UNION DECLINE IN BRITAIN:
DOES GENDER HAVE ANYTHING TO DO WITH IT?

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ABSTRACT
The paper examines if workplace gender diversity offers some explanation for the decline of unions in Britain. Using the WERS2004 linked employer–employee data and alternative econometric estimators it reports an inverse relationship between workplace union density and gender diversity. Gender and ownership status based sub-group analyses suggest the inverse relationship to be stronger for male union members and those in the private sector. Gender group size-based analysis reveals a positive link between workplace union density and gender diversity in workplaces with a female majority. The findings in this paper may mean that unions may need to embrace the changing workplace demography genuinely to improve their fate.

I Introduction
There has been a rapid decline in unionization in Britain since the late 1970s; and unions’ failure to organize workers in new establishments is thought to be the key factor underpinning the decline (Disney, 1990; Disney et al., 1995, 1996; Machin, 2000, 2003). Although there is some evidence suggesting a post-1997 levelling off in the decline of union membership (Blanden et al., 2006), the overwhelming trend is nevertheless one of a decline (Donado and Walde, 2012). Apart from unions’ failure to be recognized in new establishments, legislative changes, increased competitive pressures, unions becoming outdated in the modern labour market and changes in the composition of the workforce have been identified as factors contributing to union decline (Freeman and Pelletier, 1990; Disney et al., 1995; Machin, 2000; Blanden et al., 2006; Bryson, 2008).

Notwithstanding the classical view of distortionary influences of unions, some important roles have been attributed to them in the employment relationship. These include organizing workers and providing a collective voice (Freeman and Medoff, 1984), allocating risk between firms and workers (Malcomson, 1983) and inducing training and providing insurance (Acemoglu et al., 2001). It is not entirely clear in the existing literature why unions fail to

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play such roles in new establishments; and this calls for further research. Unions are institutions whose strength depends on the degree of coalition-building within. This paper argues that workgroup demographic composition may pose some challenges to unions’ coalition-building, thereby contributing to their decline.

One aspect of workgroup demographic composition that is shown to affect group and individual labour market outcomes is gender, which Akerlof and Kranton (2000) refer to as ‘a universally familiar aspect of identity’ (p. 716). There is established theoretical and empirical evidence on the influence of workgroup gender composition on workgroup dynamics. Worker outcomes such as discrimination, job satisfaction, performance, trust and well-being have been linked to group identity and gender composition (see, for example, Akerlof and Kranton, 2000, 2010; Alesina and La Ferrara, 2002).

There is also evidence of widespread gender discrimination in Britain (see, for example, Riach and Rich, 2006; Arulampalam et al., 2007; Berthoud and Blekesaune, 2007; Booth, 2009; for more recent evidence). Importantly, gender discrimination in the employment relationship is also shown to be a feature of the internal life of unions themselves, with trade union decision-making structures largely dominated by men (Dickens, 1997; Healy and Kirton, 2000; Kirton and Greene, 2002).

In Britain, the period that is widely reported to exhibit the decline of unions has more or less coincided with the considerable increase in the labour market participation of women, which has increased from 37.1% of the labour force in 1971 to 45.8% in 2005 (Office for National Statistics, 2006). Given this, perceptions of institutionalized sexism and gender discrimination within the union decision-making structure are hardly the recipe for coalition-building. A research question of interest is therefore whether the recent change in workplace gender composition has played some part in the decline of unions in Britain.

This paper aims to address this question by empirically investigating a possible link between workplace union density (WUD hereinafter) and workplace gender diversity (WGD hereinafter). The paper uses data from the 2004 British Workplace Employment Relations Survey (WERS2004), the most authoritative sources of information on employment relations in Britain. The data are nationally representative linked employer–employee data with large number of demographically varied workplaces located across Britain. Employer provided data on WUD and workplace gender composition permit investigation of possible links between the two. The WERS2004 data also have extensive information on employees and workplaces, including workplace location related information, that allow controlling for a wider range of influences than has been achieved in the limited existing literature. The paper finds that membership declines with gender diversity especially in private establishments. The decline is found to relate more to males leaving unions rather than females. Group size-based analysis also reveals that the decline in union density is stronger when male-dominated workplaces add females rather than when female-dominated ones add males.
The rest of the paper is organized as follows. Section II, makes a brief review of existing relevant literature. In section III, a description of the data and variables used in the empirical analyses will be provided. Section IV sets out the framework for the empirical analysis undertaken. Section V discusses the empirical results obtained before the final section concludes the paper.

II REVIEW OF RELATED LITERATURE AND THEORETICAL FRAMEWORK

Review of related literature

It is well established that the British labour market has undergone substantial de-unionization since the late 1970s.¹ Some 53% of workers in Britain were union members in 1979. Two decades later, this has declined to 28% (Disney, 1990; Disney et al., 1995; Machin, 2000, 2003). The key factor underscoring union decline in Britain has been unions’ failure to organize workers in new establishments, which is established on the basis of rates of union recognition and derecognition (Blanden et al., 2006; Machin, 2003, 2004; Disney et al. 1994; Disney et al., 1995).

Broadly, rates of union recognition have been substantially lower in relatively newer establishments while unions have rarely been derecognized in existing workplaces (Blanden et al., 2006; Gall, 2004; Machin, 2000, 2003). There was a relative increase in union recognition rates and a slight fall in derecognition starting from the mid- to late-1990s. These changes have largely been attributed to the statutory provisions contained in the 1999 Employment Relations Act for gaining recognition and the changing political climate with the then incoming Labour government (Gall, 2004; Blanden et al., 2006). These changes appeared to have levelled off the decline in union membership. Nonetheless, the general pattern of decline in union density is thought to have an inverted-U shape (Donado and Walde, 2012).

Compositional change in British industry in general and the decline of the manufacturing sector in particular have also been crucial in this respect. Manufacturing had been the bedrock of unions in Britain. Its decline, particularly in the 1980s and 1990s, saw concurrent erosion in the size and strength of unions. This has particularly been the case in private sector manufacturing, which experienced the greatest fall in unions, with rate of union recognition subsiding considerably in establishments set up after 1980. The 1980s and early- to mid-1990s had also witnessed legislative changes, including a range of anti-union legislative measures and the outlawing of compulsory union membership (Freeman and Pelletier, 1990; Disney et al., 1995; Machin, 2000; Blanden et al., 2006; Bryson, 2008).

Apart from the waning importance of manufacturing and legislative changes, other factors linked to the decline of unions include increased (international) competition, decentralized and workplace-based unionism, managerial influence aimed at weakening union influence, macroeconomic fac-

¹ There is extensive literature on trade unions. The review here focuses on one aspect of this literature in particular – union decline.

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tors such as levels of real wage and unemployment, union’s own organizing
behaviour and the change in the composition of employment (Disney, 1990;
Stewart, 1990, 1995; Borland and Ouliaris, 1994; Machin, 2000; Terry, 2003).

The change in the composition of employment alluded to in the union
decline literature essentially relates to the waning importance of the manufac-
turing sector in Britain. The thrust of this argument is that the decline in
manufacturing coincided with a rapid growth in the services sector, a sector
generally linked to lower rate of unionization. This change in employment
composition is thus inter-industry in nature. As such, neither this nor any of
the other reasons in the literature on union decline deals directly with intra-
workplace workgroup dynamics. This paper aims to analyse intra-workplace
compositional change in employment along gender lines. It is worth noting,
however, that some level of similarity between inter-industry and intra-work-
place compositional changes in employment. Green and Kirton (2006) and
Howell (1996) note that the rapid growth in the services sector and the parallel
increase in ‘atypical’ employment are associated with higher female
employment, which is also consistent with the evidence of recent increase in
the labour market participation of women in Britain. The question of impor-
tance to this paper is then whether such intra-workplace change in the share
of women employees may have contributed to union decline.

There is established theoretical and empirical literature on the influence of
workgroup identity, in general, and gender composition, in particular, on
workgroup dynamics and outcomes. Worker outcomes such as discrimination,
job satisfaction, performance and trust are linked to group identity and gen-
der composition (see, for example, Blalock, 1967; Akerlof and Kranton, 2000,
2010; Alesina and La Ferrara, 2002). In Britain, there are two important
labour market characteristics that justify investigating the possible link
between union decline and workgroup gender composition. First, the period
that is widely reported to exhibit the decline of unions has more or less coin-
cided with the considerable increase in the labour market participation of
women, which has increased from 37.1% of the labour force in 1971 to
45.8% in 2005 (Office for National Statistics, 2006). Secondly, there is evi-
dence of widespread gender discrimination in workplaces in Britain (see, for
example, Riach and Rich, 2006; Arulampalam et al., 2007; Berthoud and
Blekesaune, 2007; Booth, 2009). Crucially, gender discrimination in the
employment relationship is also a well-entrenched feature of the internal life
of trade unions, with trade union decision-making structures largely domi-
nated by men (Dickens, 1997; Healy and Kirton, 2000; Kirton and Greene,
2002). Healy and Kirton (2000) note that although positive action strategies
have been adopted by many unions for nearly two decades, the objective of
enhancing women’s involvement in trade union leadership has hardly been
achieved. These factors and perceptions of ‘institutionalized sexism’ (Kirton
and Greene, 2002, p. 157) hardly serve the purpose of coalition-building,
which is what unions need to do to succeed.

There is a dearth of evidence pertaining to possible links between union
decline and WGD. This is a major gap in the literature, particularly consider-
The substantial increase in the labour market participation of women in recent decades and the implication this may have on workgroup dynamics. There is no study on Britain that investigates possible links between union decline and WGD. In the United States, there are a number of mostly management studies that investigate the link between workgroup demographic composition and union commitment. In a meta-analysis, Bamberger et al. (1999) review 100 periodical articles and book chapters that dwell on the issue of union commitment. They suggest inconsistencies in reported empirical findings, due mainly to the way union commitment is measured. More recently, Bacharach and Bamberger (2004) use a random sample of 1475 workers in NY State to explore the potential spillover effects of demographic dissimilarity on union commitment and instrumentality. Their findings suggest that gender dissimilarity has a significant negative effect on union attachment. As is often the case in such studies, however, the study is based on a relatively small sample size. It also hardly controls for a range of potential confounding influences. Most importantly, the authors acknowledge the limitation of their use of individual-level data, as opposed to the more suitable organization-level data as used in this paper.

The brief review in the preceding paragraphs indicates that: (a) there is no evidence pertaining to the link between WUD and WGD in the United Kingdom, (b) the literature in the United States: (i) does not appear to offer consistent findings due to shortcomings stated in Bamberger et al. (1999), (ii) some of the studies appear to be based on data less well suited than WRES2004 and (iii) deals with union commitment, a more subtle yet difficult notion to measure accurately vis-à-vis the WUD measure used in this paper. This paper aims to fill gaps in the existing literature and sets out with a theoretical framework centred around identity theory as follows.

Theoretical background and testable hypotheses

There is an established body of theoretical and empirical work in the social sciences on identity, including group gender composition, and its effects. Akerlof and Kranton (2000) note that ‘because of its explanatory power, numerous scholars in psychology, sociology, political sciences, anthropology and history have adopted identity as a central concept’ (p. 716). The theoretical basis for identity centred discussions in economics has mostly rested on theories of discrimination until recently, where discrimination is thought to be

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2 Other reasons cited include: weak or nil influences of certain hypothesized union commitment correlates, sampling error and measurement error. Union commitment is defined as the extent to which an individual has a desire: (i) to retain membership, (ii) exert effort for, and (iii) identify with the objectives of their union. The widely accepted approach is to derive a union commitment scale that empirically yields four dimensions: union loyalty, belief in unionism, willingness to work for the union, and responsibility to the union (Bamberger et al., 1999).

3 A good summary of some of these can be found in Akerlof and Kranton (2000), Tolbert et al. (1999) and Tajfel and Turner (1986).
due to either preference (Becker 1957; Arrow, 1972, 1973; Phelps, 1972) or information (Aigner and Cain, 1977). 4

However, recent work by Akerlof and Kranton (2000, 2010) has formally introduced identity into economic analysis by incorporating it into individual utility functions. They formalized the earlier ‘taste’ based discrimination explanations by including identity into a model of behaviour and showing how identity influences economic outcomes. 5 Gender discrimination in the labour market is one of the issues they specifically dwell on. Their formulation is based on social identity theory that posits that an individual’s social identity depends on all of the identifications, including gender, the person uses in construing her/his views of the self. They show how identity can be related to occupation arguing ‘occupations are associated with the social categories “man” and “woman,”’ and individual payoffs from different types of work reflect these gender associations’ (p. 732).

Alesina and La Ferrara (2000, 2005), also formalizing the social identity theory, predict that individual utility from joining a group depends positively on the share of group members of one’s own type and negatively on the share of different types. The group competition theory, that was chiefly due to Blalock (1967), also give good insights into the implications of such identity formation, particularly if the size of the socially ‘subordinate’ group were to increase. 6 This, according to Blalock, threatens the resource and power advantages of the ‘dominant’ group. In return, such threats may prod the ‘dominant’ group to increase hostility and discrimination against members of the ‘subordinate’ group.

In the context of unions, actions of the ‘dominant’ group and perceptions of institutional sexism and discrimination against its ‘subordinate’ counterpart are unlikely to serve the purpose of consensus- and coalition-building. In fact, this may be the source of friction between the two groups, particularly if the size of the ‘subordinate’ group is growing. If members of the ‘subordinate’ group, encouraged by recent equality provisions, were to pose mounting challenge to the authority of the ‘dominant’ group, it may not be unrealistic to imagine this prodding some members of the ‘dominant’ group to withdraw their (union) membership. Compulsory union membership was outlawed in Britain in the early 1990s. Given this, some members, who may find it difficult to embrace the changes, may develop a sort of ‘why pay membership fee and put up with this nonsense’ type attitude and leave their unions.

The size of the ‘subordinate’ group may also be important in that a growing ‘subordinate’ group may become more standoffish, thereby further...

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4 Other theories of relevance to economists include language (difference) based discrimination (Lang, 1986) and Lazear (1999)’s communication costs explanation of (racial) diversity.

5 Akerlof and Kranton (2000) present examples of identity-related behaviours that indicate ‘that (1) people have identity-based payoffs derived from their own actions, (2) people have identity-based payoffs derived from others’ actions, (3) third parties can generate persistent changes in these payoffs, and (4) some people may choose their identity, but choice may be proscribed for others’ (p. 717).

6 Blalock (1967) defines resources as ‘the actual sources of power or those properties of the individual or group that provide the power potential or ability to exercise power’ (p. 113).
contributing to the decline of unions. The detrimental effect of the negative perceptions on the formation of new unions may not need much elaboration, for a sense of solidarity must be the prerequisite for such an undertaking. On the basis of the brief theoretical background in the preceding paragraphs and the review of the literature in Section 2.1, the following testable hypotheses have been set forth, which will be tested empirically:

**Hypothesis 1**: Given, on the one hand, the considerable increase in the labour market participation of women and, on the other hand, the perceptions of institutional sexism and discrimination within the union structure and frictions thereof; WUD and WGD are expected to be negatively related, which will be tested based on the WGD coefficient.

**Hypothesis 2**: Unions are male dominated traditionally. The increase in the share of women in the labour market and recent equality provisions might have encouraged women to join unions. However, this might have increased the antagonism between the two within the union structure, possibly nudging some members to leave unions. If so, the hypothesized negative link between WUD and WGD may be stronger for one of the two genders. This is tested using gender-based sub-group analysis.

**Hypothesis 3**: The increase in the size of the traditionally ‘subordinate’ group (women) in a setting where the power structures of workplaces and unions are in the hands of the ‘dominant’ group (men), increase the antagonism between the two groups leading to a larger decline in membership as predicted by social identity theory (Alesina and La Ferrara, 2000, 2005) and group competition theory (Blalock, 1967). This hypothesis is tested on the basis of an interaction term between a female majority dummy and WGD.

**Hypothesis 4**: As noted in Section III, the data suggest a public sector dominated by female employees. It may also be realistic to assume the public sector to have better provisions aimed at ensuring gender equality than its private counterpart. Given these, it is reasonable to expect stronger negative link between WUD and WGD in the private sector. To test this hypothesis ownership-based sub-group analysis is undertaken.

The paper has several strengths. First, it uses the WERS2004 data, which, as detailed in the next section, are well suited to address the research question. Second, the linked data also have extensive information on employees, workplaces as well as workplace location specific information, which are all a rarity judging by the data used in the limited existing literature. This enables
controlling for observable influences much more comprehensively than has been done to date. Third, the WUD and gender composition information, which forms the basis of this study, are provided by employers. As such they are less prone to errors than estimates provided by employees, as some of the studies in the literature have used. Equally, that the paper uses employer provided WUD (and workgroup gender composition) data directly, as opposed to constructing a union commitment measure, avoids measurement errors noted in the literature. Finally, the paper employs alternative econometric estimators and sub-group analyses to check for the robustness of the WUD-WGD link, something the exiting literature does not do.

III DATA AND VARIABLES

Overview of the data

The data used in this paper come from the 2004 British Workplace Employment Relations Survey (WERS2004), the most authoritative source of information on employment relations in Great Britain. It offers linked employer–employee data representative of all workplaces with five or more employees in Britain. The sample of workplaces was randomly drawn from the Inter Departmental Business Register (IDBR), disaggregated by type of industry and workplace size. Employees were then selected randomly from these workplaces (Kersley et al. 2006). That the data come from a large number of demographically varied workplaces makes possible addressing the research question at hand decisively.

The survey covers a whole host of issues relating to both employers and employees, allowing control on a battery of individual- and workplace-level influences. Moreover, the data have geographic information, including local area unemployment and vacancy rates, which have been used in the empirical analysis carried out in this paper. The final sample used in the empirical analysis comprises of 19475 employees in 1547 workplaces. This is from the initial matched sample of 22451 employees in 1733 workplaces. The reduction in sample size is the result of missing values in either the outcome or control variables used in the empirical analysis. On union membership, 36.6% of employees in the initial matched sample reported to be union members while membership in the final sample stands at 36.1%.

Table A1 in the Appendix reports descriptive statistics based on the final sample. Accordingly, 33.9% of employees (or 6598 employees) in the final sample come from workplaces that do not have unions. Nearly all of these (6503 employees or 98.6%) come from the private sector with the balance (95 employees or 1.4%) representing public sector employment. Women constitute 50.9% of employees from workplaces without unions. In contrast, 66.1% (12877) of employees come from workplaces with unions, with women and private sector employees constituting 54% and 54.4% of these respectively. The public-private sector split reveals that 30.7% (5969) of employees in the final sample come from the public sector, with the balance (13506) represent-
ing employees from the private sector. Women make up 66.7% and 46.9% of the public and private sector employees respectively.

Definition of variables

Outcome variable

The main outcome variable of interest is WUD, which is based on information provided by employers. Figure 1 below depicts a plot of WUD, disaggregated by public and private sector workplaces. Accordingly, a little over 50% of the private establishments and less than 2% of the public ones do not have unions. It also shows that, where there are unions, most public workplaces have a density of 50% or more while the corresponding figure for private workplaces is mostly below 50%.

WGD and other control variables

The WGD variable is defined as one minus the Herfindahl Index, $WGD = 1 - \sum_i S_i^2$, where $S$ represents the shares of female and male employees at a workplace, with $i = 1, 2$. It is computed using information on the proportion of female and male employees at each workplace. Figure 2 depicts the resulting WGD patterns by public and private workplaces revealing that majority of the employees in the sample (57%) come from workplaces with at least the average (0.33) level of gender diversity. It also shows that 4% of the private and about 3% of the public sector employees work in a homogeneous gender group.

Figure 1. WUD, by ownership of workplaces.

7 A separate analysis involving union recognition as an outcome variable has been undertaken although no statistically significant relationship has been found with WGD.

8 The index is also known as Blau’s Index and assumes a theoretical value ranging from a minimum of 0, signifying perfect homogeneity, to a maximum of 0.5, signifying perfect heterogeneity.
Leonard and Levine (2006) point out shortcomings of using percentage (of female/male) measure since it increases linearly with the size of one group, although such an increase amounts to a reduction in the size of the other. The use of the index measure in this paper is likely to address this issue of non-linearity. However, to make the interpretation of estimated results easier a ‘gender diverse’ dummy variable is used as detailed in Section V.

A battery of other controls relating to employees, workplaces and geographic locations, which include travel-to-work area unemployment and vacancy rates, has also been controlled for in the empirical analysis undertaken in this paper. Table A1 in the appendix reports descriptive statistics on all control variables, separately by workplace union and ownership statuses.

IV Empirical Framework

The estimation strategy adopted in this paper is guided by the patterns of WUD in the data, which is depicted in Figure 1 above. Accordingly, unions are present only in a sub-sample of workplaces in the estimation sample in general and the private sub-sample in particular. Workplaces with unions may differ in important unmeasured ways from workplaces without unions, for example in terms of employers’ attitude towards unions. This suggests a possible selection problem that needs to be accounted for in the empirical analysis undertaken. To this effect a Heckman selectivity model (Heckman, 1979) has been adopted as the main empirical strategy.

Consider the following selection and outcome equations of interest:

\[ U_i^* = w_i^\prime \alpha + \nu_i \quad \text{with} \quad U_i = 0 \quad \text{if} \quad U_i^* \leq 0 \quad \& \quad U_i = 1 \quad \text{if} \quad U_i^* > 0 \]

\[ WUD_i^* = \chi_i^\prime \beta + \epsilon_i \quad \text{with} \quad WUD_i = WUD_i^* \quad \text{if} \quad U_i = 1 \quad \& \quad WUD_i \not\text{not observed if} \quad U_i = 0 \]

The following graph illustrates the distribution of WGD by ownership type of workplaces. Figure 2. WGD, by ownership type of workplaces.

\[ \text{Percent} \]
\[ \text{kdensity WGD} \]
where $i = 1, \ldots, N$ represent employees; the latent variables $U_i^*$ and $WUD_i^*$ represent union presence and its density, respectively, at employee $i$’s workplace; $w_i$ and $x_i$ represent matrices of employee and employer characteristics, and $(v_i, \pi_i)$ bivariate normal $(0, 0, 1, \sigma_v^2, \rho)$. That OLS regression of $WUD_i^*$ on $x_i$ cannot yield consistent estimates of $\beta$ can be shown as;

$$E[WUD_i|w_i, x_i, U_i = 1] = x_i'\beta + \rho \sigma_v \phi\left( \frac{w_i'x_i}{\sigma_v} \right) \neq x_i'\beta$$

where $\phi(\cdot)$ and $\Phi(\cdot)$ denote the density and the cumulative distribution functions of a standard normal distribution; and $\phi(\cdot)/\Phi(\cdot) = \lambda(\cdot)$ is the inverse of the Mills’ ratio. The Heckman two-step procedure augments the OLS regression by an estimate of the omitted regressor based on a first-step probit regression of $U_i$ on $w_i$, since $Pr(U_i^* > 0) = \Phi(w_i'x_i)$. Defining a new error term $\varepsilon_i^* \equiv WUD_i - x_i'\beta - \rho \sigma_v \lambda(\gamma_v)$ with $\gamma_v = w_i'x_i/\sigma_v$, the augmented model becomes;

$$WUD_i \equiv x_i'\beta + \rho \sigma_v \lambda(\gamma_v) + \varepsilon_i^*$$

OLS estimation of equation (3) renders consistent estimates. A test of whether the estimated inverse Mills’ ratio term is statistically significant informs if sample selection is an issue. A robust identification requires that at least one regressor in the sample selection equation be excluded from the outcome equation (i.e. $x_i$ is a proper subset of $w_i$). The ‘exogenous’ variable used in this paper is the age of the workplace, which is shown in the literature (e.g. Machin, 2003) to be important in determining the presence of a workplace union. On the other hand, workplace age may not have much of a direct bearing on the level of union density.

The Heckman two-step approach is preferred on the ground that it addresses possible selectivity in workplace union status. However, that the WUD variable is a fractional response may raise some empirical issues. Papke and Wooldridge (1996, 2008) note that the bounded nature of such response variables and the possibility that some values may lie at the boundaries raise functional form and inference issues. To address such concerns, an alternative model – Fractional Logit model – has also been implemented in this paper. Following Papke and Wooldridge (1996), let $\{(x_i, WUD_i)\}; i = 1, \ldots, N$ denote the sequence of WUD observations with $0 \leq WUD_i \leq 1$ and $N$ being the number of employees. It is then assumed that for all $i$, $E(WUD_i|x_i) = G(x_i\beta)$, where $G(\cdot)$ is a known function satisfying $0 < G(z) < 1$ for all $z \in \mathbb{R}$. This ensures that predicted values of $WUD_i$ lie in the interval $(0, 1)$. In this paper, $G(\cdot)$ is approximated using the logistic function
as \( G(z) = A(z) = \exp(z)/(1 + \exp(z)) \). The linked nature of the WERS2004 data means that there is more than one employee per workplace in the estimation sample. To account for this, standard errors reported in the Tables are all adjusted for the relevant clusters/workplaces each specification represents.

V Results and Discussion

The estimation results pertaining to the WUD and WGD link, which are obtained from the Heckman two-step procedure, are reported in Table 1. The corresponding full estimation results are reported in Appendix Table A2. As noted in Section III, the gender diversity index renders the interpretation of the results less straightforward. To overcome this challenge a dummy variable (‘gender diverse’), which assumes the value 1 if the gender diversity index takes the value of at least 0.25 – the median value of the gender diversity index – and 0 otherwise, has been used. 12

The results in column 2 of Table 1 suggest that there is a strong and statistically significant inverse relationship between WUD and WGD, lending support to hypothesis 1. Accordingly, employees from gender diverse workplaces (i.e. workplaces with at least the median value of the gender diversity index) are associated with a 12 percentage points decline in WUD. The coefficient of the inverse Mills’ ratio is statistically significant suggesting sample selection would have been an issue if OLS were used instead.

Results from the gender-based sub-group analysis are reported in Columns 2 and 3 in Table 1. They reveal that the negative link found between WUD and WGD is specific to male employees, for the most part, thus lending support to hypothesis 2. Accordingly, male employees from gender diverse workplaces are associated with 15.1 percentage point decline in WUD vis-à-vis their counterparts from non-diverse workplaces. In contrast, a similar comparison reveals that female employees from gender diverse workplaces are associated with only about half (7.7 percentage point) of the decline in WUD observed for their male counterparts. As stated earlier, the coefficient of the inverse Mills’ ratio is negative and statistically significant, suggesting sample selection needed to be accounted for.

Column 4 in Table 1 reports empirical results from the tests conducted to establish whether there is group size-related link between WUD and WGD as stipulated in hypothesis 3. To achieve this, first a ‘majority female’ dummy variable has been generated, which assumes a value of 1 if female employees are a majority (>50%) in a workplace and 0 otherwise. Then, the specification reported in column 1 was re-estimated with the inclusion of the ‘majority female’ dummy variable and its interaction with the ‘gender diverse’ dummy variable. The results reveal that diverse workplaces that are male dominated

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12 As a sensitivity check, the continuous gender diversity index measure and two alternative dummies – ‘gender diverse’ = 1 if the gender diversity index is at least 0.2 and ‘gender diverse’ = 1 if the gender diversity index is at least 0.30 – have also been used in the empirical analysis carried out.
Table 1
**WUD and WGD, Heckman two-step based estimates from full and sub-samples**

|                          | All     | Female  | Male    | Group size | Public   | Private  |
|--------------------------|---------|---------|---------|------------|----------|----------|
| Gender diverse           | −0.120*** | −0.077*** | −0.151*** | −0.161*** | −0.072** | −0.149*** |
|                          | (0.021)  | (0.025)  | (0.027)  | (0.030)    | (0.028)  | (0.031)  |
| Majority female          |         |         |         |            | −0.148***|          |
|                          |         |         |         |            | (0.044)  |          |
| Gender diverse*majority  |         |         |         |            |          | 0.094**  |
| female                  |         |         |         |            | (0.043)  |          |
| Employee characteristics | yes     | yes     | yes     | yes        | yes      | yes      |
| Employer characteristics | yes     | yes     | yes     | yes        | yes      | yes      |
| Lambda (Inverse Mills’ Ratio) | −0.159*** | −0.120** | −0.177*** | −0.143*** | 0.022    | −0.084   |
|                          | (0.044)  | (0.048)  | (0.051)  | (0.044)    | (0.185)  | (0.070)  |
| Constant                 | 0.733*** | 0.626*** | 0.773*** | 0.806***   | 0.373*** | 0.495*** |
|                          | (0.066)  | (0.070)  | (0.083)  | (0.069)    | (0.141)  | (0.093)  |
| No. of employees         | 19475/12877 | 10320/6959 | 9155/5918 | 19475/12877 | 19475/12877 | 5854/5759 | 13506/7003 |
| No. of workplaces (clusters) | 1547/908    | 1446/851   | 1365/826   | 1547/908    | 1547/908    | 407/397  | 1132/503 |
| \(R^2\)                 | 0.263    | 0.249    | 0.294    | 0.273      | 0.131     | 0.244    |

The no. of employees (workplaces) indicates the number of employees (workplaces) for the first-/second-step regressions.
Robust standard errors adjusted for workplace clusters in parentheses.

\(***p < 0.01, **p < 0.05, *p < 0.1.\)
(i.e. workplaces with proportions of males between 50% and 85%) signify a 16.1% decline in WUD vis-à-vis male-dominated workplaces that are not diverse (so proportions of males greater than 85%). Similar comparison for female-dominated workplaces yields a 6.7% (i.e. $-0.16+0.094$) reduction in WUD comparing diverse workplaces with non-diverse ones.\textsuperscript{13} That is, workplaces that are female dominated represent less than half of the decline in WUD found in workplaces that are male dominated. In other words, the result suggests that WUD declines significantly more when male-dominated workplaces add females than when female-dominated workplaces add males thus lending support to \textit{hypothesis 3}.\textsuperscript{14}

The final two columns of Table 1 report results from workplace ownership-based sub-group analysis, which is meant to test \textit{hypothesis 4}. The results in columns 6 and 7 reveal that the negative and statistically significant link between WUD and WGD found applies for employees from both the public and the private sectors. However, the WGD linked decline in WUD found in the private sector ($-14.9\%$) is more than double the magnitude of the decline found in the public sector (7.2%) as well as being stronger in statistical significance, thus lending support to \textit{hypothesis 4}.

Estimated marginal effects relating to WUD and WGD from the alternative Fractional Logit model are reported in Table 2, while the corresponding full set of marginal effects are reported in Appendix Table A3. These results, which are also in favour of the hypotheses proposed in Section II, are very much consistent with the results from the Heckman two-step procedure discussed in the preceding paragraphs.\textsuperscript{15} The marginal effects reported in column 2 indicate that employees from gender diverse workplaces are associated with a decline in WUD of 10.6 percentage points vis-à-vis their counterparts from non-diverse workplaces. Once again this lends support to \textit{hypothesis 1}. The marginal effects from the gender-based sub-group analysis in columns 3 and 4, which are aimed at testing \textit{hypothesis 2}, reveal that males from gender diverse workplaces are associated with a decline in WUD of 16.3 percentage points compared with males from non-diverse workplaces. In contrast, females from gender diverse workplaces are linked with a relatively much lower and weakly significant decline in WUD of 3.9 percentage points vis-à-vis females from non-diverse workplaces.

The marginal effects in column 5, which are from group size-based analysis relating to \textit{hypothesis 3}, show that gender diverse workplaces that are male dominated signify a 17.2 percentage point decline in WUD vis-à-vis male-dominated workplaces that are not gender diverse. In contrast, female-dominated diverse workplaces exhibit a WUD decline of only 2.2 percentage points.

\textsuperscript{13} The linear combination of the group-size effect (i.e. $-0.16+0.094$) is significant at the conventional (5%) level.

\textsuperscript{14} This is so particularly assuming males’ traditional union leadership role even in female-dominated workplaces.

\textsuperscript{15} Marginal effects from Tobit and Ordered Logit models, which are not reported in this paper, also tally strongly with the marginal effects from the Fractional Logit model reported here.
Table 2  
WUD and WGD, marginal effects from Fractional Logit model

| Gender diverse   | All  dy/dx | Females dy/dx | Males  dy/dx | Group size dy/dx | Public dy/dx | Private dy/dx |
|------------------|-----------|--------------|-------------|-----------------|-------------|--------------|
|                   | -0.106*** | -0.037*      | -0.163***   | -0.172***       | -0.069**    | -0.099***    |
|                   | (0.0192)  | (0.022)      | (0.025)     | (0.026)         | (0.030)     | (0.019)      |
| Majority female   |           |              |             | -0.178***       |             |              |
|                   |           |              |             | (0.039)         |             |              |
| Gender diverse*maj. female | 0.150***  |              |             | (0.039)         |             |              |
| Employee characteristics | yes | yes | yes | yes | yes | yes |
| Employer characteristics | yes | yes | yes | yes | yes | yes |
| Number of employees | 19475   | 10320        | 9155        | 19475           | 5969        | 13506        |
| Number of workplaces/clusters | 1547 | 1446 | 1365 | 1547 | 415 | 1132 |
| Log pseudo-likelihood | -7893.67 | -4174.39    | -3633.26   | -7842.14       | -2916.27    | -4640.37     |

Robust standard errors adjusted for clusters/workplaces in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.
points compared with female-dominated non-diverse workplaces. Columns 6 and 7 in Table 2 report the marginal effects from the sector-based sub-group analysis. They reveal that private sector employees in gender diverse workplaces are linked with a 9.9 percentage point decline in WUD while their public sector counterparts are linked with a relatively lower (6.9 percentage point) decline in WUD.

That the results from the alternative specifications are closely comparable is reassuring considering potential doubts that may arise from the identification strategy used in the Heckman two-step procedure. As detailed in Section IV, identification in this paper hinges on the argument that older workplaces are more likely to have unions; but not necessarily membership. This is an argument widely accepted in the existing literature. Results from the first-stage of the two-step procedure also support this argument; but only weakly.\textsuperscript{16} It is, however, not too unrealistic to imagine the possibility of membership increasing with time. It may take time, for example, before workers realize the need for joining unions, since poor compensation packages and/or working conditions are experience-goods that may take some time (Gomez and Gunderson, 2004).

Appendix Tables A2 and A3 also reveal that findings related to the battery of other employee- and workplace-level controls are generally consistent with the results reported in the union literature. Accordingly, the young and females are largely less likely to be union members compared with their middle age and male counterparts respectively. Employees with a disability, with dependants, on a permanent contract, from large establishments, in non-managerial occupations and those from workplaces that encourage union membership are more likely to be union members. As would be expected, those in private establishments and those in industries other than financial and business services are unlikely to be union members.

\section*{VI Summary and conclusion}

The labour market in Britain has undergone considerable de-unionization since the late 1970s. The main factor underpinning this has been unions’ failure to organize workers in new establishments partly due to the change in employee composition observed. The change in employee composition the literature alludes to relates to inter-industry employment changes. However, there has also been considerable intra-workplace change recently in the form of an increase in the share of women in the labour market, a change that happened more or less over the same time period as the decline in unions. Could there be some link between these changes?

This paper argues that the recent increase in the participation of women in the face of widely acknowledged gender discrimination within workplaces and unions may increase friction between female and male employees. This may, in turn, pose challenges in the way of coalition-building, which unions

\textsuperscript{16} Functional form of the inverse mills ratio (IMR) can also deliver identification if the IMR is sufficiently non-linear in its range.
need to achieve to be successful. The paper made extensive review of the literature on the decline of unions in Britain; and developed testable hypotheses on the potential role workgroup gender identity played. It then carried out empirical analyses to establish if the increase in the labour market participation of women and some workplace dynamic thereof might have contributed to union decline in Britain. To this end, the paper analysed links between workplace union density and gender diversity using data from the WERS2004 linked employer–employee survey and alternative estimation frameworks.

The empirical results in the paper lend support to the hypotheses proposed and confirm that: (i) there is a negative and statistically significant link between workplace union density and gender diversity, (ii) the negative link between workplace union density and gender diversity is stronger for males, (iii) the decline in union density is stronger when male-dominated workplaces add females than when female-dominated ones add males, and (iv) the negative link found is stronger for employees from private establishments vis-à-vis those from public ones.

The findings in this paper suggest that unions and their main constituents, men, may need to embrace the changing workplaces in Britain fully to improve their fate. As some of the literature underscores, there have been positive changes in the labour market and among unions in Britain that have recognized the changes in the composition of employees within workplaces. Such changes included positive action strategies by (some) unions that are designed to enhance women’s involvement in unions. Nonetheless, it may be that there is still some way to go along such positive developments and in genuinely accepting women into unions and their inner workings.

The paper addresses a question that has hitherto been unexplored in the literature. It has used rich data with extensive employee- and workplace-level controls in addition to implementing alternative empirical methodologies. These go some distance by way of addressing potential confounders of the link between the two workplace-level changes observed in recent years, which the paper sought to analyse. However, without an experimental design of a sort and with a single cross-section it is difficult to overcome the problem of confounders fully; thus making the attribution of causation even more challenging. Given these caveats, it is worthwhile that some caution is exercised in adopting the findings of this paper.

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APPENDIX A

Table A1
Descriptive statistics, by workplace union & ownership statuses

| Feature                                             | Non-union workplaces | Union workplaces | Public workplaces | Private workplaces |
|-----------------------------------------------------|----------------------|-----------------|-------------------|-------------------|
| Mean SD                                             | Mean SD              | Mean SD         | Mean SD           | Mean SD           |
| Union density                                       | 0.000 0.000          | 0.490 0.299     | 0.587 0.265       | 0.208 0.296       |
| WGD                                                 | 0.345 0.152          | 0.325 0.148     | 0.316 0.150       | 0.339 0.148       |
| Gender diverse (0/1)                                | 0.748 0.434          | 0.676 0.468     | 0.657 0.475       | 0.719 0.449       |
| Age < 30                                            | 0.306 0.461          | 0.168 0.374     | 0.132 0.338       | 0.252 0.434       |
| Age 30–39                                           | 0.256 0.437          | 0.247 0.431     | 0.239 0.426       | 0.255 0.436       |
| Age 50+                                             | 0.224 0.417          | 0.287 0.452     | 0.309 0.462       | 0.246 0.431       |
| Female                                              | 0.509 0.500          | 0.540 0.498     | 0.667 0.471       | 0.469 0.499       |
| Married                                             | 0.619 0.486          | 0.708 0.454     | 0.725 0.447       | 0.658 0.474       |
| White                                               | 0.941 0.235          | 0.944 0.231     | 0.950 0.219       | 0.940 0.238       |
| Children <7 years old                               | 0.180 0.385          | 0.177 0.382     | 0.172 0.378       | 0.181 0.385       |
| Other dependents                                     | 0.124 0.330          | 0.180 0.384     | 0.209 0.407       | 0.140 0.347       |
| Disabled                                            | 0.105 0.306          | 0.130 0.336     | 0.138 0.345       | 0.114 0.318       |
| No academic qualification                           | 0.165 0.371          | 0.158 0.365     | 0.117 0.321       | 0.180 0.384       |
| O-level                                             | 0.248 0.432          | 0.220 0.414     | 0.194 0.395       | 0.245 0.430       |
| A-level                                             | 0.095 0.294          | 0.087 0.282     | 0.082 0.275       | 0.093 0.290       |
| Other qualification                                 | 0.320 0.466          | 0.345 0.475     | 0.386 0.487       | 0.314 0.464       |
| On permanent contract                               | 0.922 0.268          | 0.919 0.273     | 0.899 0.301       | 0.929 0.257       |
| Full-time                                           | 0.782 0.413          | 0.782 0.413     | 0.734 0.442       | 0.803 0.398       |
| Works over 48 hours                                 | 0.474 0.499          | 0.455 0.498     | 0.388 0.487       | 0.494 0.500       |
| Skill same as required                              | 0.436 0.496          | 0.413 0.492     | 0.443 0.497       | 0.411 0.492       |
| Professional                                        | 0.083 0.276          | 0.138 0.345     | 0.205 0.404       | 0.082 0.274       |
| Associate Professional & Technical                  | 0.151 0.358          | 0.165 0.371     | 0.207 0.405       | 0.139 0.346       |
| Admin. & secretarial                                | 0.203 0.402          | 0.173 0.378     | 0.206 0.405       | 0.173 0.378       |
| Skilled trades plant & mach.                        | 0.140 0.347          | 0.154 0.361     | 0.046 0.209       | 0.195 0.396       |
| Personal & customer services                        | 0.156 0.363          | 0.156 0.363     | 0.158 0.365       | 0.155 0.361       |
| Elementary occupations                              | 0.119 0.324          | 0.120 0.325     | 0.109 0.311       | 0.125 0.330       |
| Union present                                       | 0.000 0.000          | 1.000 0.000     | 0.984 0.125       | 0.519 0.500       |
| Log workplace age                                   | 2.996 1.015          | 3.352 1.172     | 3.442 1.184       | 3.138 1.098       |
| Private establishment                               | 0.986 0.119          | 0.544 0.498     | 0.000 0.000       | 1.000 0.000       |

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### Table A1 (Continued)

| Non-union workplaces | Union workplaces | Public workplaces | Private workplaces |
|----------------------|------------------|-------------------|-------------------|
| Mean | SD  | Mean | SD  | Mean | SD  | Mean | SD  |
| Sole establishment | 0.359 | 0.480 | 0.135 | 0.342 | 0.070 | 0.255 | 0.273 | 0.446 |
| No. of employees/1000 | 0.130 | 0.317 | 0.532 | 0.996 | 0.527 | 1.117 | 0.338 | 0.697 |
| Manufacturing | 0.143 | 0.350 | 0.169 | 0.375 | 0.013 | 0.111 | 0.226 | 0.418 |
| Construction | 0.073 | 0.260 | 0.033 | 0.177 | 0.019 | 0.137 | 0.058 | 0.234 |
| Wholesale & retail trade | 0.180 | 0.385 | 0.062 | 0.241 | 0.000 | 0.000 | 0.147 | 0.354 |
| Hotel and restaurant | 0.092 | 0.289 | 0.096 | 0.294 | 0.059 | 0.236 | 0.110 | 0.313 |
| Public & community services | 0.072 | 0.258 | 0.196 | 0.397 | 0.303 | 0.459 | 0.089 | 0.284 |
| Education | 0.011 | 0.104 | 0.178 | 0.383 | 0.309 | 0.462 | 0.038 | 0.192 |
| Health | 0.092 | 0.289 | 0.182 | 0.386 | 0.285 | 0.452 | 0.093 | 0.290 |
| Union encouraged | 0.008 | 0.092 | 0.345 | 0.476 | 0.432 | 0.495 | 0.143 | 0.350 |
| Urban area | 0.835 | 0.371 | 0.811 | 0.392 | 0.851 | 0.356 | 0.805 | 0.396 |
| Unemployment to vacancy ratio | 3.536 | 2.571 | 3.265 | 2.232 | 3.410 | 2.348 | 3.333 | 2.358 |
| No. of employees | 6598 | (33.9%) | 12877 | (66.1%) | 5969 | (30.7%) | 13506 | (69.3%) |
| Total number of employees | 19475 | | | | | | |
| Total number of workplaces | 1547 | | | | | | |

### Table A2

*WUD and WGD link, Heckman two-step based estimates*

| All | Female | Male | Group size | Public | Private |
|-----|--------|------|------------|--------|---------|
| Gender diverse | −0.120*** | (0.021) | −0.077*** | (0.025) | −0.151*** | (0.027) | −0.161*** | (0.030) | −0.072** | (0.028) | −0.149*** | (0.031) |
| Majority female | | | −0.148*** | (0.044) | | | | | | | |
| Gender diverse*majority female | 0.094** | (0.043) | | | | | | | | | |
| Age < 30 | −0.038*** | (0.010) | −0.029*** | (0.011) | −0.045*** | (0.015) | −0.036*** | (0.010) | −0.021* | (0.012) | −0.051*** | (0.016) |
| Age 30–39 | −0.019*** | (0.007) | −0.005 | (0.010) | −0.034*** | (0.010) | −0.019*** | (0.007) | −0.009 | (0.010) | −0.030*** | (0.011) |
| Age 50+ | −0.005 | (0.007) | 0.000 | (0.009) | −0.012 | (0.010) | −0.005 | (0.007) | −0.024** | (0.010) | 0.013 | (0.010) |
| Female | −0.043*** | (0.009) | | | | | | | | | |
| Married | −0.001 | (0.006) | −0.000 | (0.007) | −0.001 | (0.008) | −0.001 | (0.006) | −0.005 | (0.008) | 0.008 | (0.008) |
| White | 0.037* | (0.021) | 0.023 | (0.024) | 0.052*** | (0.027) | 0.034* | (0.021) | 0.042* | (0.024) | 0.039 | (0.030) |
| Children <7 years old | 0.004 | (0.007) | −0.006 | (0.010) | 0.011 | (0.010) | 0.004 | (0.007) | −0.004 | (0.010) | 0.006 | (0.010) |
| Other dependents | 0.017*** | (0.006) | 0.015* | (0.009) | 0.023** | (0.009) | 0.019*** | (0.006) | 0.014 | (0.009) | 0.026*** | (0.009) |
|                                | All         | Female       | Male         | Group size | Public       | Private      |
|--------------------------------|-------------|--------------|--------------|------------|--------------|--------------|
| Disabled                        | 0.014**     | 0.010        | 0.021*       | 0.015***   | 0.014        | 0.010        |
|                                | (0.007)     | (0.009)      | (0.011)      | (0.007)    | (0.010)      | (0.010)      |
| No academic qualification       | −0.005      | −0.009       | −0.007       | −0.008     | 0.022        | −0.028       |
|                                | (0.013)     | (0.015)      | (0.018)      | (0.013)    | (0.017)      | (0.018)      |
| O-level                         | 0.017       | 0.013        | 0.019        | 0.016      | 0.021        | 0.010        |
|                                | (0.011)     | (0.012)      | (0.015)      | (0.011)    | (0.013)      | (0.016)      |
| A-level                         | 0.019       | 0.019        | 0.020        | 0.021*     | 0.029*       | 0.012        |
|                                | (0.012)     | (0.015)      | (0.017)      | (0.011)    | (0.015)      | (0.017)      |
| Other qualification             | 0.006       | 0.015        | −0.008       | 0.005      | 0.002        | 0.009        |
|                                | (0.009)     | (0.011)      | (0.012)      | (0.009)    | (0.011)      | (0.012)      |
| On permanent contract           | 0.038***    | 0.034**      | 0.041**      | 0.037***   | 0.049***     | 0.021        |
|                                | (0.011)     | (0.014)      | (0.017)      | (0.012)    | (0.015)      | (0.019)      |
| Full-time                       | 0.020**     | 0.018*       | 0.014        | 0.015      | 0.021        | 0.022        |
|                                | (0.010)     | (0.010)      | (0.017)      | (0.010)    | (0.013)      | (0.016)      |
| Works over 48 hours             | −0.012      | −0.012       | −0.018*      | −0.017**   | 0.001        | −0.021**     |
|                                | (0.007)     | (0.009)      | (0.010)      | (0.007)    | (0.009)      | (0.011)      |
| Skill same as required by job   | −0.002      | −0.006       | 0.005        | −0.001     | −0.012       | 0.002        |
|                                | (0.005)     | (0.007)      | (0.007)      | (0.005)    | (0.007)      | (0.008)      |
| Professional                    | 0.056***    | 0.092***     | 0.023        | 0.054***   | 0.055**      | 0.071***     |
|                                | (0.017)     | (0.021)      | (0.024)      | (0.016)    | (0.024)      | (0.023)      |
| Associate                       | 0.024*      | 0.049***     | −0.009       | 0.015      | 0.037*       | 0.016        |
| Professional & Technical        | (0.014)     | (0.019)      | (0.017)      | (0.014)    | (0.021)      | (0.018)      |
| Admin. & secretarial            | 0.037**     | 0.071***     | −0.002       | 0.034**    | 0.023        | 0.060***     |
|                                | (0.015)     | (0.018)      | (0.021)      | (0.014)    | (0.021)      | (0.021)      |
| Skilled trades plant & mach.    | 0.063***    | 0.088**      | 0.037*       | 0.047***   | 0.100**      | 0.061***     |
|                                | (0.020)     | (0.037)      | (0.020)      | (0.019)    | (0.039)      | (0.024)      |
| Personal & customer services    | 0.028       | 0.053**      | 0.028        | 0.034*     | 0.043*       | 0.019        |
|                                | (0.019)     | (0.021)      | (0.029)      | (0.019)    | (0.026)      | (0.028)      |
| Elementary occupations          | 0.017       | 0.032        | 0.007        | 0.011      | 0.047*       | 0.008        |
|                                | (0.020)     | (0.025)      | (0.025)      | (0.020)    | (0.028)      | (0.027)      |
| Private establishment           | −0.159***   | −0.165***    | −0.166***    | −0.168***  |              |              |
|                                | (0.029)     | (0.033)      | (0.032)      | (0.029)    |              |              |
| Sole establishment              | 0.001       | −0.007       | 0.003        | −0.009     | −0.031       | 0.004        |
|                                | (0.028)     | (0.031)      | (0.036)      | (0.029)    | (0.047)      | (0.042)      |
| No. of employees/1000           | −0.009      | −0.017       | 0.002        | −0.011     | −0.019*      | 0.021        |
|                                | (0.010)     | (0.010)      | (0.014)      | (0.010)    | (0.011)      | (0.023)      |
| Manufacturing                   | −0.118**    | −0.104**     | −0.117**     | −0.145***  | 0.359**      | −0.090*      |
|                                | (0.047)     | (0.048)      | (0.058)      | (0.050)    | (0.150)      | (0.053)      |
| Construction                    | −0.183***   | −0.157**     | −0.181**     | −0.216***  |              | −0.269***    |
|                                | (0.065)     | (0.076)      | (0.072)      | (0.067)    |              | (0.069)      |
| Wholesale & retail trade        | −0.174***   | −0.182***    | −0.174***    | −0.179***  |              | −0.156***    |
|                                | (0.053)     | (0.052)      | (0.065)      | (0.055)    |              | (0.055)      |
| Hotel and restaurant            | −0.038      | −0.062       | −0.029       | −0.064     | 0.277**      | −0.031       |
|                                | (0.054)     | (0.064)      | (0.063)      | (0.055)    | (0.136)      | (0.058)      |
| Public & community services     | −0.107**    | −0.136***    | −0.071       | −0.114**   | 0.172        | −0.018       |
|                                | (0.049)     | (0.049)      | (0.061)      | (0.050)    | (0.133)      | (0.061)      |
| Education                       | −0.161***   | −0.130***    | −0.177***    | −0.127**   | 0.172        | −0.209***    |
|                                | (0.053)     | (0.052)      | (0.068)      | (0.054)    | (0.132)      | (0.078)      |
| Health                          | −0.220***   | −0.215***    | −0.189***    | −0.189***  | 0.099        | −0.203***    |
|                                | (0.049)     | (0.048)      | (0.062)      | (0.051)    | (0.133)      | (0.060)      |
Table A2 (Continued)

| All | Female | Male | Group size | Public | Private |
|-----|--------|------|------------|--------|---------|
| **Union membership encouraged** | 0.043* | 0.059** | 0.033 | 0.049** | 0.055** | 0.104* |
| | (0.024) | (0.026) | (0.029) | (0.024) | (0.028) | (0.055) |
| **Urban area** | −0.026 | −0.016 | −0.033 | −0.023 | −0.005 | −0.024 |
| | (0.024) | (0.029) | (0.027) | (0.024) | (0.033) | (0.032) |
| **Unemployment to vacancy ratio** | 0.008* | 0.008* | 0.007 | 0.007 | −0.001 | 0.014** |
| | (0.004) | (0.005) | (0.005) | (0.004) | (0.006) | (0.006) |
| **Lambda** | −0.159*** | −0.120*** | −0.177*** | −0.143*** | 0.022 | −0.084 |
| | (0.044) | (0.048) | (0.051) | (0.044) | (0.185) | (0.070) |
| **Constant** | 0.733*** | 0.626*** | 0.773*** | 0.806*** | 0.373*** | 0.495*** |
| | (0.066) | (0.070) | (0.083) | (0.069) | (0.141) | (0.093) |
| **Observations** | 12,877 | 6,959 | 5,918 | 12,877 | 5,759 | 7,003 |
| **R²** | 0.263 | 0.249 | 0.294 | 0.273 | 0.131 | 0.244 |

‘Construction’ ! = 0 predicts success perfectly for the public sector sub-group resulting in ‘construction’ being dropped and 115 observations not being used.

‘Wholesale & retail trade’ is omitted due to collinearity in each specification for the public sub-group.

The numbers of employees and workplaces for the Heckman 2-step procedure indicate number of employees and workplaces in the first-step/second-step regressions.

Robust standard errors adjusted for workplace clusters in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table A3

\[ WUD and WGD, \text{ marginal effects from Fractional Logit model.} \]

| All dy/dx | Females dy/dx | Males dy/dx | Group size dy/dx | Public dy/dx | Private dy/dx |
|-----------|----------------|-------------|------------------|-------------|--------------|
| Gender diverse | −0.106*** | −0.037* | −0.163*** | −0.172*** | −0.069** | −0.099*** |
| (0.0192) | (0.022) | (0.025) | (0.026) | (0.030) | (0.019) |
| Majority female |  | | | −0.178*** | (0.039) |
| Gender diverse*majority female |  | | | 0.150*** | (0.039) |
| Age < 30 | −0.082*** | −0.071*** | −0.088*** | −0.077*** | −0.024* | −0.065*** |
| (0.0091) | (0.011) | (0.013) | (0.009) | (0.013) | (0.009) |
| Age 30–39 | −0.031*** | −0.018*** | −0.046*** | −0.031*** | −0.012 | −0.027*** |
| (0.0067) | (0.009) | (0.010) | (0.007) | (0.010) | (0.006) |
| Age 50+ | −0.013* | −0.009 | −0.021** | −0.013* | −0.031*** | −0.002 |
| (0.0072) | (0.009) | (0.010) | (0.007) | (0.010) | (0.007) |
| Female | −0.045*** |  | −0.020*** | −0.047*** | −0.027*** |
| (0.0083) | (0.007) | (0.012) | (0.008) |
| Married | 0.012** | 0.010 | 0.017** | 0.012** | −0.006 | 0.017*** |
| (0.0055) | (0.007) | (0.008) | (0.005) | (0.008) | (0.006) |
| White | 0.026 | 0.001 | 0.055** | 0.026 | 0.037 | 0.011 |
| (0.0195) | (0.023) | (0.025) | (0.020) | (0.024) | (0.018) |
| Children <7 years old | 0.001 | 0.000 | −0.002 | 0.000 | −0.004 | 0.001 |
| (0.0068) | (0.010) | (0.009) | (0.007) | (0.011) | (0.006) |
| Other dependents | 0.027*** | 0.027*** | 0.027*** | 0.028*** | 0.019** | 0.023*** |
| (0.0064) | (0.008) | (0.009) | (0.006) | (0.010) | (0.006) |
| Disabled | 0.017*** | 0.010 | 0.025*** | 0.017*** | 0.017* | 0.010 |
| (0.0068) | (0.009) | (0.010) | (0.007) | (0.010) | (0.006) |
|                              | All dy/dx | Females dy/dx | Males dy/dx | Group size dy/dx | Public dy/dx | Private dy/dx |
|------------------------------|-----------|---------------|-------------|------------------|--------------|---------------|
| No academic qualification    | −0.014    | −0.019        | −0.013      | −0.015           | 0.028        | −0.014        |
| O-level                      | 0.007     | 0.000         | 0.014       | 0.008            | 0.020        | 0.011         |
| A-level                      | 0.023*    | 0.014         | 0.038**     | 0.026**          | 0.032**      | 0.022**       |
| Other qualification         | −0.001    | −0.003        | −0.001      | −0.001           | 0.001        | 0.010         |
| On permanent contract       | 0.031***  | 0.018         | 0.051****   | 0.030***         | 0.046***     | 0.022*         |
| Full-time                    | 0.042***  | 0.033***      | 0.036**     | 0.031***         | 0.033***     | 0.024***       |
| Works over 48 hours          | −0.013*   | −0.014        | −0.019*     | −0.018***        | −0.001       | −0.012*        |
| Skill same as required by job | −0.013*** | −0.016***     | −0.003      | −0.010***        | −0.016**     | −0.004         |
| Professional                 | 0.040**   | 0.086***      | −0.004      | 0.038***         | 0.054**      | 0.027*         |
| Associate Professional & Technical | 0.018   | 0.033*        | −0.002      | 0.010            | 0.036*       | 0.011         |
| Admin. & secretarial         | 0.032**   | 0.054***      | 0.004       | 0.026**          | 0.016        | 0.032**       |
| Skilled trades plant & mach. | 0.092***  | 0.105***      | 0.069***    | 0.074***         | 0.115***     | 0.063***       |
| Personal & customer services | 0.045**   | 0.063***      | 0.051       | 0.054***         | 0.043*       | 0.038*         |
| Elementary occupations       | 0.039**   | 0.044*        | 0.039*      | 0.032*           | 0.052*       | 0.026         |
| Private establishment        | −0.249*** | −0.253***     | −0.258***   | −0.252***        |              |               |
| Sole establishment           | −0.148*** | −0.121***     | −0.166***   | −0.151***        | −0.043       | −0.109***      |
| No. of employees/1000        | 0.037***  | 0.016         | 0.061***    | 0.031***         | −0.016       | 0.057***       |
| Manufacturing                | 0.102***  | 0.054         | 0.132***    | 0.077***         | 0.275        | 0.068***       |
| Construction                 | −0.060    | −0.029        | −0.059      | −0.099*          | 0.413***     | −0.119**       |
| Wholesale & retail trade     | −0.088*   | −0.081*       | −0.111*     | −0.094*          |              | −0.054         |
| Hotel and restaurant         | 0.151***  | 0.057         | 0.203***    | 0.131***         | 0.255*       | 0.084***       |
| Public & community services  | 0.124***  | 0.056         | 0.186***    | 0.118***         | 0.150        | 0.119***       |
| Education                    | 0.105**   | 0.074*        | 0.146***    | 0.136***         | 0.144        | 0.049         |
| Health                       | 0.002     | −0.020        | 0.056       | 0.033            | 0.074        | 0.010         |
| Union membership encouraged  | 0.177***  | 0.161***      | 0.194***    | 0.176***         | 0.064**      | 0.215***       |

*significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.
Table A3 (Continued)

|                      | All dy/dx | Females dy/dx | Males dy/dx | Group size dy/dx | Public dy/dx | Private dy/dx |
|----------------------|-----------|---------------|-------------|------------------|--------------|---------------|
| Urban area           | −0.049**  | −0.043        | −0.050**    | −0.045**         | 0.003        | −0.048**      |
|                      | (0.0224)  | (0.027)       | (0.025)     | (0.023)          | (0.034)      | (0.021)       |
| Unemployment to      | 0.002     | 0.003         | −0.001      | 0.001            | −0.003       | 0.004         |
| vacancy ratio        | (0.0039)  | (0.004)       | (0.005)     | (0.004)          | (0.006)      | (0.004)       |
| Log workplace age    | 0.029***  | 0.027***      | 0.031***    | 0.029***         | 0.014        | 0.030***      |
|                      | (0.008)   | (0.009)       | (0.010)     | (0.008)          | (0.012)      | (0.008)       |
| Number of employees  | 19475     | 10320         | 9155        | 19475            | 5969         | 13506         |
| Number of workplaces/clusters | 1547 | 1446 | 1365 | 1547 | 415 | 1132 |
| Log pseudo-likelihood| −7893.67  | −4174.39      | −3633.26    | −7842.14         | −2916.27     | −4640.37      |

Robust standard errors adjusted for clusters/workplaces in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

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