordinated wage setting in Norway during the 1990s. First, one observes a decentralisation of wage bargaining resulting in an increased prevalence of localised wage bargaining. In 1989 53 percent of workplaces were involved in local bargaining. In 2003 this had increased to about 70 percent.[5] Second, employer collective organisation increased markedly. The percentage of private sector employers organised in employers' associations rose from 57 percent in 1989 to 70 percent in 2003.

This is the background for our comparative study of the relationship between unions, workplace closures and workplace employment growth. Both the impact of unions on closure and the impact of unions on growth are theoretically ambiguous. We will discuss these theories in the next section. For now, note that while the classical interpretation of unions is that they increase wages and thus lower profitability, union voice theories imply that unions engender cooperation between employers and workers thus improving productivity. Empirically the impact of unions on closures appears to be time and country-dependent, as well as sensitive to methodological differences across studies. For Britain, for example, Machin (1995) finds no effect of unions on closures in the 1980s, while Bryson (2004a) finds evidence of a positive impact during the 1990s. Union recognition is associated with a 5-6 percent higher closure probability. In the USA, Freeman and Kleiner (1999) identified a positive association between closure and unionisation, but DiNardo and Lee (2004) find no statistically significant relationship during the period 1983-99. While the evidence of unions' impact on closure is mixed, the

[3] This benefited employers, of course, and may have reduced their scepticism toward unions in general (Bowman, 2002).

[4] Running simple OLS-regressions of log wages on seniority, age, years of education and a union dummy on 10 percent random samples from our data of fulltime workers for 1995 and 2003 (see section 3 on details on data) , shows that the private sector union premium increases from 2.2 percent to 3.0 percent.

[5] This does not imply a reduction of centralised wage determination, but that local bargaining supplements the centrally determined wage.

empirical literature on growth is fairly unambiguous: unionisation decreases annual employment growth. In Australia, Wooden and Hawke (2000) found a negative union effect of 2.5 percent. In Britain, Bryson (2004b) estimates a negative union effect of 3-4 percent during the 1990s, which is similar to the effect estimated by Blanchflower et al. (1991) for the early 1980s. In Canada, Long (1993) identifies 3.7 percent lower growth in unionised companies, while in the neighbouring USA, union plants were associated with 4 percent lower growth than non-union plants in the period 1974-1980 (Leonard, 1992).[6] Thus the effect is surprisingly similar across Anglo-American countries and over time, i.e., it ranges between -2.5 and -4 percent. This has led some analysts to refer to the employment effect of unions as the 'one constant' in studies of unions' economic effects (Addison and Belfield, 2004).[7] Although others would argue that this employment effect just follows from the diminishing role of unionised industries in the Anglo-American economies, a brief look at Figure 1, which depicts the relationship in Norway between 5-digit SIC industry employment growth from 1997 to 2003 and 5-digit industry union density in 1997, reveals no such obvious pattern. Thus at least for Norway this explanation is too simple. Even for Britain this explanation is probably simplistic, since Bryson (2004) shows that the union effect during the period 1990-1998 occurs within 2-digit SIC industries.

This is the first study of how unionisation affects closures and workplace employment growth in Norway. The paper seeks to contribute to the literature in four other ways. First, we estimate union closure and growth effects in different parts of the workplace wage distribution. Second, using generalised order probits (Williams, 2006) we consider whether union effects differ across different magnitudes of employment growth (shrinkage). Third, in the case of Norway, we are able to account for the potential endogeneity of union density by instrumenting using union membership fees. Fourth, using the yearly panel data for Norway, we are able to estimate System-GMM models (Roodman, 2005) to identify the causal impact of unionisation on short-run and long-run employment growth.

The structure of the remainder of the paper is as follows. Section 2 discusses why unions affect closure and growth theoretically. Our data are described in Section 3. Section 4 describes the basic econometric models. Section 5 describes unionisation in Britain and Norway, differences in trends and economic roles. In Section 6 we analyse the impact of unionisation on workplaces' closure probability, while Section 7 is devoted to analyses of the impact of

[6] In a recent study of State recoveries Krol and Svorny (2007) link slower job growth to union influence.

[7] However, some studies find quite different results. DiNardo and Lee (2004), find no statistically significant union effect on employment in the US and Machin and Wadhwani (1991) find the union negative effect in the early 1980s is confined to workplaces undergoing substantial organisational change. Furthermore, they find that unionised firms grew more quickly than non-unionised firms in the late 1970s.

unionisation on growth. Section 8 presents an analysis of the dynamics of labour demand and the relationship to unionisation. We end our paper with a brief conclusion and a discussion of the implications in Section 9.

2. Unions, Closures and Growth in the Theoretical Literature

Unions perform a number of functions that affect workplaces either directly or indirectly. In this section we will discuss four of these. The first three are directly related to unions' function at the workplace (Bryson, 2004a). First, unions provide workers with a collective voice (Freeman and Medoff, 1984). Second, they conduct bargaining. Third, they act as employers' agents in mediating employer strategies (Vroman, 1990). Fourth, and of particular relevance to Norway, is unions' effect on aggregate performance through bargaining at different levels in the economy (workplace, organisation, sector, nationally). The level at which unions bargain is partly a function of what workers seek at workplace level but it also reflects the interests of both unions and employers. These four elements may affect closures (and growth) in different ways.

If unions bargain over wages successfully, they are able to raise wages for their members above market wages. These rent seeking activities raise costs and lower profitability. By pushing wages above the value of marginal labour productivity unions may increase closure hazards. However, if firms successfully organise workplaces with excess profit, bargaining may only increase the surplus share going to union workers at the expense of the employers. In this case it is not clear that the closure hazard will be affected.

Union bargaining affects not only wages, but also investments. If wages increase, then employers substitute capital for labour, thus increasing investments. This may improve productivity and reduce employment growth if wages and agreements are not renegotiated (Grout, 1984). If renegotiation occurs, then the level of investments will generally be suboptimal (Cahuc and Zylberberg, 2004:411), which again may push workplaces towards closure. Hirsch (1992) argues that lower R&D expenditures in unionised workplaces make these workplaces less adaptable to a changing economic environment. But investors may also be deterred from investing due to unions' extraction of rents, and such underinvestment may heighten the risk of closure. A further issue is the utility that unions are seeking to maximise. If unions care about the jobs of their members they will seek to bargain over employment as well as wages. Just bargaining over wages and employment, however, is not enough to ensure productive efficiency. Where workers are risk averse, it is necessary for unions and employers to bargain over unemployment

benefits, wages and labour (known as strongly efficient bargaining) to ensure productive efficiency (Cahuc and Zylberberg, 2004).[8]

While the above considerations have dominated the recent literature, Freeman and Medoff (1984) stressed the role unions perform as mediators of workers' concerns and grievances, and their potential to act as agents of the firm. The idea is that not only are unions more effective in conveying information to employers, thus ensuring efficiency gains by improving motivation and providing stricter controls, they make employers better informed decision-takers. All these aspects tend to make unions improve efficiency and thus reduce closure hazards. However, it is not clear whether the union voice mechanism actually improves employer profitability since engagement with union voice brings costs as well.

Unions and employers may bargain over wages at different levels - either locally at plant-level or firm level, or else at a more centralised level where the agreement covers whole sectors. The level of an agreement can affect both labour costs and productivity. For example, in an industry where the majority of workers are unionised, employers may be less concerned about the additional costs of wage hikes since others in the industry may be expected to shoulder the same union wage costs. This is less likely to be the case where union bargaining is fragmented, or where only a minority of firms in an industry are unionised. Thus, the question of how unionisation affects closures and growth is intrinsically linked to how different bargaining regimes affect closures and growth. Ultimately, a workplace closes when its financial performance no longer satisfies the current owners because the expected value of their outside options (for example, new investments or plants) is greater than the expected net income stream from the current workplace. Consequently, closure is irrevocably linked to financial performance. Recent empirical research supports Freeman and Medoff's conjecture that union effects on productivity depend critically on how positively the employer engages with the union (Bryson et al., 2006).

There is at least one framework that links wage structure and bargaining regimes to growth and productivity in an economy on a steady state growth path. Rehn and Meidner (Rehn, 1952) argued that low pay inequality acted as a tax on low productivity firms and a subsidy on high productivity firms, encouraging a shift towards higher average productivity and higher aggregate output. Agell and Lommerud (1993) and Moene and Wallerstein (1997) formalise this notion, and the latter embed it together with a mechanism of vintage technology (Johansen,

[8] This becomes even more complicated where workers are heterogeneous and may be represented by several unions. One usually assumes that coordinated bargaining results in wage compression. If the right-to-manage model prevails, i.e., employers determine employment after wages are set, even coordinated bargaining may not result in wage compression, and may instead produce wages reflecting the labour demand elasticity of the different worker groups (Cahuc and Zylberberg, 2004:403).

1959) into a steady state growth model. Assuming that workplaces in decentralised and centralised bargaining regimes are equally productive at entry, their productivity follows the same productivity path until closure, and unions are equally strong, the model of Moene and Wallerstein (1997) implies that centralised bargaining is associated with higher exit and entry rates than decentralised bargaining. Thus for our purpose, we should observe higher rates of closures associated with unions and centralised bargaining.

The mechanisms linking unions to employment growth can partly be understood by the same set of theories that explain unions' impact on closure. A priori, effects are ambiguous and may differ in the long-run compared to the short-term. A union wage premium encourages employers to substitute capital for labour, and increase capital investments, thus reducing employment growth directly. On the other hand, if unions discourage capital investment through rent-extraction, this may lower investments (Hirsch, 1992), potentially avoiding capital substitution in the short-term at least. Long-run improvements in productivity, even if achieved through short-term job loss, will improve the competitive position of the firm and thus potentially raise employment.

Machin and Wadwhani (1991) note that if union suppliers are regarded as unreliable suppliers, such branding may hurt sales growth and thus lower employment growth. This 'bad reputation' effect may be more relevant for Britain than for Norway, but even in the latter case, we cannot rule out employer scepticism about the role of unions in certain industries.[9]

With decreasing return to scale production technology, heterogeneous labour and different bargaining power for different worker groups, the search model of Cahuc et al. (2007) implies that due to firms' strategic manipulation of wages through employment and capital decisions, increased bargaining power for some groups may lead to over-employment relative to other groups and actually in some cases increase overall employment.

Finally, if union bargaining increases wages and fringe benefits it can reduce worker turnover and quits (e.g., Elias, 2004) thus increasing the labour supply facing a workplace. In itself this does not have any implication for growth. However, if a shock occurs causing a labour demand hike, for example if sales growth makes it desirable to grow, being attractive to workers will make it more likely that the supply of labour will rise and satisfy the increased demand. Taken together, these theoretical observations suggest counter-veiling union influences on

[9] Typically this will be within the construction sector and restaurants and bars. Note also that the Norwegian bargaining system is such that every second year there are main negotiations, while in the intervening years only minor wage adjustments are open for negotiations. By agreement, strikes are ruled out between the main negotiations, and while strikes may of course occur in conflict with the agreement, striking workers will have a high probability of loosing in court. This 'peace-agreement' makes Machin and Wadwhani's (1991) point less relevant for Norway.

employment growth and suggest some differences in effects across Britain and Norway. There is therefore value in exploring these relationships empirically.

3. Data

3.1. Data sets

We utilise questionnaire survey data from Britain and Norway plus additional register data information which is only available for Norway. First, we exploit the British Workplace Employment Relations Survey (WERS) Panel 1998-2004 which provides large-scale, statistically reliable evidence about a broad range of industrial relations and employment practices across most sectors of the British economy. WERS is collected to map employment relations practices in workplaces across Britain and to monitor changes in those practices over time. The level of observation is the workplace, namely a place of employment at a single address or site. The 1998 data are a stratified random sample of workplaces in Britain with at least 10 employees. Information on these workplaces was collected through a face-to-face interview with the senior manager responsible for employment relations on a day-to-day basis.[10] In addition, we utilise linked data from employees to identify workplaces' rank in the wage distribution. The Panel follows up on a random sub-sample of the workplaces that participated in the 1998 survey, had continued to be in operation throughout the intervening six-year period, and employed at least 10 employees at the time of the 2004 interview. In total 938 interviews were conducted, a response rate of 75 percent. In addition, the remaining establishments from the 1998 survey that were not selected for a Panel interview were screened by telephone to establish whether they were still in existence and to establish the current level of employment at their workplace. Of the 1,506 private sector workplaces in the 1998 survey, 1,262 were still in existence in 2004, 240 had closed down and 4 were unaccounted for.[11]

Second, we exploit the Norwegian Workplace Employment Relations Survey 1997 and 2003 (NWERS). These surveys comprise a questionnaire, answered in the early winter of 1997 and 2003 by the daily manager or personnel manager of roughly 2300 Norwegian establishments from both public and private sectors. These establishments are sampled from establishments with more than 10 employees. The sample is constructed so that large establishments are over-sampled (for

[10] Fieldwork began in 1997 but the bulk of the interviews occurred in 1998.

[11] Eight cases identified as private sector workplaces in WERS98 were dropped from the analyses because subsequent checks revealed that they were not workplaces.

example, all establishments with more than 300 employees are included in the sample). Furthermore, these surveys are constructed so that a significant proportion of the establishments in the later surveys participated in the previous one thus providing invaluable information on workplaces across time. Each workplace in the NWERS-surveys (1997, 2003) is identified by a unique identifying number making it possible to link the surveys to administrative register data and other surveys as well. The NWERS2003-establishments employ over 350 000 workers, i.e., nearly a fifth of the Norwegian workforce.[12] The questionnaire covers topics such as structure of representation at the workplace, means of communication with employees, incidence of negotiation over compensation, work practices and organisation issues. As such, it is quite similar to WERS.

The third data source is the public administrative register data. It comprises *all* employers and their employees in Norway 1995–2004 (roughly 150000 employers and 1800000 employees each year) employed on May 15th each year. Each worker, each establishment (workplace) and each firm are identified by unique identifying numbers, making it possible to track workers as well as firms and establishments through time. This data set is similar to the integrated register based data system, Current System for Social Data (CSSD), linked by Statistics Norway, comprising information from public administrative registers (except CSSD is not restricted to employment spells active on May 15th). This linked employer-employee data set provides information on workers (gender, educational qualifications), jobs - for example earnings, daily wage, hourly wage (only 2002-2004), the value of fringe benefits as they are reported to the tax authorities, union membership, weekly working hours (intervals, exact hours 2002-2004), seniority - firm and establishment identifying numbers and on establishment characteristics such as industry (5-digit SIC), sector and municipality. It is possible to link information from this data system to the NWERS-establishments, thus providing information on workers, workplaces, firm and local labour market (municipality) conditions and information on detailed industry code (3-digit SIC) conditions.

In sum, the WERS and NWERS-surveys are similarly sampled, and the questionnaires comprise quite similar questions to managers. Where the surveys differ are on information from trade union representatives and on workers. No information from trade union representatives exists in the Norwegian data. Worker information in NWERS is linked from public administrative register data, WERS is based on questionnaire information. NWERS may thus comprise more reliable information, while WERS contains richer and more precise subjective information.

[12] The sampling procedure and the questionnaire are described in Holth (2003) and Torp (2005).

3.2. Important measures

WERS information on workplace outcomes in 2004 comes from survey interviewers' contacts with workplaces as part of the second wave of the panel. The outcome codes provide the information to identify workplace closure (Chaplin *et al*, 2005). Workplace closure is defined as the complete cessation of the activities of a workplace with the termination of all contracts of employment. The transfer of employment to a new site or to another workplace in the same organization is not included in this definition, nor is a simple change of ownership such as a take-over. In Norway a closure is defined from the administrative register (where the workplace's number quite simply disappears).[13] In some cases this reflects the creation of a new unit. The rules for changing a workplace's identifying number are as follows: If all employees are identical, the workplace has to change a) owners, b) address (change of municipality) and c) main product (new major industry code) to get a new number. If all employees are not identical, the workplace has to change two of the following three criteria: a) owners, b) address (change of municipality) and c) main product (new major industry code) to get a new number. Thus one is fairly restrictive when providing a new identifying number to an old workplace.

For workplaces found operating, employment in WERS is recorded in the follow-up interview in 2004. Where workplaces were not interviewed in 2004, either because they were not in the random sub-sample followed up, or because their employment size had fallen below the 10 employee threshold for an interview, their employment data were obtained from a telephone screening interview. Employment and employment growth in NWERS are taken directly from the administrative registers, measuring workers having an active (on-going) work spell on May 15th in the relevant year (i.e., 1997 and 2003). Note that the minimum criteria for such jobs are that they last at least a fortnight; imply expected weekly working hours of at least four hours, and that wages are reported to the tax authorities and are linkable to the job files.

Information on unionisation is one of the areas where WERS and NWERS differ. WERS rests solely on precise questionnaire information, while NWERS mixes questionnaire and register information. We focus on three measures of unionisation: a dummy for union recognition at the workplace, dummies for the number of union agreements at the workplace, and workplace union density. Unions are recognised if agreements exist between the employer and at least one union.[14]

---

[13] Note that there exists a separate number series for firms (owners).

[14] Due to the design of the Norwegian NWERS one may observe missing information on the question of how many agreement(s) with union(s) do you have? However, one can observe whether the employer determines wages by participating in collective bargaining. For these few cases we have re-coded the number of agreements as three implying that unions are recognised for bargaining, and added a dummy for missing union information.

In the Norwegian data union density is calculated using information on individual union membership reported to the tax authorities for tax exemption purposes (whereas in WERS these data are collected in an interview with the employer).

When we estimate log growth equations we are only able to utilise information from surviving workplaces, i.e., a selected sample. We seek to account for potential bias arising from the link between unionization and survival probabilities using a Heckman selection model. We argue that variables expressing entry barriers are appropriate instruments. Such variables affect the owners' outside options, and they do not affect the growth of surviving workplaces. We believe that information on capital utilisation at 2-digit industry (SIC) offers the potential for identification.[15] Our idea is to identify a variable that measures minimum entry costs for new workplaces. Such a variable can be interpreted as capturing entry barriers. However, we are only able to identify such a variable for Norway. In the Norwegian data we can measure the minimum level of capital related to buildings and plants of entry workplaces, and to harmonise this across different workforce entry sizes, we measure this minimum start-up capital level per employee. Our final variable captures the relative growth in the industry minimum start-up capital level per employee from 1994-95 to 1996-97.

In the Norwegian case, using register data only, we can follow each workplace each year until 2004 or until closure. Thus we are able to construct a panel of workplaces covering the period 1997 to 2003.

4. Econometric Models – Empirical Strategy for Studying Long-Term Survival and Growth

The probability of workplace closure can be written as:

$$1) \qquad \Pr\left(I_{ft} - C_{ft} \geq A_{ft}\right) \leftrightarrow \Pr\left(I_{ft} - C_{ft} - A_{ft} \geq 0\right),$$

where I_{ft}, C_{ft}, and A_{ft} denote workplace f's expected discounted operating income from production, expected discounted costs and alternative value/outside options for the owner of workplace f, respectively, evaluated at period t. The owners of workplace f close the workplace when expected net surplus from production provides less net value than the owners' alternative

[15] Note that the average capital level as such is endogenous, even at entry and even if considered sunk, since as pointed out by Cabral (1995) this conveys information on expected future performance.

return to their investments. We model this relationship by assuming that $Y_{ft} = I_{ft} - C_{ft} - A_{ft}$, which expresses overall expected discounted net value from further production, is a latent variable. Then we assume that:

2) $$Y_{ft} = x_f'b + \varepsilon_{ft},$$

where $\varepsilon_f \sim N(0,1)$, and the x's denote exogenous covariates affecting the expected discounted net value. Note the x-vector mixes covariates from different time periods as well as time-invariant covariates, thus subscript t is dropped.

We first observe our sample of active workplaces 1997 (Norway)/1998 (UK), and then observe the surviving workplaces 2003 (Norway)/2004 (UK). Thus we assume that y_f is an indicator variable taking the value 1 if Y_{ft} is negative during our period of observation (1997-2003 (Norway), 1998-2004 (UK)), zero otherwise. Since a negative Y_{ft} implies closure, we can express the probability of closure during our period of observation as:

3) $$Pr(y_f = 1) = \Phi(x_f'b),$$

where Φ expresses the standard normal cumulative distribution function.

Our vector of exogenous covariates is decomposed as follows:

4) $$x_f'b = b_1'Union + b_2'Basic\_controls + b_3'Extended\_controls + b_4'entry\_barrier(cost),$$

where basic controls are size, age, industry and regional dummies, extended controls are dummies for main occupation and male-dominated workforce, lagged log relative growth, dummies for performance, and variables expressing market competition.

Next we follow the previous literature and study the relationship between unionisation in the base year and growth over a period of six years. These regressions establish how employment growth is independently related to a number of workplace characteristics at the beginning of the period including unionisation. Between our base year and end year background variables may have changed, thus affecting workplaces' employment trajectory but we take no account of this until we model year-on-year employment change.

When we model employment growth for surviving workplaces with OLS we are ignoring the possibility that growth is related to survival. Running OLS-regressions on the surviving workplaces will therefore yield biased estimates due to selection. Our main equation is:

$$5) \qquad \Delta \ln L_{ft} = z_f'a + \eta_{ft},$$

where $\eta_{ft} \sim N(0,\sigma)$, $\Delta \ln L_{ft}$ expresses log employment growth for workplace f from period t-6 to period t, and that the z's denote exogenous covariates from period t-6 or earlier thought to affecting employment growth.[16] In the UK data t-1 and t is 1998 and 2004, respectively, while for Norway t-1 and t are 1997 and 2003, respectively. However, to acknowledge the potential selection problem we also conduct regressions assuming $cov(\eta_{ft},\varepsilon_{ft})\neq 0$, and estimate 3)[17] and 5) jointly by maximum likelihood (STATA's Heckman-procedure). Note that we assume that the z'a can be expressed:

$$6) \qquad z_f'a = a_1 Union + a_2 Basic\_controls + a_3 Extended\_controls,$$

i.e., we achieve identification in the growth equation since variables expressing entry barriers will make owners more reluctant to close, but should not affect the growth of incumbents. We argue that variables expressing entry barriers also measure variation in owners' outside options. At the same time, the owners' outside options, conditioned on survival, should not affect the growth of surviving workplaces.[18] We are, however, only able to follow this approach in the Norwegian case. For the UK analysis identification rests on functional form only.

These growth regressions raise a final important issue that should be addressed: the growth equation does not take into account that unions may have differential impact on different levels of growth. For instance, it may be that unions influence small changes, but are powerless to affect major employment changes. Thus we estimate a generalized ordered Probit (a partial proportional odds model, see Williams (2006)) using Richard William's GOLOGIT2-procedure for STATA. We assume the following growth categories:

$k=1$ if $\Delta \ln L_{ft} < -0.25$,

$k=2$ if $-0.25 <= \Delta \ln L_{ft} < 0$,

$k=3$ if $0 <= \Delta \ln L_{ft} < 0.25$,

[16] The z-vector includes controls for workforce size in period t-6 in the form of size dummies. Using log workforce as a control, another formulation of our model would be $\ln L_t = a \ln L_{t-6} + b' x_{t-6} + \eta_{ft}$.

[17] We then model the probability of survival, i.e., 1-Pr(y=1).

[18] A related argument is found in Luttmer (2007), where barriers to entry and fixed costs affect growth and the size distribution in the economy, but then only through the entry firm population and not the incumbent firms.

$k=4$ if $0.25<=\Delta \ln L_{ft}$.

Then assuming the normal distribution as in 5) we have:

7) $\Pr(k=1)=\Phi(-0.25-z'c_1)$,

$\Pr(k=2)=\Phi(-z'c_2)-\Phi(-0.25-z'c_1)$,

$\Pr(k=3)=\Phi(0.25-z'c_3)-\Phi(-z'c_2)$,

$\Pr(k=4)=1-\Phi(0.25-z'c_4)$.

The z'c-vector can be expressed: $z_f'c=c_u\text{Union}+ c_x\text{Basic\_controls}$. When we estimate this model using the GOLOGIT2-procedure, our point of departure is the assumption of an equal c-vector across the k's. If this is rejected, the model is estimated allowing an unequal c-vector across the categories of growth.

5. Changes in Union Participation and Bargaining, 1997-2004

In this section we briefly describe the development in unionisation in Norway and Britain during our period of 1997/1998 to 2003/2004. Table 1 presents background statistics weighted to be nationally representative for the population of workplaces with more than 10 employees. As noted in the introduction, the difference between Britain and Norway regarding unions is striking. Norway is much more unionised than Britain. The workplace union recognition rate in Britain is one third of the rate in Norway 1997/1998, and then fell to one quarter in 2003/2004. The percentage of workers employed by union workplaces was half the Norwegian rate in 1997/1998, and fell further to around two-fifths.

In Britain one observes a small decline in union density – whether measured in terms of mean workplace-level density or aggregate union density among employees - while the percentage of union members in Norway is basically unchanged. However, in both countries one observes a small reduction in union recognition.

Multi-unionism, i.e., agreements with more than one union, is rather rare in Britain: in 1998 and 2004 around 5 percent of private sector workplaces had multiple unions. This contrasts markedly with Norway, where the percentage of multi-union workplaces actually rose from 30 percent in 1997 to 32 percent in 2003.[19]

[19] The occurrence of multi-unionism does not necessarily imply that the management has to deal with several unions separately. In Norway it is common in larger enterprises and corporations to select an enterprise union representative who acts as the unions' representative in negotiations with management on sensitive issues like downsizing and

Perhaps the most striking difference of all appears to be the dominance of individual wage determination in Britain compared with Norway. In Britain, almost nine-in-ten workers are in workplaces where at least some of the workers have their pay set via individual wage determination. This compares with a small and declining percentage of workers in Norway (24 percent in 1997 and 19 percent in 2004). Conversely, centralised bargaining covers a substantial and growing percentage of employees in Norway, while in Britain coverage is small and diminishing.

Finally, Table 1 shows that there are only small differences between the UK and Norway with respect to closure rates and growth during this period. While closure rates are slightly higher in the UK than in Norway (18.7 vs. 17.4) – contrary to our conjecture based on Moene and Wallerstein (1997) - log growth is slightly less negative (-0.2 vs. -1.2).

6. The Impact of Unionisation on Workplace Closure

In Britain there is a big union-non-union differential in closure rates with unionised workplaces having an 8 percentage point higher probability of closure relative to their non-union counterparts (25 percent and 17 percent respectively). However, there are also very large differences within the unionised sector, closure rates being by far the lowest in workplaces with 3 or more unions. Of course, there are few such workplaces in the private sector in Britain and they tend to be larger workplaces, so we can not discount the possibility that this closure differential within the union sector is partly a function of workplace size. In Norway closure rates are a little higher in the non-union than the union sector (19.6 percent versus 16.0 percent) but they are highest of all in workplaces with three or more union agreements (21.2 percent).

The descriptive information above does not take into account workplace characteristics such as size, industry variation, differences in market structure and differences in previous workplace performance. Thus in Table 2 we turn to Probit regressions of the probability of closures. Table 2 shows the estimated marginal effects from Probit models, while Table A1 presents the full regression results. The key variable of interest is the (0,1) union recognition dummy variable.

---

closure of plants within the enterprise. In a study of the 10 major enterprises in Norway 9 had selected such a union representative (Utgaard, 2004), and the only one not having established such an arrangement, Scandinavian Airline System (SAS), has in recent years experienced recurrent strikes and hold-ups. Similarly, in the UK employers may negotiate with multiple unions jointly in what is termed 'single-table bargaining' (Bryson and Wilkinson, 2002).

Columns 1 to 3 present models for Britain, while the models for Norway are presented in columns 4 to 7. In Model 1 (4) we control for size, age, a dummy for belonging to a single-plant firm, and dummies for industry (1-digit SIC) and region. In Model 2 (5) we add controls for main occupation, a dummy for being male-dominated, lagged employment growth over the previous year, workplace financial performance, and market and competition variables. Finally in Model 3 (7) we replace single-digit SIC industry dummies with two-digit ones.

Union recognition is not statistically significantly associated with workplace closure in Britain or Norway. The point estimate is positive for Britain, whereas it is negative for Norway.

Table 2 also reveals other quite interesting facts related to workplace closure. Recent job cuts and recruitment problems are associated with higher closure probabilities in both Britain and Norway. Since these variables capture previous bad performance this finding is not surprising. Similarly, when we observe that lagged employment growth in Norway is associated with reduced closure rates this is as expected. The positive association between lagged employment growth and closure in Britain could be interpreted as an indication of inefficiencies arising from (too) rapid growth. While the competition variables do not seem to be of importance in Britain, for workplaces in the open Norwegian economy having one's main market abroad is associated with higher rates of closures though, perhaps surprisingly, this is contingent on competition not being strong.

Finally, one should note the impact from our relative capital growth measure on closure. In Sub-Sections 3.2 and 3.3 we argue that this captures the impact of entry barriers on closure, and thus are expected to affect closure negatively. Model 6 of Table 2 shows this to be true in Norway.[20]

In Table 3 we repeat the analyses of Table 2 using alternative measures of workplace unionisation. We report only the marginal effects associated with the union variables. In the case of Norway neither the number of union agreements nor union density at the workplace affect closure probabilities. However, the analysis for Britain reveals the same puzzling finding that we observed in the descriptive statistics of Table 2: when at least 3 unions are recognised, the closure hazard drops significantly. Compared to the reference case, no unions, recognising at least 3 unions implies a lowering of the closure hazard by 10-13 percent. This effect is robust to the inclusion of controls such as workplace size. It is nevertheless worth bearing in mind that these workplaces only make up 2 percent of the weighted private sector sample in Britain.

Until now we have ignored the effect that unions have in raising wages. In both countries there is a positive union wage premium. This may be to the detriment of workplaces. Yet wages

also reflect workplace productivity and union workplaces may become high wage/high productivity workplace in order to accommodate unionisation. High wages in union workplaces may reflect high productivity and/or high union bargaining power. Low wages in unionised workplaces may reflect low bargaining power and/or low productivity. Either way, above market wages may induce closure in the long-run. If the impact of unionisation on closure depends on the workplace's position in the wage distribution then these impacts may cancel each other out on average. Arguably Freeman and Medoff's (1984) voice theory is more relevant at the bottom of the wage distribution than at the top, while a high average workplace wage may reflect high productivity but also high union bargaining power. Thus we conduct similar probit regressions as those reported in table 2 and 3, but add wages and unionXwages cross-terms. For the UK these regressions are limited to wage dummies due to the way wages are reported.[21] For this reason, we also loose some observations for the UK regressions. Table 4 presents the estimated marginal effects of union and wages on the closure probability based on our regressions.

In the UK low wage non-union workplaces experience higher probability of closure than other workplaces. Thus unions prolong life for low-wage workplaces in the UK. This is consistent with a union voice effect dominating any union bargaining effect. In Norway high wage workplaces experience lower closure hazards than others, but not if the workplace is unionised. If the high wage workplace is unionised, then it experiences higher closure rates than others (significant with a p-value of 0.052).

For Norway we have also conducted the regressions adding union density, log average workplace wages and cross-terms. All marginal effects are significant at a 5 percent level. This confirms our findings above. If one calculates the marginal effect at the 10th percentile, median and the 90th percentile of the wage distribution, one finds no significant impact at the 10th and the median, but a strong significant and positive impact of union density at the 90th percentile.[22] Increasing union density by 10 percent increases the closure hazard by 1.3 percent. Thus, although on average unions appear to have no effect on closure, when one conditions on wages,

---

[20] A likelihood-ratio test rejects the assumption of excluding the variable from the model, i.e., our capital measure contributes significantly to the model's explanatory power.

[21] For the UK we match in workplace-level wages from banded wage data reported by employees.

[22] The results of Table 4's 1) and 2) are not directly comparable, since the dummies in 1) measure the impact relative to mid-wage non-unionised workplaces, while 2) measures a continuous relationship, but they reveal the same tendencies. For example, both models show that high wage unionised workplace close quicker, and that unionisation prolongs the life of low-wage workplaces. In case 2) you can calculate the marginal effect by assuming for example 50 percent unionisation and high wages of 7 (average workplace log wage=7). Thus increasing the union density by 1 percentage point from 50 percent increases the closure hazard by 0.01*[-1.123*0.5+0.216*7]=0.0095. For very low wage highly unionised workplaces (e.g., wage=4 and union density=0.99) the marginal impact of increasing the union density from 99 percent to 100 percent is 0.01*[-1.123*0.99+0.216*4]=-0.0025.

we find a reduced probability of closure in low wage union workplaces in the UK and Norway, but in Norway we also find a higher probability of closure in high wage union workplaces.

7. The Impact of Unionisation on Workplace Growth

Annual growth rates were close to zero in Britain and differed little by union status. In Norway, growth per annum was around -1 percent per annum for the whole private sector, but there was negative growth among union workplaces (-1.7 percent per annum) and positive growth among non-union workplaces (0.7 percent per annum). To establish whether these associations are independent of other factors associated with employment growth we estimated the same models as in Section 4. Note, however, as pointed out in Section 4 that the regressions in this section do not attempt to identify the causal impact of unions on employment. Rather, in accordance with the previous literature, we map descriptively how employment growth is related to a number of workplace characteristics including unionisation.

Table 5 shows how growth is related to union recognition, number of union agreements and union density. We only present the estimated parameters associated with the union variables (but Table A2 presents the full results related to the analysis of union recognition). Models 1, 2, 4 and 5 are estimated using OLS, Model 3, Model 6 and Model 7 are estimated jointly with a survival selection equation using maximum likelihood.

The table reveals that union recognition is not independently associated with employment growth in British workplaces between 1998 and 2004. This is so whether or not we account for the possible selection bias arising through workplace survival. Furthermore, the selection equation given this set of covariates is independent of the growth equation.

The story for Norway is completely different. During the period 1997 to 2003 Norway behaves more like what previous studies have found for the Anglo-American countries. Employment growth is 3 to 5 percent lower in workplaces where unions are recognised in 1997 compared to those that do not recognise unions. We also identify a strong negative selection effect, i.e., conditional on past performance, we observe that there is something unobserved about surviving workplaces that is negatively correlated with their growth (Model 6). This is consistent with a regression-towards-the-mean interpretation.

It also appears that Norway and Britain are quite different regarding how growth is affected by our controls. In Norway younger workplaces and smaller workplaces have stronger

growth than older and larger workplaces, while in Britain we do not observe any relationship between size, age and lagged growth.

Table 5 also presents results regarding the other union variables, namely union density and the number of recognised unions. In Britain workplaces with at least three recognised unions in 1998 have a 4.3 percent lower growth rate than non-union workplaces (Model 2). However the effect is statistically non-significant once conditioned on 2-digit SIC's and once one adjusts for sample selection arising from survival. In Norway, on the other hand, unions are associated with a 4-5 percent lower growth rate than non-union workplaces even when one takes account of sample selection. The exception is workplaces with at least 3 recognised unions, which have the same growth as non-union workplaces.

These analyses leave three questions unanswered. The first question is whether or not these union effects are related to workplace wages in a similar way that we found that the union effects on closures were for Norway. The second question is whether our surprising findings are due to a differential impact of unions on different levels of growth? It may be that unions seem to have no impact on growth in the UK due to offsetting union impacts on job cuts and expansion. Similarly, when we observe 3-4 percent lower growth associated with unions in Norway, is this primarily driven by unions affecting employers' job cuts or their potential for employment growth? The third question, which will be addressed in Section 8, is whether or not the observed relation between unions and growth in Norway corresponds to a causal impact of unions on employment growth?

To answer the first question, we have estimated the growth equations adding wages and unionXwages cross-terms.[23] For the UK these analyses did not bring any new insight. For Norway, we do observe a significant negative cross-effect, while wages and unions affect growth positively. Thus we observe that high wage workplaces grow more than low wage workplaces, but the presence of unions severely dampens growth at these high wage workplaces. At the bottom of the wage distribution, however, the negative impact of unions on growth disappears.

To answer the second question we have estimated several Generalised Ordered Probit regressions on the UK and Norwegian data, where we group growth into a variable taking four values. Table 6 presents the marginal effect on the probability of being in the four growth categories. We measure union influence by the number of agreements. We show the results related to this union variable, because this is where we observe some union impact in the Norwegian data.

[23] These are available from the authors on request.

For the UK nothing much happens. It appears that whatever unions do in Britain, they do not affect closures and growth. For Norway, once again we find strong union effects. The table shows that unions with one exception increase the probability of both major and minor layoffs and job cuts compared to non-agreement workplaces, while they reduce the probability of large job hikes. The exception is when only one agreement exists, where the probability of minor layoffs and job cuts are reduced compared to non-agreement workplaces. Unions do not affect the probability of small workforce increases.

8. The Dynamics of the Labour Demand and Union Membership

Our empirical investigations into closure and growth issues in sections 6 and 7 were motivated partly by the previous literature and partly by the fact that for both countries we have survey data for two points in time with 6 intervening years. The latter fact clearly limits the possibility of studying dynamics. Furthermore, one may also be concerned that the union effect we observe is not a causal impact of unions on growth. First, if workers anticipate bad times and seek union membership as protection this union endogeneity may bias our estimates, potentially turning a positive relationship between unions and growth into a negative one (as we observe for Norway). Second, the two-period model only addresses the issue of adjustments over 6 years. What's more, we estimate growth using control variables for the base period only. That is to say, we omit variables that may co-vary with employment over time, assuming that the conditioning variables in the base period are the only ones that matter. In fact, if unions affect the long-term level of employment as well as short-term adjustments, then the lack of final period explanatory variables such as unionization may create an omitted variable bias which also affects our estimates in Section 7. This notion is formalised by considering equations 8)-11). Equation 8) describes the two-period approach followed by the literature:

8) $$\Delta \ln L_{ft} = a_L \ln L_{ft-x} + a_u U_{ft-y} + a_x X_{ft-y} + \varepsilon_{ft},$$

where $\Delta \ln L_{ft}$ expresses log employment growth from the base period x ($\ln L_{ft} - \ln L_{ft-x}$), U expresses union density and X other controls. However, since employment very likely depend on current period variables, for example as expressed by Equation 9):

9) $$\ln L_{ft} = a_u U_{ft} + a_x X_{ft} + \varepsilon^*_{ft},$$

this implies that employment growth is affected by growth in the explanatory variables:

$$10) \qquad \Delta \ln L_{ft} = a_u \Delta U_{ft} + a_x \Delta X_{ft} + \varepsilon'_{ft},$$

where all variables express changes from the base period x.

Estimation of 8) by OLS thus ignores the introduction of a lagged endogenous variable, it ignores the existence of other endogenous variables and it assumes that $\text{cov}(U_{ft}, U_{ft-x})=0$ and $\text{cov}(X_{ft}, X_{ft-x})=0$. This can hardly be an ideal solution, since each of these traits implies biased OLS estimates.

Therefore, in this section we address these two issues. Firstly, we use our survey data for UK and Norway to conduct growth regressions using control variables for the base period *and* the final period.

Secondly, we use the Norwegian linked employer-employee panel data to study the dynamics of labour demand and union density in more detail, and thus correct for other possible weaknesses of Section 7. For such an analysis to make sense, we need to provide more structure on our model of labour demand.

We start by assuming that there exists an equilibrium relationship between labour demand, union density and wages:

$$11) \qquad \ln L^*_{ft} = \beta_u U_{ft} + \beta_w \ln W_{ft} + \beta_x' X_{ft} + \alpha_f + \nu_{ft},$$

where $\eta_{ft} \sim N(0,\sigma)$, α_f expresses a fixed workplace effect, $\ln L^*_{ft}$ expresses unobserved log labour demand for workplace f at period t , U_{ft} and $\ln W_{ft}$ express workplace f's union density and log wage at period t, while the X's denote other exogenous covariates affecting labour demand. Equation 11), through the fixed effect, incorporates the fact that workplaces may permanently differ with respect to labour demand. Note that the fixed effect also captures fixed production level differences. Thus, conditioned on the level of production and all other things equal, we anticipate that higher wages should reduce labour demand (i.e., $\beta_w<0$). The impact of union density is ambiguous, since one could argue that unions are associated with higher adjustment costs (if so implying $\beta_u<0$) but also improved performance and actually more flexibility through Freeman and Medoff's (1984) voice theory (implying $\beta_u>0$). Our estimate of β_u will thus be interpreted as a net impact on equilibrium long-term labour demand.

As pointed out above, we (as researchers) do not observe $\ln L^*_{ft}$, and neither are the workplaces ensured that they at any point of time are able to achieve this desired labour demand. We assume that the observed employment change from one period to the next ($\Delta \ln L_{ft} = \ln L_{ft} - \ln L_{ft-1}$) is partly determined by changes in desired labour demand ($\Delta \ln L^*_{ft} = \ln L^*_{ft} - \ln L^*_{ft-1}$), partly by the discrepancy between realised and desired labour demand ($\ln L^*_{ft-1} - \ln L_{ft-1}$) and a white noise error term θ_{ft}. This is expressed in Equation 12):

$$12) \qquad \Delta \ln L_{ft} = \gamma_1 \Delta \ln L^*_{ft} + \gamma_2 (\ln L^*_{ft-1} - \ln L_{ft-1}) + \theta_{ft}.$$

Inserting 11) into 12) then yields our econometric specification, Equation 13):

$$13) \ \Delta \ln L_{ft} = \ln L_{ft} - \ln L_{ft-1} = \gamma_1 \beta_u \Delta U_{ft} + \gamma_1 \beta_w \Delta \ln W_{ft} + \gamma_1 \beta_x \Delta X_{ft} + \gamma_2 \beta_u U_{ft-1} + \gamma_2 \beta_w \ln W_{ft-1} + \gamma_2 \beta_x X_{ft-1} - \gamma_2 \ln L_{ft-1} + \alpha_f + \gamma_1 \nu_{ft} + (\gamma_2 - \gamma_1) \nu_{ft-1} + \theta_{ft}$$
$$= \pi_1 \Delta U_{ft} + \pi_2 \Delta \ln W_{ft} + \pi_3 \Delta X_{ft} + \pi_4 U_{ft-1} + \pi_5 \ln W_{ft-1} + \pi_6 X_{ft-1} + \pi_7 \ln L_{ft-1} + \alpha_f + \varepsilon_{1ft} + \varepsilon_{2ft-1} + \theta_{ft},$$

where the π-s express reduced form parameters and the ε-s error terms. When estimating 13), first-differencing will take care of the fixed effect. Since 13) already comprises a growth-term this may, unfortunately, cause less robust estimates. But as seen in equations 14)-16), Equation 13) can easily be transformed into an equation of levels:

$$14) \ \ln L_{ft} - \ln L_{ft-1} = \pi_1 (U_{ft} - U_{ft-1}) + \pi_2 (\ln W_{ft} - \ln W_{ft-1}) + \pi_3 (X_{ft} - X_{ft-1}) + \pi_4 U_{ft-1} + \pi_5 \ln W_{ft-1} + \pi_6 X_{ft-1} + \pi_7 \ln L_{ft-1} + \alpha_f + \varepsilon_{1ft} + \varepsilon_{2ft-1} + \theta_{ft},$$

$$15) \ \ln L_{ft} = \pi_1 U_{ft} + \pi_2 \ln W_{ft} + \pi_3 X_{ft} + (\pi_4 - \pi_1) U_{ft-1} + (\pi_5 - \pi_2) \ln W_{ft-1} + (\pi_6 - \pi_3) X_{ft-1} + (1 + \pi_7) \ln L_{ft-1} + \alpha_f + \varepsilon_{1ft} + \varepsilon_{2ft-1} + \theta_{ft},$$

$$16) \ \ln L_{ft} = \pi_1 U_{ft} + \pi_2 \ln W_{ft} + \pi_3 X_{ft} + \pi'_4 U_{ft-1} + \pi'_5 \ln W_{ft-1} + \pi'_6 X_{ft-1} + \pi'_7 \ln L_{ft-1} + \alpha_f + \varepsilon_{1ft} + \varepsilon_{2ft-1} + \theta_{ft},$$

where π'-s now express linear combinations of the original reduced form parameters.

Estimation of 16) by OLS yields biased estimates due to the moving average composite error term. We estimate Equation 16) with System-GMM (see Blundell and Bond (1998) and Bond (2002)) using Roodman's (2005) STATA-procedure for dynamic panel data estimation. The procedure is based on first-differencing to take care of the fixed effect, and then uses lagged growth-variables as instruments for the levels, while lagged level-variables act as instruments for the growth variables. The procedure's standard treatment and default option for endogenous

variables yields satisfying tests (see Table 7 for test values). Since our sample of workplaces is limited, we present Windmeijer finite-sample corrected standard errors (Windmeijer, 2005).

As seen in Equation 17) the estimation of the reduced-form parameters of Equation 16) identify the structural parameters of interest:

17) $$\pi_1 = \gamma_1\beta_u,\ \pi_2 = \gamma_1\beta_w,\ \pi_3 = \gamma_1\beta_x,\ \pi'_4 = \pi_4 - \pi_1 = \gamma_2\beta_u - \pi_1,\ \pi'_5 = \pi_5 - \pi_2 = \gamma_2\beta_w,$$
$$\pi'_6 = \pi_6 - \pi_3 = \gamma_2\beta_x,\ \pi'_7 = 1 - \gamma_2$$
$$\downarrow$$
$$\gamma_2 = 1 - \pi'_7,\ \beta_u = -(\pi'_4 - \pi_1)/(1 - \pi'_7),\ \beta_w = -(\pi'_5 - \pi_2)/(1 - \pi'_7),\ \beta_x = -(\pi'_6 - \pi_3)/(1 - \pi'_7),$$
$$\gamma_1 = -(1 - \pi'_7) * \pi_1 / (\pi'_4 - \pi_1).$$

We see that Equation 16) directly identifies γ_2. The inverse of γ_2, $1/\gamma_2$, also provides an estimate of how long it takes for a disturbance to the long-term relationship to disappear. We can then derive γ_1 and the β's, while the delta-method provides estimates of the structural parameters' standard error.

Finally, in both the growth regressions and in the System-GMM regression we have added the workplace average union membership fee as an ordinary additional IV-instrument, and it is the exclusion of this union supply-side variable that allows us to identify our equations. [24] We argue that the union membership fee is an appropriate instrument for workplace union density. The impact of the average union membership fee on workplace union density is ambiguous, since an increased fee in itself should reduce union density, while higher fees could mean that this union provides a better service. However, the value of our instrument does not rest on the direction of the impact. The important trait is that it does not affect workplace labour demand directly.

We acknowledge that union membership fees as prices are determined in equilibrium by aggregate supply and aggregate demand, and this could inviolate the fees as instruments. One should, however, note the following. Unions' membership fees are usually set centrally. This is certainly true for the country-wide major unions. Several of these unions are present at most workplaces. When determining their membership fees centrally the unions do not take into account the economic situation for a specific single firm, and thus the labour demand disaggregated at the specific workplace is unaffected. The validity of our instrument is, however,

[24] The derivation of this fee is simple. We know for all union workers the union membership fee, and since we know workers' educational qualifications (6-digit) and industry (5-digit SIC), we can calculate from union members' fee the average union membership fee for each combination of 4-digit educational qualificationX3-digit SIC code. Then we link this average union membership fee to all workers (non-union and union members), and calculate the workplace average union membership fee.

weakened when fees are set locally or if fees are set as a percentage of earnings (note that even then they usually incorporate fixed price elements). This latter case is, however, taken into account since, in many specifications, we control for wages. Finally, to add strength to the validity of our instrument we also provide tests of the exclusion restrictions. The exclusion of our supply-side instrument makes us able to identify what we interpret as a labour demand equation.

Table 7 presents our results on employment growth. The first-difference growth regressions of models 1 to 8 provide a background for the dynamic labour demand regression of Table 8.[25] Models 1 and 2 present the survey annualised growth regressions for UK and Norway, respectively, incorporating union density and a dummy for single unit firm as controls, where we weight each observation according to the 1997-sampling probability. Albeit not significant (but close), the point estimate is clearly positive for Norway. For Britain it is negative, but far from significant. Furthermore, running the same regression un-weighted yields a strongly significant and positive result for Norway, whereas for Britain we find a positive point estimate with a p-value of 0.2. This clearly indicates that if a union effect exists, it is stronger among larger workplaces than smaller ones.

Model 3 then repeats the analysis for Norway, but now using the complete panel of observations (thus modelling yearly growth). Growth in union density turns strongly significant, implying that 10 percentage points growth in union density yields 2 percent higher employment growth. Model 4 adds log wages as a control, but this causes only minor changes.

Model 5 relaxes the assumption that only observations of workplaces that survive until 2003 are valid, i.e., it incorporates observations of workplaces that died between 1997 and 2003. The inclusion of dying workplaces is clearly important, since the union effect turns insignificant, with a point estimate of 0.18. This means that the union effect is weaker, possibly even negative among the dying workplaces, i.e., implying a negative correlation between union density and size for these dying workplaces. This is consistent with our notion that workers seek union membership when they anticipate bad times.

Model 6 then reports the results from the same regression as Model 5, except that we now instrument union density using the average union membership fee. As seen by the reported test values, our instrument should ideally have performed better statistically, but note that the possible bias is towards the OLS-figures of Model 5. The main result is that the positive union impact increases 10-fold, and is strongly significant. This figure implies that if union density grows by 1 percentage point, then employment increases by 4 percent.

[25] The first-difference approach is less sensitive to the exogeneity assumption of controls than the within-transformation (Cameron and Trivedi (2005:758)).

Models 7 and 8 repeat the analyses of models 5 and 6, respectively, but drop the weighting procedure. The unweighted regressions reveal strongly significant positive union impact. One should also note that when union density is instrumented (Model 8), the tests for instrument strength and appropriateness improves, and now they are clearly satisfying. This implies that our instrument performs less well in small workplaces, but this should come as no surprise. Small workplaces will generally be more volatile, and one faces to a larger extent integer problems. At the same time, small workplaces may to a greater extent than large workplaces lack union recruitment representatives and have more informal labour relations. The union impact, however, is basically unchanged compared to the weighted result of Model 6, and thus we can infer that when we instrument union density, our results are less sensitive to the weighting procedure.

Let us then address two issues – the sample sensitiveness and the size-union density relationship. First, the reader might worry that what we observe in Table 7 is dependent on our NWERS-sample of workplaces. Since the Norwegian register data comprise the complete population of Norwegian workplaces during 1995 to 2003, to address this issue we picked out all workplaces with more than 10 employees in 1997, and then followed them until 2003. Thus the data set comprise survivors and dying workplaces. On this data set, we repeated the analysis of Table 7's Model 7 (the estimates are available upon request). This regression was not weighted since the data set comprised the complete population. We then identified a strong positive and significant union impact of 0.20 (p-value=0.001). This point estimate is remarkably close to the result of Model 5 (0.18). The difference is caused by the greater uncertainty due to the sampling procedure applied to the data which the analyses of Table 7 are based on. Thus we conclude that our results are not confined to the NWERS-sample, but are representative for the Norwegian population of workplaces having more than 10 employees (in 1997).

Second, we should point out that what we show in Table 7 is not the well-known observation that union density is higher in larger workplaces than smaller workplace (e.g., Schnabel, 2003; Nergaard and Stokke, 2007). The exclusion of the union membership fee (a union supply variable) in the final regressions ensures that we estimate a labour demand equation.

Finally, in Table 8 we turn to the labour demand regressions of Equation 16). These regressions incorporate a dummy for single unit workplace and the square root of the workplace's age as additional controls (expressed by the X's in Equation 16)). Model 1 reports the OLS-estimates (which ignores the fixed effect and the moving average error term). Model 2 reports the results from the within-workplace OLS regression (which takes care of the fixed workplace effect, but ignores the bias following a moving average error term), while Model 3

reports the results when applying the system-GMM regression. In this model the 'classical' tests (Hansen test and the two Arellano-Bond tests) appear satisfying. We focus on the estimates of Model 3, since the estimates of models 1 and 2 are known to be biased.

The estimated parameters associated with the current period variables can be interpreted as the short-term impact. We see that increasing the union density by 1 percentage point appears to increase employment by 1.36 percent momentarily. Such a shock dies out, as indicated by the inverse of γ_2, after roughly ten years. More importantly though, is the long-term impact expressed by the structural parameters. We see that 1 percent increases in the equilibrium level of employment causes realised employment to grow by 0.35 percent. One percent positive discrepancy between the long-term employment level and the realised level causes an employment growth of 0.11 percent. The long-term relationship between unions and employment is also strong. One percent higher union density implies 3.9 percent higher employment.

Thus we identify a strong positive causal relationship between union density and workplace employment for Norway. Although a social experiment providing exogenous variation in union density would be preferable for disentangling and identifying the causal impact of unions on employment, we believe that we have achieved the next-best solution.

9. Conclusion

Using similar data from Norway and Britain covering the period 1997/98 to 2003/4, we have studied how unions affect workplace closure and growth. The purpose was to establish whether the negative employment growth effects usually estimated for the Anglo-Saxon countries extend to Norway, a corporatist country where unions perform a different role to that in liberal regimes, a role which is central to Norwegian economic and social policy and one which is deemed useful and legitimate by workers and employers alike. If, as some have maintained, the negative effects associated with unions found in previous studies from the Anglo-Saxon economies are caused by a tradition of conflict, they should be less pronounced in the Norwegian economy.

In order to compare and contrast our findings with the previous literature most of the paper adopts the standard empirical strategy which is based on Probit and OLS regressions together with maximum likelihood techniques to account for sample selection arising from attrition due to workplace closure. However, we depart from the literature by taking explicit account of wages. We find that unions had no impact, on average, on closures in either country.

But when we explored union effects according to the workplace's rank in the wage distribution we found that unions prolonged the life of low-wage workplaces in Britain whereas Norwegian unions increased (reduced) closure hazards in high (low) waged workplaces.

Our findings on employment growth run counter to most of the empirical literature. Contrary to earlier studies, unions had no effect on workplace growth in Britain, a finding which is consistent with muted union effects on wages and a general diminution of union effects on workplace outcomes in Britain (Blanchflower and Bryson, 2008). In Norway, union workplaces experienced 4 percent per annum lower growth than non-union workplaces. This effect is in line with higher estimates from the Anglo-American literature and run counter to our expectation that, if anything, one might expect union effects on growth to be lower in Norway, or even positive given the role of centralised pay bargaining in setting wages for the majority of both unionised and non-unionised workers. We therefore decided to explore these effects further using unique linked employer-employee dynamic panel data for Norway. These data allow us to move beyond the existing literature identifying associations between unionisation and growth by identifying the causal impact of union density on employment growth net of wages with a technique which explicitly models employers' underlying labour demand. The technique is more data intensive, requiring yearly panel data on workplaces and their workers, together with changes in union density and employment. Using workplace fixed effects we are able to account for the possibility that workplaces will permanently differ in their demand for labour. Using first differences on unionisation and other explanatory variables we are able to account for omitted variables bias which is likely to affect estimates of growth which rely solely on the measurement of conditioning variables in the base period. This omitted variable bias arising from failure to account for shifts in unionisation and the other exogenous variables is negative if shifts in unionisation and the other exogenous variables are negatively correlated with the final period employment.[26] We are also able to use lagged variables and union membership fees to account for the potential endogeneity of unionisation. Finally, this modelling framework allows us to distinguish between unions' effects on short-term and long-term employment adjustments, whereas the standard approach is capturing unions' relationship to short-term adjustments only.

These extensions to the standard modelling framework prove important. Using the dynamic panel modelling approach we find unions have positive and statistically significant impacts on both short-run and long-run employment adjustments. The effects are also quantitatively sizeable. In the short-run a 1 percent rise in union density results in a 1.36 percent

[26] For example, if workers seek union membership for protection when they anticipate bad times, then the omitted variable bias associated with unionisation may turn an otherwise positive relationship between unions and size into negative one.

increase in employment. In the long-term 1 percent higher union density implies 3.9 percent higher employment.

These results suggest that, at least in the Norwegian case, the average causal impact of unions on employment growth is positive, not negative as might appear to be the case using standard modelling procedures. The standard results are biased by omitted variables. The dynamic panel approach also accounts for the possibility that workers join unions in anticipation of a decline in employment, something that would otherwise downwardly bias union effects on employment. The reason why one might get positive union effects on employment growth in Norway is that, having controlled for wage effects as we do, centralised wage bargaining takes wages out of competition, allowing unions to focus on their voice and agency roles for the employer which can be of mutual benefit to both the firm and workers. This is consistent with Teulings and Hartog's (1998) proposition that rent-seeking is not unions' primary objective in corporatist countries.[27] It is also supportive of the notion of Cahuc et al. (2007) that firms strategic manipulation of wages through employment and capital decisions, may in some cases increase overall employment when the bargaining power of some worker groups increases (which is expressed in our empirical analyses through higher union density).

We do not have adequate data to run the same exercise for Britain. However, one may speculate first that, since the standard modelling approach uncovers no negative union impact on short-term employment adjustments, it is unlikely that they would emerge from a dynamic panel analysis. On the other hand, fragmented wage bargaining may limit unions' ability to offer positive productivity-enhancing voice and agency roles to employers, constraining their ability to affect employment positively. In any event these findings indicate the need for caution when interpreting negative effects of unions on growth and survival in the literature as causal impacts of unionization.

[27] They argue that 'corporatist unions have fundamentally different incentives than unions in decentralized economies' (Teulings and Hartog, 1998: 20). Thus corporatist unions renegotiate contracts to maximise the joint surplus of workers and employers, and not to maximise the workers' share of the surplus.

References

Addison, J. T. and C.R. Belfield (2004) Unions and Employment Growth: The One Constant?, *Industrial Relations*, 43, (2): 305-323.

Agell, J. and K.E. Lommerud (1993). 'Egalitarianism and Growth', *Scandinavian Journal of Economics*, 95: 559-79.

Blanchflower, D. G. (2007). 'International Patterns of Union Membership', *British Journal of Industrial Relations*, 45(1): 1–28

Blanchflower, D. G. and Bryson, A. (2008) *Union Decline in Britain*, Centre for Economic Performance Discussion Paper No. 0864

Blanchflower, D. G. and Bryson, A. (2007) *The Wage Impact of Trade Unions in the UK Public and Private Sectors*, IZA Discussion Paper No. 3055

Blanchflower, D. G. and Bryson, A. (2003) 'Changes over time in union relative wage effects in the UK and the US revisited', In Addison, J.T. and Schnabel, C. (eds.), *International handbook of Trade Unions*. Cheltenham, UK and Northampton, Mass.: Edward Elgar.

Blanchflower, D. G., Millward, N. and Oswald, A. J. (1991). 'Unionism and employment Behaviour', *The Economic Journal*, 101: 815–34.

Blanden, J; S. Machin and J. Van Reenen (2006). 'Union Recognition and Productivity' *British Journal of Industrial Relations,* 44: 169-190.

Blundell, R. and S. Bond (1998). 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics*, 87: 115-43.

Bond, S. (2002), 'Dynamic panel data models: A guide to micro data methods and practice,' *Portuguese Economic Journal,* 1: 141-162.

Bowman, J. (2002). 'Employers and the persistence of centralized wage setting. The case of Norway. ' *Comparative Political Studies*, 35: 995-1026.

Bryson, A. (2004a). 'Unions and Workplace Closure in Briatin, 1990-1998', *British Journal of Industrial Relations*, 42:283-302.

Bryson, A. (2004b). 'Unions and Employement Growth in british Workplaces during the 1990s: A Panel Analysis', *Scottish Journal of Political Economy*, 51:477-505.

Bryson, A. (2007). 'New Labour, New Unions', In: Park, A., Curtice, J. Thomsen, K., Phillips, M. and Johnsen, M. (eds.), *British Social Attitudes: the 23rd Report – Perspectives on a changing society*. London: Sage, 183- 211.

Bryson, A., Charlwood, A. and Forth, J. (2006) 'Worker Voice, Managerial Response and Labour Productivity: An Empirical Investigation', *Industrial Relations Journal*, 37: 5, 438-455

Bryson, A. and Forth, J. (2006) *The Theory and Practice of Pay Setting*, Manpower Human Resources Lab Discussion Paper No. 1, London School of Economics (also NIESR Discussion Paper No. 285)

Bryson, A. and Wilkinson, D. (2002) *Collective bargaining and workplace performance: an investigation using the Workplace Employee Relations Survey 1998*, Employment Relations Research Series No. 12, Department of Trade and Industry Research Series.

Cabral, L.M.B. (1995). 'Sunk Cost, Firm Size and Firm Growth', *The Journal of Industrial Economics*, 43:161 – 172.

Cabral, L.M.B. and T. W. Ross (2007). Are sunk cost a barrier to entry? Mimeo.

Cahuc, A. and A. Zylberberg (2004), Labor Economics, Boston, Mass: MIT PRESS.

Cahuc, P., Marque, F. and Wasmer, E. (2007). 'Intrafirm wage bargaining in matching models: macroeconomic implications and resolution methods with multiple labor inputs', *International Economic Review* (forthcoming).

Cameron, A. C. and P. K. Trivedi (2005). Microeconometrics. Cambridge: Cambridge University Press.

Card, D. (2001). 'The effects of unions on the wage inequality in the U.S. labour market', Industrial and Labour Relations Review, 54: 296-315.

Card, D., Lemieux, T. and Riddell, W. C. (2003), *Unionisation and Wage Inequality: A Comparative Study of the US, the UK and Canada*, NBER Working Paper #9473

DiNardo, J., and D.S. Lee (2004), 'Economic Impacts of New Unionization on Private Sector Employers: 1984-2001', *Quarterly Journal of Economics*, 119: 1328-1441

Elias, P. (2004). 'Job-related training, trade union membership and labour mobility: a longitudinal study', *Oxford Economic Papers*, 46:563 - 578.

Esping-Andersen, G. (1990). Three Worlds of Welfare Capitalism. Cambridge: Polity Press

Freeman, R. and Kleiner, M. M. (1999). 'Do Unions Make Enterprises Insolvent?' *Industrial and Labor Relations Review*, 52 (4): 510-527

Freeman, R. and Medoff, J., 1984. *What do unions do?* New York: Basic Books.

Gall, G. (2004). 'Trade union recognition in Britain, 1995-2002: turning a corner?' *Industrial Relations Journal*, 35:249-270.

Hibbs, D. and H. Locking (2000). 'Wage dispersion and productive efficiency: Evidence for Sweden', *Journal of Labor Economics*, 18: 755 - 782.

Hirsch, B. T. (1992). 'Firm Investment Behaviour and Collective Bargaining Strategy', *Industrial Relations*, 31 (1): 95-121

Holth, B. A. (2003). Arbeids- og bedriftsundersøkelsen 2003. Dokumentasjon. NOT 2003/66. Oslo and Kongsvinger: SSB.

Johansen, L. (1959). 'Substitution vs. Fixed production Coefficients in the Theory of Economic Growth.' *Econometrica*, 27: 156 – 176.

Kersley, B., Alpin, C., Forth, J., Bryson, A., Bewley, H., Dix, G. and Oxenbridge, S. (2006). *Inside the Workplace: Findings from the 2004 Workplace Employment Relations Survey*. London: Routledge.

Krol, R. and S. Svorny (2007). 'Unions and Employment Growth: Evidence from State Economic Recoveries', *Journal of Labor Research,* 28: 525-535.

Leonard, J. S. (1992). 'Unions and employment growth', *Industrial Relations*, 31: 80-94.

Luttmer, E. (2007). 'Selection, growth, and the size distribution of firms', *Quarterly Journal of Economics*, 122: 1103 – 1144.

Long, R. J. (1993). 'The Effect of Unionization on Employment Growth of Canadian Companies', *Industrial and Labor Relations Review*, 46: 691-703

Machin, S. and Wadhwani (1991). 'The Effects of Unions on Organisational Change and Employment', *The Economic Journal*, 101: 835-854.

Millward, N., Bryson, A. and Forth, J., 2000. *All Change at Work? British Employment Relations, 1980-98, as portrayed by the Workplace Industrial Relations Survey Series*, Routledge, London

Moene, K. O. and M. Wallerstein (1997). 'Pay inequality', *Journal of Labor Economics*, 15: 403-30.

Menezes-Filho, N. (1997) 'Unions and Profitability over the 1980s: Some evidence on Union Firm Bargaining in the UK', *Economic Journal*:, 107:651-670.

Metcalf, D. (2005). 'Trade unions:resurgence or perdition? An economic analysis. In *Trade Unions: Resurgence or Decline?*. Edited by Fernie, S.; Metcalf, D. Routledge, 2005.

Nergaard, K. and Stokke, T.A. (2005). 'Organisasjoner og tariffavtaler', In. Torp, H. (2005), *Nytt arbeidsliv. Medvirkning, Inkludering og belønning*. Oslo: Gyldendal Akademisk, 111-132.

Nergaard, K. and Stokke, T.A. (2007). 'The puzzles of union density in Norway', *Transfer, the European Review of Labour and Research*, 13(4):

Rehn, G. (1952). 'The Problem of Stability: An analysis of Some Policy Proposals', In: Turvey, R. (ed.), *Wage Policy under Full Employment*. London: W. Hodge.

Roodman, D. (2005). xtabond2: Stata module to extend xtabond dynamic panel data estimator. Center for Global Development, Washington. http://econpapers.repec.org/software/bocbocode/s435901.htm

Scheuer, S. (1997). 'Collective bargaining coverage and the status divide: Denmark, Norway and the United Kingdom compared', *European Journal of Industrial Relations*, 3: 39-57.

Schnabel, C. (2003). 'Determinants of Trade Union Membership', In Addison, J. T. and C. Schnabel (eds.) *International handbook of trade unions*. Cheltenham: Edward Elgar: 13-43

Stokke, T.A., S. Evju and H. O. Frøland (2003). *Det kollektive arbeidslivet. Organisasjoner, tariffavtaler, lønnsoppgjør og inntektspolitikk*. Oslo: Universitetsforlaget.

Torp, H. (ed.)(2005). Nytt arbeidsliv. Medvirkning, inkludering og belønning. Gyldendal Akademisk.

Teulings, C.N. & Hartog, J. (1998). *Corporatism or Competition?: Labour Contracts, Institutions and Wage Structures in International Comparison*, Cambridge: Cambridge University Press, UK. 346 p

Utgaard, R. (2004). *Fagbevegelsens frontsoldater eller ledelsens løpegutter. Om konserntillitsvalgtes bidrag i omstillinger i internasjonale konsern*. Fafo-report 454. FAFO.

Vroman, S. B. (1990). 'The Union-Nonunion Wage Differential and Monitoring Costs',*Economics Letters,* 32(4): 405-409.

Williams, R.(2006). 'Generalized Ordered Logit/ Partial Proportional Odds Models for Ordinal Dependent Variables', *The Stata Journal,* 6(1):58-82

Windmeijer, F. (2005). 'A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators', *Journal of Econometrics*, 126: 25-51.

Wooden, M. and A. Hawke (2000). 'Unions and the Employment Growth: Panel Data Evidence.' *Industrial Relations*, 39: 88–107.

Figure 1 5-digit SIC industry employment growth 1997-2003 and industry union density 1997

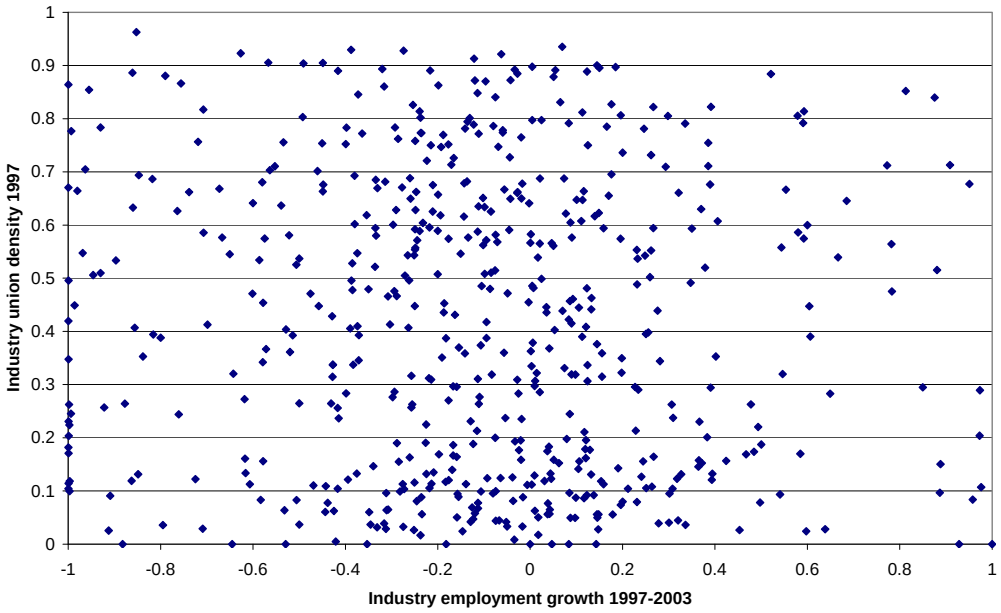

Table 1 Changes in Private Sector Unionisation, 1997/8-2003/4

	UK		Norway	
	1998	2004	1997	2003
Workplaces				
Union recognition (%)	24.6	16.3	79.3	73.4
No agreements (%)	75.3	83.5	31.7	36.3
1 agreement (%)	20.0	11.4	37.9	31.6
2 agreements (%)	2.7	3.5	14.7	16.9
3 or more agreements (%)	2.0	1.6	15.5	15.2
Union density (%-points)	10.7	8.7	37.3	37.2
Individual wage determination (%)	91.6	91.6	31.1	26.6
Centralised bargaining (%)	5.6	2.3	24.3	25.2
Local bargaining (only or combined) (%)	11.0	8.4	44.5	48.2
Bargaining, DK-level	8.3	5.5	-	-
Closure (%)	18.7		17.4	
Log employment growth (%)	-0.2		-1.2	
Workers				
Union recognition (%)	41.7	32.6	86.0	81.3
No agreements (%)	58.4	66.7	18.2	25.7
1 agreement (%)	22.4	20.5	29.9	27.8
2 agreements (%)	9.4	7.7	14.0	17.3
3 or more agreements (%)	10.4	5.2	37.8	29.2
Union density (%-points)	20.8	16.9	48.7	47.9
Individual wage determination (%)	88.5	88.6	23.6	18.7
Centralised bargaining (%)	6.3	5.1	19.7	21.9
Local bargaining (only or combined) (%)	26.7	20.2	56.5	59.3
Bargaining, DK-level	9.3	7.4	-	-

Note: Based on the British WERS 1998 and 2004, and the Norwegian NWERS 1997 and 2003. The figures are nationally representative for the population of workplaces with more than 10 employees. For the British figures note the following: (1) Union recognition and number of union agreements include cases where no recognition declared yet employer says collective bargaining occurs. These cases are coded as 'single recognised union' for N agreements. (2) Individual wage determination is actually any wage determination other than collective bargaining. (3) Centralised bargaining and local bargaining are not mutually exclusive. In both cases variables identify workplaces with any incidence of that type of bargaining. Local bargaining is any workplace-level or organization level collective bargaining. Also included 'Bargaining but DK level' because quite a big category in Britain. For the Norwegian figures note that union recognition and No agreements do not add to 100. The reason is that some of workplaces classified as recognising unions in 1997 were not asked the question regarding the number of agreements, but have their union recognition status defined according to whether wages were set by collective bargaining (either centrally or locally). For reasons of comparability, union recognition in 2003 is also defined as either having at least one agreement or being involved in collective wage bargaining. Note also that roughly 10 percentage points of the workplaces that individually set wages in 1997, have union agreements. This involves roughly 5 percentage points of the workers in 1997.

Table 2. The Impact of union recognition on closures. Private sector. Probit regressions. Marginal effects.

	UK			Norway			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model6	Model 7
Union recognition	0.055	0.039	0.020	-0.046	-0.043	-0.041	-0.019
Missing union info.	-	-	-	-0.017	-0.029	-0.032	-0.100
Age of workplace (ref.: 10+ years)							
Age <5 years	0.111**	0.082	0.081	0.219**	0.223***	0.229***	0.222***
5 =<Age<10 years	0.128***	0.066	0.039	0.035**	0.038**	0.036**	0.036*
Workplace size (ref: 500+ employees)							
11-24 employees	0.058	0.056	0.064	0.124***	0.098*	0.096*	0.086
25-49 employees	0.179***	0.209***	0.226***	0.159***	0.129*	0.126*	0.125*
50-99 employees	-0.029	-0.013	-0.006	0.055	0.039	0.035	0.030
100-199 employees	0.023	0.017	-0.007	0.038	0.016	0.014	0.008
200-499 employees	-0.000	-0.016	-0.025	-0.012	-0.026	-0.028	-0.014
Single workplace	0.018	-0.020	-0.022	0.012	0.017	0.020	0.015
Log relative growth (t to t-1)		0.121**	0.126***		-0.076***	-0.073***	-0.068**
Job cuts/laid off		0.075**	0.088**		0.137***	0.140***	0.131***
Recruitment problems		0.069**	0.071**		0.042***	0.042***	0.025***
Financial performance relative to industry average (ref.: a lot better than average)							
FP better than average		-0.024	-0.020		0.019	0.024	0.037
FP average		0.105**	0.098*		-0.016	-0.012	0.012
FP below average		-0.036	-0.066		0.024	0.026	0.050
FP missing		0.136	0.028		0.088	0.088	0.085
Merger		0.049	0.043		-0.017	-0.021	-0.035
Sold-off/de-merger		-0.020	-0.029		0.027	0.030	0.043
Strong competition		0.027	0.035		0.005	0.009	0.009
Main market abroad		0.083	0.073		0.068*	0.073**	0.050
S.CompXabroad		-0.024	-0.025		-0.083**	-0.086**	-0.078**
Growing market		-0.013	-0.006		-0.026	-0.034	0.146*
Male dominated		0.187***	0.209***		-0.024	-0.015	-0.020
Ind. rel. growth min. capital						-0.009**	
Controls for:							
Industry (1-digit SIC)	Yes	Yes		Yes	Yes	Yes	
Industry (2-digit SIC)			Yes				Yes
Regions (1-digit)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main occupation (1-digit)		Yes	Yes		Yes	Yes	Yes
N(observations)	1488	1488	1488	1368	1368	1368	1368

Note: Marginal effects calculated from Table A1. See Table A1 for further details. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively. The regressions for Britain also include dummies for not trading, missing lagged employment, missing age information and for difference kinds of measure of financial performance (e.g., profits).

Table 3. The Impact of unions on closures. Private sector. Probit. Marginal effects.

	UK			Norway			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model6	Model7
Method:	ML	ML	ML	ML	ML	ML	ML
1):							
1 union agreement	0.068	0.056	0.041	-0.046	-0.044	-0.042	-0.040
2 union agreements	0.128*	0.101	0.091	0.032	0.038	0.036	0.021
3+ union agreements	-0.134***	-0.121***	-0.116***	0.053	0.059	0.064	0.055
Missing data on N agree.	-0.030	-0.080	-0.079	-0.076	-0.085	-0.088	-0.048
Pseudo-R^2	0.16	0.28	0.29	0.081	0.108	0.111	0.149
2):							
Union density	0.001	0.000	-0.000	-0.001	-0.007	-0.007	-0.007
Pseudo-R^2	0.1496	0.2626	0.2784	0.072	0.098	0.102	0.142
Controls for:							
Age, size, single unit	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Previous performance		Yes	Yes		Yes	Yes	Yes
Competition		Yes	Yes		Yes	Yes	Yes
Industry (1-digit SIC)	Yes	Yes		Yes	Yes	Yes	
Industry (2-digit SIC)			Yes				Yes
Regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main occupation		Yes	Yes		Yes	Yes	Yes
Ind. rel. growth min. capital						Yes	
N(observations)	1490	1490	1490	1368	1368	1368	1368

Note: Table elements express parameter estimates from 2 sets of regressions replicating the analysis of Table 2 – models 2 and 5 using 1) variables expressing the number of union agreements (no agreement reference), and 2) union density: Dependent variable in all regressions is a dummy for workplace closure during our period of observation. UK: end year=2004, start year=1998. Norway: end year=2003, start year=1997. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively. The full regression results available from the authors upon request.

Table 4. The importance of the position in the wage distribution for the impact of unions on closures. Private sector. Probit. Marginal effects.

	UK	Norway
	Model 3	Model7
Method:	ML	ML
1):		
Union recognition-high wage	-0.014	0.395*
Union recognition-middle wage	0.013	-0.016
Union recognition-low wage	-0.045	-0.066
Low wage	0.240***	0.149
High wage	0.050	-0.112***
Pseudo-R^2		0.155
2):		
Union density		-1.123**
Union density X log average workplace daily wage		0.216**
Log average workplace daily wage		-0.100**
Pseudo-R^2		0.150
Controls for:	Yes	Yes
Age, size, single unit		
Previous performance		
Competition	Yes	Yes
Industry (2-digit SIC)	Yes	Yes
Regions	Yes	Yes
Main occupation	Yes	Yes
N(observations)	1115	1368

Note: Table elements express parameter estimates from 2 sets of regressions replicating the analysis of Table 2 – models 3 and 7 adding wage measures and cross-terms between wages and union for two union measures: 1) union recognition and 2) union density (Norway only). Dependent variable in all regressions is a dummy for workplace closure during our period of observation. UK: end year=2004, start year=1998. Norway: end year=2003, start year=1997. The full regression results available from the authors upon request. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively.

Table 5. The impact of unions on growth. Private sector.

	UK			Norway			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Method:	OLS	OLS	ML	OLS	OLS	ML	ML
1):							
Union recognition	0.007	-0.004	-0.002	-0.032**	-0.041***	-0.047***	-0.035***
Missing union info.							
R^2	0.15	0.28		0.088	0.152		
Wald test indep. eqns. (rho=0): chi2(1)			0.03			43.01	0.00
Rho-estimate			-0.143			-0.748***	0.016
2):							
1 union agreement	0.008	-0.002	-0.001	-0.026***	-0.036***	-0.035***	-0.035***
2 union agreements	0.010	0.003	0.011	-0.044***	-0.051***	-0.051***	-0.055***
3+ union agreements	-0.021	-0.043**	-0.048	-0.017	-0.019	-0.020	-0.021
R^2	0.15	0.28		0.088	0.152		
Wald test indep. eqns. (rho=0): chi2(1)			0.13			43.01	0.08
Rho-estimate			-0.312			-0.748***	0.051
3):							
Union density	-0.000	-0.000	0.000	-0.043	-0.048**	-0.048**	-0.049***
R^2	0.15	0.28		0.089	0.115		
Wald test indep. eqns. (rho=0): chi2(1)			0.02			0.04	0.10
Rho-estimate			-0.084			0.035	0.050
Controls for:							
Age, size, single unit	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Previous performance		Yes	Yes		Yes	Yes	Yes
Competition		Yes	Yes		Yes	Yes	Yes
Industry (1-digit SIC)	Yes	Yes		Yes	Yes	Yes	
Industry (2-digit SIC)			Yes				Yes
Regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main occupation		Yes	Yes		Yes	Yes	Yes
N(observations)	957	957	1174	1161	1161	1368	1368

Note: Table elements express parameter estimates from 2 sets of regressions replicating the analyses of tables 2 and 3 on growth (instead of closure) using 1)variable measuring union recognition, 2) variables expressing the number of union agreements (no agreement reference), and 3) union density: Dependent variable in all regressions is log(Size end year/Size start year)/6. UK: end year=2004, start year=1998. Norway: end year=2003, start year=1997. Models 3, 6and 7 are estimated using Stata's Heckman-procedure, i.e., maximum likelihood jointly with a selection equation. The full regression results available from the authors upon request. Table A2 shows the full results for case 1) Union recognition. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively.

Table 6. The impact of union agreements on categories of growth. Private sector. Generalized ordered Probit. Marginal effects.

	UK				Norway			
	-0.25>G	0>G≥-0.25	0.25>G≥0	G≥0.25	-0.25>G	0>G≥-0.25	0.25>G≥0	G≥0.25
1 union agreement	-0.028	-0.008	0.003	0.034	0.107***	-0.076***	0.023	-0.054***
	(0.057)	(0.017)	(0.004)	(0.070)	(0.028)	(0.026)	(0.042)	(0.025)
2 union agreements	0.007	0.002	-0.001	-0.008	0.034	0.068***	0.038	-0.140***
	(0.064)	(0.015)	(0.007)	(0.072)	(0.037)	(0.018)	(0.036)	(0.035)
3+ union agreements	0.002	0.000	-0.000	-0.002	0.046**	0.006**	-0.016*	-0.037***
	(0.106)	(0.026)	(0.011)	(0.121)	(0.023)	(0.003)	(0.009)	(0.005)
Controls for:								
Age, size, single unit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry (1-digit SIC)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.117				0.055			
N(observations)	944				1161			

Note: Table elements show the estimated marginal effect on the growth category probabilities (these are denoted by the column headings). G denotes log employment growth, which is calculated log(Size end year/Size start year)/6. UK: end year=2004, start year=1998. Norway: end year=2003, start year=1997.. Table A3 reports the estimated parameters and standard errors of the model for UK and Norway. Dependent variable in the two regressions expresses the category, taking the value of 1 (-0.25>G) to 4 (G≥0.25). The control variables are otherwise identical to Table 3's Model 1(4)-case 1). Robust standard errors reported in parenthesis. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively.

Table 7 The impact of changes in union density on employment growth

	Growth annualised		Annual growth					
	UK	Norway	Norway					
Population-weighted	Yes	Yes	Yes	Yes	Yes	Yes	No	No
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Δunion density$_t$	-0.000	0.181	0.207**	0.213***	0.184	4.185**	0.653***	4.178***
	(0.002)	(0.139)	(0.103)	(0.083)	(0.148)	(2.076)	(0.213)	(1.173)
Δlog average wage$_t$				0.069	0.075	0.003	0.145	0.054
				(0.083)	(0.046)	(0.043)	(0.112)	(0.121)
Δsingle_unit$_t$	-0.031	0.130***	0.251***	0.183***	0.134***	0.146***	0.057	0.086**
	(0.059)	(0.052)	(0.054)	(0.035)	(0.046)	(0.033)	(0.037)	(0.044)
Controls for:								
Year dummies			Yes	Yes	Yes	Yes	Yes	Yes
IV						Yes		Yes
First step test for excl. instrument, F-value						6.850		13.06
Cragg-Donald weak instrument test, F-value						5.689		19.92
Andersen canon.corr. LR-test, P-value						0.017		0.001
Population	98/04	97/03	97/03	97/03	97-	97-	97-	97-
F (workp.)/N(obser.)	572/ 572	1186/ 1186	1186/ 5848	1186/ 5848	1324/ 6088	1324/ 6088	1324/ 6088	1324/ 6088

Note: Columns headed by Growth annualised present the result from analyses where the dependent variable denotes log employment growth, which is calculated log(Size end year/Size start year)/6. UK: end year=2004, start year=1998. Norway: end year=2003, start year=1997. Columns headed by Annual growth present the result from analyses where the dependent variable denotes log employment growth, which is calculated log(Size year t/Size year t-1). In Models 1-6 each observation is weighted according to the 1997(1998)-sampling probability. Estimation method: Models 1-5 and 7: First-difference OLS, Model 6 and 8: First-difference IV/GMM regression., Population: 98-04 denotes private sector UK workplaces participating in WERS1998 surviving to 2004, 97-03 denotes private sector Norwegian workplaces participating in NWERS 1997 surviving to 2003, and 97- denotes private sector Norwegian workplaces participating in NWERS 1997, surviving at least to 1999 (maximum period of observation until 2003). Instruments: Models 6 and 8: workplace average union membership fee as instrument for union density, All regressions also incorporate an intercept term. Robust standard errors reported in parenthesis. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively.

Table 8 The impact of union density on log annual workforce employment. Norway

Estimation method	OLS	OLS-Within	System-GMM
	Model 1	Model 2	Model 3
union density$_t$	0.677***	0.471**	1.364***
	(0.208)	(0.208)	(0.430)
log average wage$_t$	0.209*	0.127	-0.035
	(0.111)	(0.129)	(0.253)
single_unit$_t$	0.068*	0.091**	-0.496**
	(0.039)	(0.044)	(0.249)
square root of age$_t$	0.980***	0.374	2.076*
	(0.362)	(1.869)	(1.138)
log workforce size$_{t-1}$	0.946***	0.319***	0.894***
	(0.008)	(0.051)	(0.041)
union density$_{t-1}$	-0.677***	-0.246*	-0.954**
	(0.201)	(0.145)	(0.395)
log average wage $_{t-1}$	0.212*	-0.351***	0.006
	(0.111)	(0.089)	(0.184)
single_unit $_{t-1}$	-0.077**	-0.066	-0.496**
	(0.039)	(0.042)	(0.249)
square root of age $_{t-1}$	-0.945***	-0.476	-1.994
	(0.351)	(1.601)	(1.097)
Selected structural parameters of interest			
γ_1	240.737	1.422*	0.354**
γ_2	0.054***	0.681***	0.106***
β_u	0.003	0.331	3.853**
β_w	-0.045	-0.329*	-3.282*
Controls for:			
Year dummies, intercept	Yes	Yes	Yes
Hansen test of overid. Restrictions, P-value			0.230
Arellano-Bond test for AR(1) in first differences			0.000
Arellano-Bond test for AR(2) in first differences			0.452
Population	97-	97-	97-
F (workp.)/N(obser.)	1324/6088	1324/6088	1324/6088

Note: Columns heading denotes estimation method. The dependent variable denotes log workforce size year t. In Population: 97- denotes private sector Norwegian workplaces participating in NWERS 1997, surviving at least to 1999 (maximum period of observation until 2003). Instruments: Model 3: lagged variables of all variables + workplace average union membership fee (see text). All regressions also incorporate an intercept term. Robust standard errors reported in parenthesis. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively.

Appendix

Table A1. The Impact of union recognition on closures. Private sector. Probit regressions.

	UK			Norway			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Union recognition	0.224	0.184	0.102	-0.186	-0.180	-0.174	-0.087
	(1.12)	(1.01)	(0.55)	(0.220)	(0.249)	(0.253)	(0.255)
Missing union info.	-	-	-	-0.074	-0.137	-0.154	-0.702
	-	-	-	(0.340)	(0.301)	(0.311)	(0.830)
Age <5 years	0.410*	0.351	0.358	0.723***	0.746***	0.765***	0.764***
	(1.96)	(1.57)	(1.56)	(0.263)	(0.232)	(0.220)	(0.209)
5 =<Age<10 years	0.479**	0.297*	0.189	0.142**	0.159***	0.150***	0.156*
	(2.57)	(1.61)	(0.99)	(0.062)	(0.060)	(0.056)	(0.085)
Missing age info.	0.086	0.159	0.311	-	-	-	-
	(0.23)	(0.47)	(0.94)	-	-	-	-
11-24 employees	0.257	0.287	0.344	0.567***	0.455*	0.449*	0.415
	(1.10)	(1.22)	(1.32)	(0.115)	(0.259)	(0.265)	(0.319)
25-49 employees	0.646***	0.810***	0.889***	0.583***	0.494***	0.486**	0.498**
	(2.83)	(3.60)	(3.44)	(0.129)	(0.214)	(0.219)	(0.234)
50-99 employees	-0.131	-0.067	-0.033	0.216	0.163	0.147	0.129
	(0.60)	(0.29)	(0.13)	(0.183)	(0.292)	(0.295)	(0.306)
100-199 employees	0.093	0.081	-0.036	0.150	0.070	0.058	0.037
	(0.47)	(0.38)	(0.14)	(0.119)	(0.151)	(0.154)	(0.213)
200-499 employees	-0.002	-0.083	-0.139	-0.054	-0.122	-0.133	-0.069
	(0.01)	(0.37)	(0.53)	(0.130)	(0.193)	(0.194)	(0.207)
Single workplace	0.076	-0.102	-0.117	0.050	0.076	0.088	0.072
	(0.42)	(0.61)	(0.63)	(0.063)	(0.097)	(0.090)	(0.081)
Log relative growth t		0.599***	0.653***		-0.333***	-0.321***	-0.315**
		(2.60)	(2.77)		(0.111)	(0.113)	(0.132)
Missing lagged info.		0.460	0.533		-	-	-
		(1.21)	(1.47)		-	-	-
Job cuts/laid off		0.337**	0.406**		0.497***	0.509***	0.495***
		(1.96)	(2.38)		(0.113)	(0.114)	(0.107)
Recruitment problems		0.340**	0.364**		0.189***	0.190***	0.117***
		(2.33)	(2.50)		(0.060)	(0.057)	(0.040)
FP better than average		-0.123	-0.108		0.081	0.100	0.158
		(0.54)	(0.46)		(0.077)	(0.070)	(0.184)
FP average		0.473***	0.460*		-0.073	-0.055	-0.056
		(2.02)	(1.93)		(0.357)	(0.359)	(0.541)
FP below average		-0.196	-0.431		0.102	0.109	0.212
		(0.57)	(1.18)		(0.212)	(0.208)	(0.317)
FP missing		0.541	0.137		0.437	0.440	0.444
		(1.33)	(0.32)		(1.009)	(1.011)	(1.008)
Sales, fees or budget		-0.180	-0.189				
		(0.86)	(0.96)				
Costs/expenditure		0.109	0.309				
		(0.37)	(1.03)				
Stock Market indicator		-0.575	-0.273				
		(1.47)	(0.65)				
Other		-0.322	0.042				
		(0.97)	(0.12)				
Merger		0.217	0.199		-0.078	-0.094	-0.169
		(0.80)	(0.70)		(0.237)	(0.242)	(0.236)
Sold-off/de-merger		-0.108	-0.164		0.115	0.124	0.184**
		(0.34)	(0.48)		(0.089)	(0.089)	(0.083)
Strong competition		0.132	0.141		0.023	0.039	0.043
		(0.65)	(0.57)		(0.092)	(0.089)	(0.091)
Main market abroad		0.357	0.176		0.269**	0.286***	0.209
		(1.20)	(1.90)		(0.132)	(0.121)	(0.178)
S.CompXabroad		-0.127	-0.138		-0.453*	-0.479*	-0.455
		(0.33)	(0.32)		(0.253)	(0.252)	(0.289)
Growing market		-0.065	-0.031		-0.111	-0.147	-0.741**

		(0.40)	(0.19)		(0.217)	(0.211)	(0.363)
Male dominated		0.717***	0.805***		-0.108	-0.069	-0.094
		(2.77)	(3.25)		(0.090)	(0.106)	(0.095)
Ind. rel. growth min. capital						-0.042***	
						(0.015)	
Constant	-0.680 **	-1.895**	-1.746**	-1.061***	-1.264***	-1.201***	-7.881***
	(2.67)	(4.55)	(3.10)	(0.2251)	(0.245)	(0.219)	(0.901)
Controls for:							
Industry (1-digit SIC)	Yes	Yes		Yes	Yes	Yes	
Industry (2-digit SIC)			Yes				Yes
Regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main occupation		Yes	Yes		Yes	Yes	Yes
Pseudo-R^2	0.15	0.26	0.28	0.07	0.10	0.10	0.14
N(observations)	1488	1488	1429	1368	1368	1368	1325

Note: Log relative growth t measures log relative workforce growth from period t-1 to t (UK: t=1998, Norway:t=1997). FP denotes financial performance. Norway: Industry relative growth minimum capital expresses industry average (2-digit SIC) of relative growth in minimum capital values related to buildings for newly started firms per employee from 1994-95 to 1996-97. Robust standard errors are denoted in parentheses. Due to the stratified sampling, each observation is weighted according to the inverse sampling probability. In the Norwegian case, due to the sampling procedure the standard errors are corrected for clustering on the strata-variable. ***, *** and *** denote 1, 5, and 10 percent level of significance, respectively.

Table A2. The Impact of union recognition on growth. Private sector.

	UK			Norway			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Method:	OLS	OLS	ML	OLS	OLS	ML	
Union recognition	0.007	-0.004	-0.002	-0.032**	-0.041***	-0.047***	-0.035***
	(0.46)	(0.26)	(0.15)	(0.010)	(0.010)	(0.015)	(0.006)
Missing union info.	-	-	-	-0.019	-0.037	-0.041	-0.047
	-	-	-	(0.026)	(0.035)	(0.028)	(0.036)
Age of workplace (ref.: 10+ years)							
Age <5 years	0.017	0.011	0.009	0.025*	0.029	0.056***	0.024
	(1.00)	(0.69)	(0.44)	(0.013)	(0.019)	(0.013)	(0.029)
5 =<Age<10 years	-0.009	-0.019	-0.015	0.015***	0.009	0.015***	0.007
	(0.50)	(1.14)	(0.79)	(0.007)	(0.007)	(0.005)	(0.006)
Workplace size (ref: 500+ employees)							
11-24 employees	0.035	0.038	0.048	0.099***	0.103***	0.117***	0.098***
	(1.51)	(1.69)	(1.99)**	(0.015)	(0.014)	(0.014)	(0.014)
25-49 employees	0.027	0.031	0.035	0.066***	0.072***	0.091***	0.075***
	(1.26)	(1.48)	(1.21)	(0.012)	(0.016)	(0.016)	(0.017)
50-99 employees	0.032	0.035	0.036	0.056***	0.0620***	0.077***	0.074***
	(1.57)	(1.66)	(1.77)	(0.016)	(0.019)	(0.019)	(0.017)
100-199 employees	0.002	0.008	0.008	0.045*	0.047***	0.064***	0.065***
	(0.10)	(0.36)	(0.38)	(0.020)	(0.010)	(0.018)	(0.020)
200-499 employees	0.027	0.025	0.031	0.037***	-0.016***	0.043***	0.046***
	(1.51)	(1.29)	(1.61)	(0.009)	(0.006)	(0.012)	(0.012)
Single workplace	-0.007	-0.014	0.001	-0.018**	-0.057**	-0.015**	-0.012**
	(0.50)	(1.20)	(0.08)	(0.006)	(0.023)	(0.006)	(0.005)
Log relative growth		-0.016	-0.005		-0.061***	-0.079***	-0.061***
		(1.16)	(0.38)		(0.024)	(0.023)	(0.023)
Job cuts/laid off		0.009	0.012		-0.057**	-0.035	-0.056
		(0.78)	(0.73)		(0.023)	(0.022)	(0.020)
Recruitment problems		-0.003	-0.003		-0.006	-0.000	-0.004
		(0.21)	(0.20)		(0.004)	(0.004)	(0.004)
Financial performance relative to industry average (ref.: a lot better than average)							
FP better than average		0.021	0.013		0.013	0.018	0.012
		(1.16)	(0.72)		(0.017)	(0.014)	(0.018)
FP average		-0.015	-0.014		-0.016	-0.018	-0.003
		(0.76)	(0.65)		(0.018)	(0.025)	(0.012)
FP below average		0.009	0.018		-0.007	-0.002	-0.002
		(0.25)	(0.41)		(0.028)	(0.029)	(0.026)
FP missing		-0.028	-0.033		0.102**	0.113**	0.088**
		(0.90)	(1.01)		(0.041)	(0.052)	(0.043)
Merger		-0.004	-0.008		-0.008	-0.009	-0.005
		(0.23)	(0.42)		(0.017)	(0.009)	(0.019)
Sold-off/de-merger		-0.072**	-0.069*		0.009	0.013	0.007
		(2.09)	(1.87)		(0.015)	(0.015)	(0.012)
Strong competition		0.007	0.009		0.008	0.008	0.011
		(0.44)	(0.63)		(0.012)	(0.011)	(0.010)
Main market abroad		-0.038*	-0.020		-0.025*	-0.015	-0.029**
		(1.64)	(0.74)		(0.013)	(0.013)	(0.012)
S.CompXabroad		0.053**	0.028		0.016	0.002	0.021
		(1.96)	(0.94)		(0.015)	(0.018)	(0.015)
Growing market		0.023**	0.033**		0.006	0.004	0.014
		(1.96)	(2.65)		(0.013)	(0.016)	(0.022)
Male dominated		0.051***	0.045		0.024**	0.018	0.022
		(3.51)	(1.52)		(0.011)	(0.011)	(0.008)
Controls for:							

Industry (1-digit SIC)	Yes	Yes		Yes	Yes	Yes	
Industry (2-digit SIC)			Yes				Yes
Regions (1-digit)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main occupations (1-digit)		Yes	Yes		Yes	Yes	Yes
R^2	0.15	0.28		0.088	0.152		
Wald test indep. eqns. (rho=0):chi2(1)			0.03			43.01	0.00
Rho-estimate			-0.143			-0.748***	0.016
N(observations)	956	956	1174	1161	1161	1368	1368

Note: Dependent variable is log(Size end year/Size start year)/6. In Britain the denominator is 6.3 which is the median gap between survey interviews. UK: end year=2004, start year=1998. Norway: end year=2003, start year=1997. Models 3 and 6 are estimated using Stata's Heckman-procedure, i.e., maximum likelihood jointly with a selection equation. The selection equation is identical to Models 3 and 6 in Table A1. An intercept is included in all regressions. In regressions for Britain a dummy for not trading, a dummy for missing lagged employment, a dummy for missing age information and dummies for difference kinds of measure of financial performance (e.g., profits) are also included. Robust standard errors are denoted in parentheses. Due to the stratified sampling, each observation is weighted according to the inverse sampling probability. In the Norwegian case, due to the sampling procedure the standard errors are corrected for clustering on the strata-variable. ***, *** and *** denote 1, 5, and 10 percent level of significance, respectively.

Table A3 The impact of union agreements on categories of growth. Private sector. Generalized Ordered Probit.

	UK			Norway		
	-0.25>G	0>G≥-0.25	0.25>G≥0	-0.25>G	0>G≥-0.25	0.25>G≥0
1 union agreement	0.091	0.091	0.091	-0.309***	-0.078	-0.192**
	(0.186)	(0.186)	(0.186)	(0.086)	(0.071)	(0.091)
2 union agreements	-0.021	-0.021	-0.021	-0.098	-0.258***	-0.589***
	(0.198)	(0.198)	(0.198)	(0.103)	(0.062)	(0.180)
3+ union agreements	-0.005	-0.005	-0.005	-0.133**	-0.133**	-0.133**
	(0.331)	(0.331)	(0.331)	(0.065)	(0.065)	(0.065)
Controls for:						
Age, size, single unit	Yes	Yes	Yes	Yes	Yes	Yes
Industry (1-digit SIC)	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2		0.116			0.055	
N(observations)		944			1161	

Note: Table elements show the estimated parameters and standard errors of generalized ordered Probit regressions. l The column headings denote the growth categories. G denotes log employment growth, which is calculated log(Size end year/Size start year)/6. UK: end year=2004, start year=1998. Norway: end year=2003, start year=1997. Dependent variable in the two regressions expresses the category, taking the value of 1 (-0.25>G) to 4 (G≥0.25). Note that the estimates are measured relative to category 4 (G≥0.25), which thus acts as a reference category. Note also that equal parameter estimate in each of the categories are imposed if not rejected. For the UK-estimates the equal parameter assumption were not rejected. The full regression results available from the authors upon request. Robust standard errors reported in parenthesis. ***, ** and * denote 1, 5, and 10 percent level of significance, respectively.

CENTRE FOR ECONOMIC PERFORMANCE
Recent Discussion Papers

866	Arunish Chawla	Multinational Firms, Monopolistic Competition and Foreign Investment Uncertainty
865	Niko Matouschek Paolo Ramezzana Frédéric Robert-Nicoud	Labor Market Reforms, Job Instability, and the Flexibility of the Employment Relationship
864	David G. Blanchflower Alex Bryson	Union Decline in Britain
863	Francesco Giavazzi Michael McMahon	Policy Uncertainty and Precautionary Savings
862	Stephen Hansen Michael F. McMahon	Delayed Doves: MPC Voting Behaviour of Externals
861	Alex Bryson Satu Nurmi	Private Sector Employment Growth, 1998-2004: A Panel Analysis of British Workplaces
860	Alejandro Cuñat Szabolks Deak Marco Maffezzoli	Tax Cuts in Open Economies
859	Bernd Fitzenberger Karsten Kohn Alexander Lembcke	Union Density and Varieties of Coverage: The Anatomy of Union Wage Effects in Germany
858	Dimitra Petropoulou	International Trade, Minimum Quality Standards and the Prisoners' Dilemma
857	Andreas Georgiadis	Efficiency Wages and the Economic Effects of the Minimum Wage: Evidence from a Low-Wage Labour Market
856	L. Rachel Ngai Christopher A. Pissarides	Employment Outcomes in the Welfare State
855	Carlo Rosa	Talking Less and Moving the Market More: Is this the Recipe for Monetary Policy Effectiveness? Evidence from the ECB and the Fed
854	Dimitra Petropoulou	Competing for Contacts: Network Competition, Trade Intermediation and Fragmented Duopoly
853	Barbara Petrongolo Christopher A Pissarides	The Ins and Outs of European Unemployment
852	Mirko Draca Steve Machin Robert Witt	Panic on the Streets of London: Police, Crime and the July 2005 Terror Attacks

851	Augustin de Coulon Jonathan Wadsworth	On the Relative Gains to Immigration: A Comparison of the Labour Market Position of Indians in the USA, the UK and India
850	Andreas Georgiadis	HRM Practices and Knowledge Processes Outcomes: Empirical Evidence from a Quasi-Experiment on UK SMEs in the Tourism Hospitality and Leisure Sector
849	Mirabelle Muûls Dimitra Petropoulou	A Swing-State Theory of Trade Protection in the Electoral College
848	Dimitra Petropoulou	Information Costs, Networks and Intermediation in International Trade
847	Bernardo Guimaraes	Optimal External Debt and Default
846	Javier Ortega Laurence Rioux	On the Extent of Re-Entitlement Effects in Unemployment Compensation
845	Richard E. Baldwin Frédéric Robert-Nicoud	A Simple Model of the Juggernaut Effect of Trade Liberalisation
844	Richard B. Freeman	Labor Market Institutions Around the World
843	Emma Hall Carol Propper John Van Reenen	Can Pay Regulation Kill? Panel Data Evidence on the Effect of Labor Markets on Hospital Performance
842	Fabrice Defever Farid Toubal	Productivity and the Sourcing Modes of Multinational Firms: Evidence from French Firm-Level Data
841	Barbara Petrongolo	What are the Long-Term Effects of UI? Evidence from the UK JSA Reform
840	Kevin D. Sheedy	Robustly Optimal Monetary Policy
839	Christopher A. Pissarides	The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?
838	Kevin D. Sheedy	Inflation Persistence when Price Stickiness Differs between Industries
837	Kevin D. Sheedy	Intrinsic Inflation Persistence

The Centre for Economic Performance Publications Unit
Tel 020 7955 7673 Fax 020 7955 7595 Email info@cep.lse.ac.uk
Web site http://cep.lse.ac.uk