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The Persistence of Union Membership within the Coalfields of Britain

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Abstract

Spatial variance in union membership has been attributed to the favourable attitudes that persist in areas with an historical legacy of trade unionism. Within the UK, villages and towns located in areas once dominated coalmining remain among the strongest and durable bases for the trade union movement. This paper empirically examines the effect of living within or near these areas upon union membership. Those residing in ex-mining areas retain an increased propensity for union membership. However, this effect diminishes sharply with distance. The analysis reveals that particular places can serve as conduits of trade unionism, long after employment within traditional industries has vanished.

Keywords: Union Membership, Spatial Variance, Spill-Over, Coalmining

JEL Codes: J50; J51

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1. Introduction

The long-term downward trend in union membership in the UK is well known. Based upon membership returns submitted annually by individual trade unions to the Certification Office, trade union membership within the UK peaked in 1979 at approximately 13.2 million. Since then, there has been a precipitous decline, such that there are now around 6.8 million members. Estimates published by the UK Government based upon the Labour Force Survey places the current number of union members within Great Britain at approximately 6.8 million. Between 1995 and 2019, the percentage of employees who are a trade union member (referred to as 'union density') declined from 32 per cent to 24 per cent (DBEIS 2020). Official estimates for 2019 however reveal the persistence of regional variance in union membership across the UK. Union density in England ranges from 18% in London and the South East to approximately 28-29% across the regions of Northern England. Among the devolved nations, density is estimated to be 29% in Scotland, 31% in Wales and 34% in Northern Ireland. In the context of a body of literature that demonstrates the wide variety of benefits associated with union membership among workers which appear to exist in the absence of any apparent detrimental impact upon workplace performance (Bryson and Forth, 2017), it is important to understand the factors that underpin such differences in union density across different parts of the UK.

A number of studies have examined how much of the decline in union membership observed over recent decades can be attributed to compositional changes in the structure of employment and, by inference, how much can be attributed to changes in the propensity of workers to join unions (Green, 1992; Bryson and Gomez, 2005; Blanchflower and Bryson, 2009). Less attention has however been given to understanding the persistence of spatial variance union membership. Early patterns of union membership were largely attributed to the geographical distribution of employment within industries characterised by relatively high levels of organised labour (Phelps Brown, 1959). However, by the height of trade union membership within the UK, both individual and establishment level studies identified the presence of significant regional effects (Elsheikh and Bain, 1980; Bain and Elias 1985; Beaumont and Harris, 1988), with levels of union membership and coverage higher within Wales, Scotland and Northern England than would otherwise be expected. Martin et al (1996) demonstrate that these

regional effects persisted during the 1980s despite the substantial deindustrialisation and economic restructuring that occurred within these areas during the early 1980s (MacKay and Davies, 2011). The persistence of such patterns are confirmed within subsequent studies by Monastiriotis (2007) and Beynon et al (2012). Geographical variations in unionization have persisted despite the general tendency for regional differences in employment structure to diminish.

In explaining why structural effects are unable to account for geographical variance in union membership, Martin et al (1996) emphasise the importance of “regional and local variations in the inherited and socialised traditions, customs and cultures” (p99) that influence both the propensity of individuals to join unions, the attitudes of employers towards unions in the workplace and the nature of trade union practice. The inference being made from these empirical analyses is that within areas once characterised by employment within highly unionised sectors of the economy such as mining, steel, ship building, manufacturing and other concerns that may have dominated local labour markets, geographically based traditions continue to underpin spatial subsystems of trade unionism and industrial relations (Dunlop, 1958). Beaumont and Harris (1988) therefore suggest that broad administrative areas (or aggregations thereof), with their sharply defined borders, are not the most appropriate spatial unit of analysis to empirically identify the importance of historical and cultural factors influencing union membership within the contemporary period. Variation in such phenomena is more appropriately examined at a sub-regional level of analysis (Beaumont and Harris, 1988, p400).

Within the UK, colliery villages and towns located in areas once dominated by coalmining remain among the strongest and durable bases for the trade union movement (Beynon, 2014) and a fundamental base for social democracy (Mitchell, 2011). However, the direct influence of living within a former coalmining area upon union membership within the UK has not previously been examined. This paper examines the union joining behaviour of those who reside either within or near to areas that were once dominated by employment

in mining, utilising data from the Labour Force Survey from 2000 to 2019¹. Analysis reveals that those residing in areas where there is an historical legacy of coalmining still exhibit an increased likelihood to join trade unions. This propensity persists upon controlling for regional fixed effects and diminishes sharply with distance away from these ex-mining areas. The analysis demonstrates the importance of locality, history and the associated culturally embedded values which endure over time for our understanding of contemporary union membership. We show current rates of unionisation are strongly linked to historical rates of unionisation via the 'long shadow' caste by industries, which while no longer present, incubated high levels of union experience in their hey-day.

2. Families, Localities and the Path Dependence of Union Membership

Within areas where there is an historical legacy of trade unionism, the propensity of workers to join trade unions appears to be greater due to the favourable attitudes that exist towards union membership (Charlwood, 2002; Diamond and Freeman, 2002). This suggests industrial relations traditions of key groups of workers, firms and industries in a region are not self-contained, but rather generate spill-overs to other workers, firms and industries in the region *through the course of time* (Martin *et al.* 1996: p118). Evidence as to the importance of such processes to the persistence of union membership within the US is provided by Holmes (2006), who demonstrates that higher unionisation rates in care homes and grocery stores in West Virginia and Pennsylvania are linked to the unionisation of the old coal and steel sectors in those areas. The analysis directly reveals how historical proximity to once highly unionised workplaces spills over to the present day, to other groups of workers and firms, including those in relatively un-organised sectors. Although the specific mechanisms involved are complex and are themselves influenced by the process and path of economic development, the result is that the attitudes, expectations and behaviour of employees and employers in other industries in the region are influenced by the historical traditions and contemporary proximity to these locally dominant industries and their workforces (Martin *et al.* 1996: pp118-119).

¹ Office for National Statistics, Social Survey Division, Northern Ireland Statistics and Research Agency, Central Survey Unit (2020). Quarterly Labour Force Survey, 1992-2020: Secure Access. [data collection]. 18th Edition. UK Data Service. SN: 6727, <http://doi.org/10.5255.UKDA-SN-6727-20>.

Within economics, the path dependency of trade union membership is often attributed to the 'experience good' model of trade union membership (see Bryson and Gomez, 2003; Gomez and Gunderson, 2004; Bryson et al., 2004). The argument here is that the benefits of union membership, particularly among younger entrants to the labour market, are uncertain and difficult to quantify. The value of joining a union can therefore only be gauged through its direct experience or via the experience and personal recommendations of close associates. Those working in regions of relatively high union density will find it easier to assess the benefits of membership via the positive attitudes to unionisation of those around them. In contrast, within regions of low union density if fewer workers experience unionism and see the true benefits, then fewer workers support unions and union density declines. This increases the never unionisation rate and creates a self-perpetuating decline in union density (see Bryson and Gomez, 2005; Booth et al., 2010). Booth's (1985) 'social custom' model of union membership provides a related explanation. In an area characterised by favourable attitudes towards union membership, the returns to union membership are greater because workers acquire reputational benefits from the purchase. Those who choose to remain non-members may suffer ignominy of the local population. A path dependence in unionization and industrial relations practices therefore emerges.

Goldthorpe et al. (1969) and Bulmer (1975) also afforded great significance to the social environment of workers beyond the workplace to explain their attitude towards union membership. A study by Beynon (1973) of union formation within a new plant of the Ford Motor Company in Liverpool considered the "roots of activism" and explored the reasons why those men recruited as assembly line workers became trade union activists. In this account, the influence of kinship emerges as a significant factor, providing workers new to the assembly line a 'trade union interpretation' of particular events within the workplace. Similarly, in Marshall's (1967) classic study of labour in the South of the US, the success of a strike by female garment workers in the late thirties in Tennessee is explained in part by the family connections of the strikers, many of whom had brothers and fathers who were members of the United Mine Workers Union. The importance of the social environment has been confirmed in subsequent studies. Research has specifically acknowledged the role of the family in shaping ideas about trade unionism (see for

example, Klandermans, 1986; Healy and Kirton, 2013; Waddington and Kerr, 2002) and that being part of social networks that are supportive of unions has a positive impact on union joining behaviour (Gomez, Gunderson and Meltz, 2002; Haynes et al, 2005; Griffin and Brown, 2011).

Evidence of the importance of socialization within the family in encouraging trade union membership is provided by studies that find increased levels of membership among the children of unionised parents (Visser, 2002). The influence of parents on the commitment of their children towards trade unions has also been demonstrated to be greater among parents who participate in union activities, such as attending union meetings and reading union related material (Hester and Fuller, 2001). Studies of union membership among young workers based upon panel data for the UK further reveal that the intergenerational correlation of trade union membership cannot simply be attributed to cross-generational correlations in the determinants of union membership (including the transmission of political beliefs) and also indicate that the strength of intergenerational transmission is stronger where fathers are active in trade unions (Blanden and Machin, 2003). The strength of intergenerational transmission has been found to be stronger where both parents are union members and among those born within areas characterised by high union density, and that these effects persist even among those who subsequently move away (Bryson and Davies, 2019). This analysis supports the contention that familial connections embedded in localities can serve as conduits of trade unionism, even if distanced from the workplace temporally and geographically.

3. The Importance of Mining

Mining has always been a relatively small part of the overall UK economy but quite fundamental to it. Until the 1960s the UK was basically a single fuel economy with electricity generation, transport, steel and chemical production and domestic heating all reliant upon coal. This led to highly significant industrial and trade union interlinks most clearly demonstrated in the Triple Alliance of trade unions between the coal miners, and the steel and rail workers. However, mining has been an industry in long term decline. Table 1 reveals that employment within coalmining in the UK peaked during the period 1913-1922. During this decade, on average approximately one million people were

employed in coalmining, representing a little over 5% of those in employment. Employment in mining peaked at 1.19 million in 1920, whilst the overall share of employment attributable to mining was highest during 1923 and 1924 at 6.4%. Employment within the sector declined steadily thereafter, falling to approximately 700 thousand in 1947 when the industry was nationalised. The rate of decline in employment increased during the 1960s as the National Coal Board closed less productive pits in peripheral coalfields, including South Wales, Durham, Lancashire and Scotland, as it sought to shift the focus of its production to the low-cost central coalfields located primarily within the East Midlands (Rees, 1985). Whilst the rate of decline fell during the 1970s, by 1979 employment had fallen to 240 thousand. Following the 1984/5 miner's strike, employment in mining had fallen to below 100 thousand. The most recent data places employment within UK coalmining at well below one thousand (BEIS, 2019).

Despite the relatively small size of the sector, mining was a very important source of employment within some areas. Across many parts of the UK, miners often lived in small isolated communities within rural environments that they dominated. Regional data from the 1921 Census reveal that 35% of working males (aged 12 or over) resident within the industrial areas of South Wales were employed in mining. Within England, employment within coal mining was also important within the counties of Durham (29%), Derbyshire (24%), Nottinghamshire (21%) and Northumbria (20%). Examination of data for Local Government Districts however reveals the true importance of mining within particular localities. For example, in the North East of England, within both the mining districts of Easington in County Durham and Ashington in Northumberland approximately three quarters of males were employed in mining. Such figures were replicated across many districts of South Wales, including Nantyglo/Blaina (77%); Rhondda (74%); MynyddIslwyn (74%) and Abertillery (73%). In the Midlands, 70% of males living in Bolsover in Derbyshire and Huthwaite in Nottinghamshire worked in mining. Mining defined the very character of these and many other coalfield communities.

The mining workforce was highly unionised. No other unskilled group was able to organise so early and with such completeness as the miners did (Beynon and Austrin, 1994, p 365). The Miners Federation of Great Britain was formed from a collection of

county-based unions in 1888. At its peak in 1920, the constituent federations had approximately 945 thousand members (see Marsh and Ryan, 1984, pp198-199), equivalent to approximately 80% of the mining workforce. The intense association between mining and particular communities was reflected in both the character of the union movement and the nature of its organisation, based as it was upon the local lodge. Within the lodge both industrial and community issues were discussed and in this way mining unionism extended directly into medical, welfare and educational issues. So much so that the miners' libraries in South Wales have been described as "the greatest network of cultural institutions created by working people anywhere in the world" (Rose, 2001: 237). In these ways and others "[t]he history of mining unionism differed greatly from that of other occupational groups...county-based unions were almost unique to that sector. Still smaller scale localism characterised mining unionism in South Wales, where the Miners' Federation....consisted of 20 districts, corresponding to individual valleys.....the union itself became the major cohesive force in the regional formation, dominating all other community institutions from the chapel to the sports team" (Southall, 1988, p480). Traditions of industrial relations were reproduced through processes of "local institutionalisation and socialisation" (Martin et al, 1996).

The role played by community has also featured at the heart of many explanations of industrial action and collective resistance (Sunley, 1990; Griffiths and Johnston 1991; Samuel et al 1986). The cohesiveness of working-class communities has often been cited as a major determinant of local strike propensity. Where workers live in socially isolated, tight knit communities, dependent upon one main source of employment, they are more likely to strike. The miners' strike of 1984/5 continues to have an ongoing, active, symbolic presence, which continues to shape present day attitudes towards trade unionism (Beynon, 2014). Low levels of both inward and outward migration (ONS 2016) also mean that these mining communities are more likely to be characterised by a resident population who remain more closely connected to the experience of the strike through the ties of family, friends and place. These experiences contribute to the 'narrative resources' that have been identified as important for union renewal - "the range of values, shared understandings, stories and ideologies that aggregate identities and interests and translate and inform motives" (Levesque and Murray, 2010: 339). Within these

communities, people developed “networks of friends, relatives and acquaintances, where they have learned about life and acquired a cultural frame of reference through which to interpret the social world around them” (Beynon and Hudson, 1993: 182). These shared values and experiences relate to the ‘structure of feeling’ (Williams, 1961) within coalmining areas that supports a continued commitment to trade unionism.

4. Data

The main source of data regarding union membership within the UK is the Labour Force Survey (LFS) and official government statistics on trade union membership are based on this source. An annual question on trade union membership was introduced into the LFS in 1989 and it has been asked in the fourth quarter (Q4) every year since 1992. In terms of union membership, respondents are asked “Are you a member of a trade union or staff association?” The likelihood that a respondent to the LFS is a member of a union will reflect both their propensity and opportunity to join a trade union. To control for differences in the opportunity that workers have to join unions, our analysis also utilises information in the LFS related to union presence. Trade union presence is established with a follow-up question which asks those respondents who are not members of a union whether any of the people at their place of work are members of a trade union or staff association (it is assumed that if the respondent is a member then unions must be present at their workplace). By restricting our analyses to those who are employed in workplaces where unions are present, the effect of living in a coalmining area on the propensity to join a union can be considered.

Although a large survey, sample sizes still limit the ability of the LFS to provide detailed information about geographical variations in union membership during any given year. Published estimates of union membership within the United Kingdom are therefore only provided for relatively broad geographical areas. To produce small area estimates of union membership, we utilise 18 years of data covering the period from 2000 to 2018, reflecting the availability of consistent geographical identifiers. Each household within the main LFS is surveyed over five quarters, with the final interview occurring one year after the first. Some respondents will therefore respond to questions on trade union membership twice. The presence of repeated observations is accounted for within our

statistical analysis. Due to our interest in examining the effect of living in old coalmining areas on the likelihood of being a union member, all analyses are based upon place of residence as opposed to place of work. Those who are self-employed are excluded from the analysis, reflecting the low rate of membership (7%) among this group and as is common in the analysis of union density (BEIS, 2020).

To examine how union density varies among those residing in old coalmining areas, we utilise a definition of coalfields developed by Beatty and Fothergill (1995). Based upon ward level Census data for 1981, the authors define coalfields as those areas where 10% or more of male residents in employment worked in the coal industry in 1981. This was the last Census taken before the major colliery closures that led to the year-long strike by miners in 1984/5 and the eventual erosion of the industry. It takes a snapshot of that moment of stability between the major rundown of coalmining in the 1960s and the eventual end of mining. In some areas this statistical threshold was interpreted flexibly, for example to include some wards that did not meet the 10% criteria but which were either largely or wholly surrounded by other coalfield wards or where mining took place in more built up diversified industrial areas where there was slightly lower dependence upon coalmining employment, such as in Lancashire and North Staffordshire. We utilise this definition of coalfields in preference to that available from the ONS Area classification due to its coverage of Scotland² and its subsequent use in the 1998 Coalfields Task Force Report for England. On the basis of further work commissioned by the UK Government (ICRRDS, 2003), the definition of coalfields was revised and expanded to include two additional old coalfields that had already lost their workforce by 1981; Gloucestershire and Cumbria. The coalfield files are held in the form of look-up tables that list which Lower layer Super Output Areas (England and Wales) or Data Zones (Scotland) are located within particular coalfield areas. These Census based geographies are also available within LFS from 2005 onwards, enabling those respondents who reside within a coalfield area to be flagged. Finally, we examine the geographical spill over by examining how levels of union membership vary with respect to how far away those in

² The coalfields of Scotland were located largely across the 'Central Belt'. The ONS Area classification allocates the 13 local authorities within the Central Belt of Scotland to the 'Scottish Industrial Legacy' group.

employment live from what were once coalmining areas. Distances, measured in kilometres, have been derived from the centroids of all LSOAs and Data Zones within Great Britain to their nearest coalfield boundary. These have been calculated using road network travel distances using the Ordnance Survey's MasterMap Highways network. Again, these distances have been merged onto LFS data on the basis of these geographies. As such, all those living within an LSOA or Data Zone will either be recorded as living within a coalfield or will be assumed to live the same distance away from the nearest coalfield.

5. Descriptive Analysis

Figure 1 presents estimates of employee union density for detailed areas of Great Britain for the period 2000-2018. These areas relate to Unitary Authorities and Local Authority Districts as they were prior to the reorganisation of local government in England that were brought into effect in April 2009³. The shading of the map refers to the position of an area within the overall distribution of union membership, based upon deciles. Coalfield boundaries have also been overlaid. In line with official statistics, union density is lowest within London, the South East and the East of England. Many coalmining areas continue to exhibit relatively high levels of union membership, most notably South Wales and the North East. There are areas beyond the boundaries of these coalfields that also exhibit relatively high levels of union density, such as Merseyside in the North West and Glasgow in Scotland. The Figure also indicates relatively low levels of membership that exist within parts of the country that are generally regarded as having high levels of union membership overall, such as Aberdeenshire in Scotland and North Yorkshire.

Table 2 provides a more direct assessment of the association between union density and residence within a coalmining area. Within Great Britain, it can be seen that 10% of employees live within areas that were characterised by relatively high levels of employment in mining in 1981. The proportion of employees living in ex-mining areas is highest in the North East (29%), where a majority live within what was once the Durham Coalfield (24%). Within both Wales and Yorkshire, almost 1 in 4 employees live within

³ Data for the City of London has been combined with the neighbouring City of Westminster due to the small sample sizes associated with those residing in these areas.

ex-mining areas. Both London and the East of England had no coalmining, however small coalfields existed in both the South East (Kent) and the South West (Forest of Dean in Gloucestershire). Across Great Britain as a whole, levels of union membership are higher in ex-mining areas (32%) than elsewhere (25%). The higher levels of density within ex-mining areas cannot simply be attributed to the increased opportunity to join unions within ex-mining areas. Restricting the sample to those who are employed within unionised workplaces, the propensity to join trade unions remains higher within ex-mining areas (63%) compared to non-mining areas.

Within region comparisons further demonstrate that this mining differential is not simply a by-product of mining areas being located within the more unionised parts of Great Britain. Within regions, levels of union membership are generally higher within ex-mining areas than elsewhere. The largest differential is observed in the South East. Subject to the caveat of small sample sizes, union density among those living within what was the Kent coalfield (n=289) is 13 percentage points higher than in the rest of the South East. Within Wales, there is a 6 percentage point differential between those residing in ex-mining areas compared to those living elsewhere. The Strathclyde region of Scotland is the only part of Great Britain where union density is actually higher within non-mining areas. In terms of individual coalfields, union density is highest in Cumbria (49%) and South Wales (39%). The relatively high levels of union membership in Cumbria will in part relate to the highly unionised nuclear workforce that is located in that area. Once again, the increased propensity of workers from coalmining areas to join unions *within* particular regions persists upon controlling for higher levels of union presence within these areas.

The effect of residing in old coal mining areas upon trade union membership within the present period would be expected to spill over into neighbouring geographical areas. Table 3 examines how levels of union membership vary with respect to how far away those in employment live from what were once coalmining areas. It can be seen that across all sectors of the economy, union density declines steadily with respect to the distance with which those in employment live away from a coalfield. Those who live furthest away from old coalmining areas will of course capture those who live in those

parts of the UK where union density is generally low, such as the South East, the South West and Eastern England. However, it can be seen that union density is lower even among those who reside just several kilometres away from the boundaries of what were once coalfields. Table 3 also considers how proximity to once highly unionised workplaces spills over to those in relatively un-organised sectors. The analysis considers union membership within the nontraded sectors of construction; wholesale and retail; and hotels and restaurants. As discussed by Holmes (2006), these sectors are present across the economy. Analysis reveals that levels of union density within the non-traded sector are much lower than those observed in other sectors of the economy (11% compared to 31%). However, even within these sectors, union density is higher among those who live within or near old coalfield areas. These patterns persist among those workers who are employed at workplaces where unions are present, suggesting that the propensity to join unions diminishes with respect to distance with which people live near ex-mining areas.

6. Multivariate Analysis

Methodological Approach

To examine whether the high levels of unionisation in these areas relate to the legacy of their industrial heritage or whether they are simply a by-product of geographical differences in the characteristics of individuals or the types of jobs that they are employed in, we estimate a series of logistic regressions that model the probability of union membership among our sample of respondents to the LFS. Models of the following general form are estimated:

$$MEM_{it} = \alpha + PC_{it}\beta + JOB_{it}\gamma + COAL_{it}\lambda + RESP_{it}\pi + \varepsilon_{it}$$

The analysis is based upon pooled cross sectional data from 15 years of the LFS. The dependent variable MEM_{it} identifies whether or not an employee i is a member of a union during period t . Our key variables of interest are those relating to whether or not employees live either within or near an old coalmining area ($COAL_{it}$). By simultaneously controlling for the personal characteristics (PC_{it}), job related characteristics (JOB_{it}) and

other respondent characteristics ($RESP_{it}$), the model identifies the separate independent effect of living in a coalmining area on membership status within our sample of employees. The control variables for job related characteristics include key determinants of union membership such as occupation, industry, sector of employment and workplace size. In terms of personal characteristics, we simply control for age and gender. Respondent characteristics include controls for year, whether the survey was conducted via telephone or face to face and whether or not the survey was conducted via a proxy respondent. Approximately a third of LFS interviews are conducted through a proxy respondent. A proxy respondent is typically a spouse or partner (usually female) responding on behalf of the intended survey respondent who is absent from the household at the time of the interview. Previous analyses have demonstrated lower levels of reporting among proxy respondents across a variety of questions within the LFS, including trade union membership (BIS, 2013), where proxy respondents simply may not know certain details about the intended respondent.

Within our analysis, the overall effect of living within a mining area is firstly captured through the inclusion of a simple dummy variable. The second stage replaces this measure with a set of dummy variables that capture how the probability of union membership varies according to the distance lived from a coalmining area. These analyses are conducted for all employees and are then repeated for those employed in the non-traded sector only to examine whether living in or near an old mining area continues to exert an influence on the union joining behaviour of those employed in relatively unorganised sectors of the economy. Within each stage of the analysis, we examine the effect of controlling for regional fixed effects to account for confounding factors that may vary by region. These models establish the *within region* effect of living within an old coalmining area upon accounting for ‘baseline’ levels of union membership within a region, which itself will be the result of past employment within traditionally unionised sectors. We also restrict our sample to those workers who are employed at unionised workplaces in order to account geographical variance in the opportunities to join unions. Finally, the interaction between living in a coal mining area and region of residence is examined through the inclusion of variables that identify those living within coalmining areas within different parts of Great Britain. These regional analyses also

examine the effect of both living within or near a coalmining area. Within all regressions, assessments of statistical significance are based upon robust standard errors that account for repeated observations across individuals who may have responded to questions on union membership within both Wave 1 and Wave 5 of the LFS.

Results

Table 4 presents multivariate estimates of the effects of residing in coalmining areas derived from logistic regressions as described above, expressed as odds ratios. The first panel reveals that the inclusion of a single dummy variable reveals that, across Great Britain as a whole, living within a non-mining area (Column 1) significantly reduces the likelihood of union membership by 31% (odds ratio 0.685). Controlling for underlying levels of union membership within the regions where coalmining areas are located (Column 2) reduces the size of the mining effect to 19% (odds ratio of 0.807). The effect of living within a coalfield upon union membership persists upon restricting the sample to those employed within workplaces where unions are present (Column 3, odds ratio of 0.756)), even after controlling for region fixed effects (Column 4, odds ratio 0.835). The second panel of Table 4 considers how the probability of union membership varies according to the distance lived from a coalmining area. The reference category is again those who live within a coalmining area. It can be seen that the likelihood of union membership declines monotonically with respect to distance. Across each of the 4 specifications, even those living just 0-5km beyond the boundaries of old coalmining areas are significantly less likely to be a member of a trade union than those living within.

The lower half of Table 4 restricts the analysis to those employed in non-traded sectors. It remains the case that living within a non-mining area significantly reduces the likelihood of union membership among employees, both before and after controlling for regional fixed effects (odds ratios of 0.76 and 0.85 respectively). Restricting the samples to those employed in unionised workplaces does diminish the statistical significance of our results. Nonetheless, it remains the case that within these relatively non-unionised sectors, the probability of union membership is higher among those who remain most closely connected to these mining communities.

We next consider whether the effect of residing in or near a coalmining area upon the likelihood of union membership varies across different parts of the UK. To do this, the GB-level mining area identifier is replaced by a set of dummy variables that account for both region and whether or not someone is living within an ex-mining area. Results of this analysis are presented in Table 5. Due to the small sample sizes associated with some coalfields, this set defines 9 broader geographical areas and does not distinguish between the individual coalfields that exist within these areas. Non-mining areas in Southern England (defined as East of England, South East, London and the South West) is selected to act as the reference category. The odds ratios represent the relative likelihood of union membership associated with living in an area after taking account of the effects of other characteristics describing individuals and their jobs to the overall likelihood of being a union member. Across Great Britain, the likelihood of being a union member is highest within the mining areas of Wales (2.448) and the North West (2.130). However, these are then followed by the non-mining area of Strathclyde (2.031). The analysis also demonstrates the relatively high likelihood of union membership within both the mining (1.916) and non-mining areas (1.822) of the North East. Controlling for regional fixed effects allows us to evaluate whether those residing within a coalmining area exhibit an increased likelihood of union membership compared to those living within non-mining areas in the same region. Across a majority of regions, residing beyond a coal mining area is associated with a significantly lower probability of being a union member compared to other employees residing within the same region. Those living beyond the boundaries of ex-mining areas within Southern England (0.615) exhibit relatively low levels of union joining behaviour compared to those living within the coalfields of Kent and the Forest of Dean. There are 2 regions where evidence of a statistically significant differential is absent: the North East and Strathclyde.

Finally, Table 6 examines how the effects of distance lived from a coalmining area vary across different parts of Great Britain. This is achieved through the inclusion of a set of dummy variables that account for both region and distance lived from a coalmining area. The previous analysis demonstrated that the effects of geographical spill over were most evident among those who lived within 20 km of a coalfield. We therefore use 20km+ to capture all those living furthest away from a coalfield. Within these analyses we control

for regional fixed effects. Across a majority of areas, it is once again demonstrated that the likelihood of union membership declines with distance from coalfields. The reduced sample sizes associated with restricting the analysis to those employed in unionised workplaces both increases the volatility of the results and reduce the statistical significance. Nonetheless, it remains the case that those who live further away from ex-mining areas generally exhibit a reduced likelihood of being a union member.

There are, however, 2 areas where distance lived from a coalmining area does not appear to be related to union membership. In the North East, it can be seen that whilst those living within mining areas are more likely to be union members than those living in adjacent areas, those living more than 20km away from the coalfields also exhibit relatively high levels of membership. Further examination reveals that this reflects the high levels of union density observed within Redcar and Cleveland, Stockton on Tees and Middlesbrough which were traditionally characterised by employment within other highly unionised sectors including Steel, Shipbuilding, Chemicals and Manufacturing. Although apparently distant from the coalfields of the North East, these areas were close enough to the large coastal coal mines of Blackhall, Horden and Easington up the coast from Hartlepool, for there to be personal links (Beynon et al, 1994).

There are also difficulties in Strathclyde where there is no apparent relationship between distance from mining areas and union membership, which remains highest within those areas along the River Clyde once characterised by shipbuilding; namely West Dunbartonshire, Renfrewshire and Inverclyde. Union membership within the contemporary period reflects both some spill-over from these industries and from the political activism which, in the early twentieth century, earned it the title 'Red Clydeside'. Here too though there were historical links with mining. Until the late Seventies millions of tonnes of iron ore were imported through the General Terminus Quay on the Clyde (opened in 1849 to provide a loading quay for coal exporters) for the inland steelworks at Motherwell and the Clyde Iron Works near Carmyle in Glasgow.

These links with steel are important ones and suggest the need to consider the significance of geography alongside any simple measure of distance. Historically, the

steel mills and furnaces were located near to the coking coal mines. However, the increasing need for the importation of vast quantities of iron ore saw major changes. In both Durham and South Wales, the inland plants at Consett and Ebbw Vale closed in favour of coastal locations at Redcar and Port Talbot. Whilst the latter remained within easy reach of the coalfield, the Teeside plant was further away. Similar processes operating across different terrain contribute to heterogeneity in the effects of living near old coalmining areas on the likelihood of union membership.

These discrepant cases may also relate to issues around the general validity of the coalfield definition we have employed. The emphasis upon residence sits well with the established idea of the colliery village or town with the labour force in residence close to the mine. This was the “classic” view of coal mining in the UK and was strongly in evidence in South Wales and Durham. However, the dramatic mine closures that took place in the late 1950s and 1960s affected these arrangements. This was most evident in Durham where, for geological reasons, the newest mines were located to the east of the coalfield where massive collieries were situated along the coast, transporting men to work coal faces under the sea. It was these mines that stayed open for longer, whilst the smaller older mines in the west around Bishop Auckland, Crook, Spennymoor and Chester-le Street all closed. In 1981 there were only three small mines – Eden, Bearpark and Sacriston - working on the coalfield west of Durham City with men from the closed mines travelling to the working mines at the coast. Here the general picture is a disruption of the established arrangement of the mining village with a concentration of employment along the east coast with a noticeable build-up of miners living in the centre and west of the county travelling quite long distances to their new mine and a possible remoteness from the activities of the union lodge.

A similar though less dramatic effect took place in Scotland where there was also a closure of village pits accompanied by commuting to a limited number of ‘cosmopolitan’ pits, “so called because they drew workers from quite widely dispersed localities with distinct political and working cultures” (Phillips, 2012, p258), contributing again to our ex-mining areas being measured with a greater degree of error. This contrasts markedly with South Wales where, although the coalfield was similarly diminished, the coal mines

(and mining jobs) that remained were spread more evenly from east to west. While the anthracite area in the west was particularly badly hit in terms of mine closures, what remained was a spread of mines across each of the valleys with clusters of dense employment built up around Abertillery, Mountain Ash, Maesteg and Ystradgynlais. Using the 10% residency definition produces a coalfield boundary in South Wales that is very similar to the one drawn around the location of jobs or employment. However, in Durham the boundary based on coal mines (and active lodges) in 1981 would be much more tightly delineated than one based on residence.

7. Conclusions

The analysis demonstrates the persistence of geographical variance in the likelihood of being a union member. These patterns reflect the persistence of the effects of early differences in the locations of industries characterised by relatively high levels of organised labour. Through the course of time, the effects of these industries on union joining behaviour has spilled over to other sectors of the economy and to neighbouring geographical areas, contributing broad regional differences in the likelihood of being a union member. Nonetheless, within these regions it remains the case that those living within areas that were once characterised by coalmining still exhibit an increased likelihood of being a union member compared to those living elsewhere.

The influence of family, friends and colleagues on union joining behaviour is empirically well established. It is therefore perhaps not unsurprising that ex-mining areas, with their relatively settled communities, are places where the importance of such influences will be heightened. What is surprising is that the effect of living near these areas on union joining behaviour diminishes so sharply with respect to distance. Union joining probabilities are significantly lower among those who live just 5-10 kilometres beyond the boundaries of these old coalfields. This is not to suggest that the effects of union membership within the coal industry have not spilled over to neighbouring areas over the course of generations. For example, the probability of union membership within Wales remains relatively high even among those who live well beyond the boundaries of the old coalfields. Within region differentials however demonstrate that particular places can

serve as conduits of trade unionism, long after employment within traditional industries has vanished.

The definition of coalfields used in this paper is, in itself, the product of a detailed programme of research (Beatty and Fothergill, 1996; ICRRDS, 2003) that has been central to informing UK Government discussions regarding the consequences of industrial decline and what can be done to regenerate these areas (Coalfields Task Force, 1998; Beatty et al, 2019). Based upon 1981 Census data it is only able to take a snapshot of that moment of stability between the major rundown of coalmining in the 1960s and the eventual demise of mining. In some areas, the absence of a relationship between proximity to these coalfields and union membership points to the importance of other sources of spill-over and the need to consider the importance of geography alongside any simple measure of distance. However, the analysis has demonstrated the availability of a potentially important instrument for union membership that can be utilised in econometric studies that seek to understand the causal effects of trade unions.

References

Bain, G.S. and Elias, P. (1985). 'Trade Union Membership in Great Britain: An Individual-level Analysis' *British Journal of Industrial Relations*, 23(1): 71-92.

Beatty C. and Fothergill S. (1996). 'Labour Market Adjustment in Areas of Chronic Industrial Decline: The Case of the UK Coalfields' *Regional Studies*, 30(7): 627-640,

Beatty C., Fothergill S and Gore T. (2019) *The State of the Coalfields 2019: Economic and social conditions in the former coalfields of England, Scotland and Wales*, Centre for Regional Economic and Social Research, Sheffield Hallam University.

Beaumont, P.B. and Harris, R.I.D. (1988). 'Sub-Systems of Industrial Relations: The Spatial Dimension in Britain' *British Journal of Industrial Relations*, 26(3): 397-407.

Beynon, H. (1973) *Working for Ford*, London, Allen Lane.

Beynon, H. (2014). 'Still too much socialism in Britain' The legacy of Margaret Thatcher'. *Industrial Relations Journal*, 45: 214-233.

Beynon H. and Austrim T (1994) *Masters and Servants: Class and Patronage in the Making of a Labour Organization. The Durham Miners and the English Political Tradition*. Rivers Oram Press.

Beynon H., Davies R. and Davies S. (2012). 'Sources of Variation in Trade Union Membership Across The UK: The Case Of Wales' *Industrial Relations Journal*, 43(3): 200–221.

Beynon H. and Hudson R. (1993). 'Place and Space in Contemporary Europe: Some Lessons and Reflections' *Antipode*, 25(3): 177-190.

Beynon H., Hudson, R, and Sadler, D. (1994) *A Place Called Teesside: A Locality in a Global Economy*, Edinburgh, Edinburgh University Press

Blanden, J. and Machin, S. (2003). 'Cross-Generation Correlations of Union Status for Young People in Britain'. *British Journal of Industrial Relations*, 41(3): 391–415.

Booth, A. L. (1985) 'The Free-Rider Problem and a Social Custom Model of Trade Union Membership', *The Quarterly Journal of Economics*, 100(1): 253-261.

Bryson A and Blanchflower B (2009) 'Trade Union Decline and the Economics of the Workplace' in W Brown, A Bryson, J Forth and K Whitfield (eds) *The Evolution of the Modern Workplace*, Cambridge: Cambridge University Press.

Bryson, A. and Davies, R. (2019), 'Family, Place and the Intergenerational Transmission of Union Membership' *British Journal of Industrial Relations*, 57(3): 624-650.

Bryson A and Forth J (2017) *The added value of trade unions*, Trades Union Congress.
<https://www.tuc.org.uk/added-value-trade-unions>

Bryson, A. and Gomez, R. (2003). 'Buying into Union Membership'. In H. Gospel and S. Wood (eds.), *Representing Workers: Union Recognition and Membership in Britain*. London: Routledge.

Bryson, A. and R. Gomez (2005), 'Why Have Workers Stopped Joining Unions? The Rise in Never-Membership in Britain', *British Journal of Industrial Relations*, 43(1): 67–92.

Bryson, A., Gomez, R. and Willman, P. (2004) 'The End of the Affair? The Decline in Employers' Propensity to Unionize', Chapter 8 in J. Kelly and P. Willman (eds.), *Union Organization and Activity*, Routledge, London: 129-149

Bulmer, M.I.A. (1975) 'Sociological Models of the Mining Community'. *The Sociological Review*, 23(1): 61-92.

Department for Business, Energy and Industrial Strategy (2019), *Digest of UK Energy Statistics (DUKES) 2019*. <https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2019>

Department for Business, Energy and Industrial Strategy (2020), *Trade Union Statistics 2019*. www.gov.uk/government/statistics/trade-union-statistics-2019.

Department for Business, Innovation and Industrial Strategy (2013), *Measuring Bias in the LFS for Trade Union Membership Statistics*. BIS/13/733.

Charlwood, A. (2002), 'Why Do Non-Union Employees Want to Unionize? Evidence from Britain', *British Journal of Industrial Relations*, 40(3): 463–491.

Coalfields Task Force (1998) *Making the Difference, a new start for England's Coalfield communities*, The Coalfields Task Force Report, June 1998

Diamond, W. and Freeman, R. (2002). *What Workers Want from Workplace Organisations: A Report to the TUC's Promoting Trade Unionism Task Group*. London: Trades Union Congress.

Dunlop J. T. (1958) *Industrial Relations Systems*, Henry Holt.

Elsheikh, F. and Bain, G.S. (1980) 'Unionisation in Britain: An Inter-Establishment Analysis Based on Survey Data' *British Journal of Industrial Relations*, 18(2) 169-178.

Goldthorpe J.H., Lockwood D., Bechhofer F. and Platt J (1969) *The Affluent Worker in the Class Struggle*, Cambridge University Press.

Gomez R. and Gunderson M. (2004). 'The Experience Good Model of Trade Union Membership' in Wunnava, P.V. (2004) *The Changing Role of Unions: New Forms of Representation*: Routledge.

Green, F. (1992), 'Recent Trends in British Trade Union Density: How Much of a Compositional Effect?'. *British Journal of Industrial Relations*, 30(3): 445-458.

Griffin L. and Brown M. (2011). 'Secondhand Views? Young people, social networks and positive union attitudes'. *Labour and Industry: A Journal of the Social and Economic Relations of Work*, 22(1): 83-101.

Griffiths, M. and Johnston, R.J. (1991) 'What's in a place? An approach to the concept of place, as illustrated by the British National Union of Mine-workers' strike, 1984-85'. *Antipode*, 23(2): 185-213.

Haynes, P., Vowles, J. and Boxall, P. (2005). 'Explaining the Younger– Older Worker Union Density Gap: Evidence from New Zealand'. *British Journal of Industrial Relations*, 43(1): 93–116.

Healy, G. and Kirton, G. (2013) 'The Early Mobilization of Women Union Leaders - A Comparative Perspective' *British Journal of Industrial Relations* 51(4):709-732.

Hester, K., & Fuller, B. (2001) 'Building Union Commitment: The Impact of Parental Attitudes and Participation' *Labor Studies Journal*, 26(2), pp.17-30.

Holmes, T. J. (2006). 'Geographic Spill over of Unionism', Federal Reserve Bank of Minneapolis Research Department Staff Report 368.

International Centre for Regional Regeneration & Development Studies (2003) *Updating Coalfield Areas*, ODPM, London.

Kirton G. (2004). 'The Influences on Women Joining And Participating in Unions'. *Industrial Relations Journal*, 36(5): 386-401.

Klandermans, B. (1986). 'Psychology and Trade Union Participation: Joining, Acting, Quitting', *Journal of Occupational Psychology*, 59(3): 189–204.

Lévesque C. & Murray G. (2010) 'Understanding Union Power: Resources and Capabilities for Renewing Union Capacity'. *Transfer: European Review of Labour and Research*, 16(3): 333-350.

MacKay R.R. and Davies R. (2012) 'Collective Learning, Effective Demand, Loss of Work and Loss of Direction: The Growing Regional Divide within the UK', *Regional Studies*, 46(7), 859-871.

Marsh A. and Ryan V. (1984), *Historical Directory of Trade Unions, Volume 2*. Sclar Press.

Marshall, F. R. (1967) *Labor in the South*, Harvard University Press

Martin, R., Sunley, P. and Wills, J. (1996) *Union Retreat and the Regions: The shrinking Landscape of organised labour*, London: Jessica Kingsley Publishers Limited

Mitchell T (2011) *Carbon Democracy: Political Power in the Age of Oil*, London: Verso

Monastiriotis, V. (2007). 'Union Retreat and Regional Economic Performance: The UK Experience', *Regional Studies*, 41(2): 143–156.

Office for National Statistics (2016) Internal migration, England and Wales: Year Ending June 2015; Statistical Bulletin.

Phelps Brown, Henry (1959). *The Growth of British Industrial Relations*. Macmillan

Phillips, J. (2012) 'Material and moral resources: the 1984–5 miners' strike in Scotland' *The Economic History Review*, 65(1): 256-276.

Rees, G. (1985) 'Regional Restructuring, Class Change, and Political Action: Preliminary Comments on the 1984–1985 Miners' Strike in South Wales' *Environment and Planning D: Society and Space*, 3(4): 389–406.

Rose J. (2001) *The Intellectual Life of the British Working Classes* Yale University Press.

Samuel R., Bloomfield B, and Boanas G. (1986) *The Enemy Within: Pit Villages and the Miners' Strike of 1984-5*. Routledge & Kegan Paul

Southall, H. (1988). 'Towards a geography of unionisation: the spatial organisation and distribution of early British trade unions.' *Transactions of the Institute of British Geographers*, 13(4): 466-483.

Sunley, P. (1990). 'Striking Parallels: A Comparison of the Geographies of the 1926 and 1984–85 Coalmining Disputes'. *Environment and Planning D: Society and Space*, 8(1), 35–52.

Visser, J. (2002). 'Why fewer European workers join unions. A social customs explanation of membership trends', *British Journal of Industrial Relations*, 40(3): 403-430.

Waddington, J. and Kerr, A. (2002), Unions fit for young workers?. *Industrial Relations Journal*, 33(4): 298-315.

Williams, R. (1961), *The Long Revolution* London: Chatto & Windus.

Figure 1: Small Area Estimates of Union Density; 2000-2018

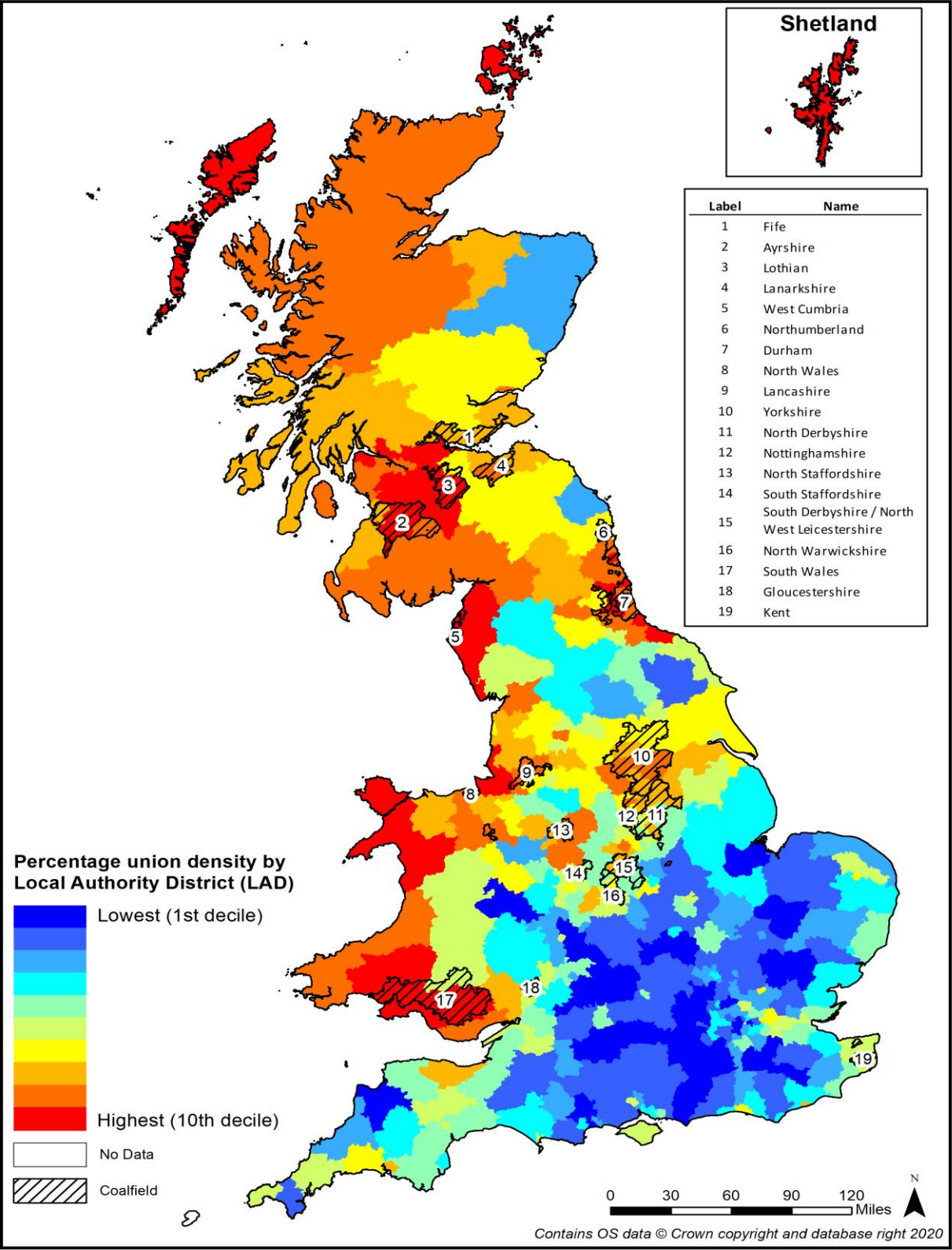


Table 1: Production and Employment within UK Coal Mining

Year	Total Output (Million tonnes)	Employment (Thousands)	% Employed Population
1873-1882	140.3	467	3.6%
1883-1892	172.6	536	3.7%
1893-1902	206.6	692	4.3%
1903-1912	258.0	908	5.2%
1913-1922	245.0	1036	5.4%
1923-1932	236.9	975	5.2%
1933-1942	224.7	749	3.5%
1943-1952	208.0	704	3.0%
1953-1962	215.9	664	2.7%
1963-1972	170.1	378	1.5%
1973-1982	124.5	231	0.9%
1983-1992	95.3	81	0.3%
1993-2002	44.1	11	0.0%
2003-2012	19.9	6	0.0%

Source: BEIS (2019).

Table 2: Employment and Union Density in Mining and Non-Mining Areas

	Union Density		Union Membership where Present		% Employed Population	
	Mining	Non-Mining	Mining	Non-Mining	Mining	Non-Mining
North East	34.0	32.3	63.7	61.7	28.9	71.1
Durham	33.8		63.6		23.5	
Northumberland	34.9		64.2		5.4	
North West	34.2	30.4	65.2	62.0	9.4	90.7
Lancashire	32.6		63.6		8.5	
Cumbria	49.0		78.4		0.9	
Yorkshire	30.8	27.4	60.7	57.6	23.5	76.5
East Midlands	28.3	23.8	59.6	54.1	22.4	77.6
Derby	29.3		58.9		7.1	
South						
Derbyshire/North						
West						
Leicestershire	27.3		61.3		3.9	
Nottinghamshire	28.0		63.9		11.4	
West Midlands	28.1	25.5	61.4	57.9	10.8	89.2
Warwickshire	25.5		57.9		3.7	
South						
Staffordshire	26.6		61.3		2.4	
North						
Staffordshire	30.8		63.9		4.8	
East of England		21.4		54.0		100.0
London		20.8		55.5		100.0
South East	33.8	20.3	62.3	524.0	0.4	99.6
South West	26.8	23.5	60.0	53.5	0.7	99.3
Wales	39.2	33.1	69.6	63.0	25.2	74.8
North Wales	35.0		71.6		0.6	
South Wales	39.3		69.6		24.6	
Scotland:						
Strathclyde	31.1	34.4	63.2	66.3	5.9	94.1
Ayrshire	31.7		64.4		2.7	
Clydesdale	30.5		62.2		3.2	
Rest of Scotland	31.6	28.9	61.0	60.1	13.2	86.8
Fife/Central	31.3		60.7		8.5	
Lothian	32.1		61.6		4.7	
All	32.0	25.0	62.9	57.2	9.6	90.4
Sample	44,273	414,821	23,023	209,902	44,273	414,821

Table 3: Geographical and Sectoral Spill over

Distance from Coalfield	Membership			Membership Where Unions are Present		
	Non- traded	Traded	All	Non- traded	Traded	All
0 km (within Coalfield)	38.3	14.5	32.0	65.1	50.3	62.9
0/5 km	37.4	13.4	31.2	63.4	48.6	61.4
5/10 km	34.8	11.7	29.1	61.2	46.8	59.4
10/20 km	33.8	11.8	28.4	61.7	46.9	59.7
20/50 km	32.4	11.4	27.1	60.0	46.7	58.2
50/100 km	26.8	9.0	22.5	57.5	42.1	55.6
100+ km	25.0	8.5	21.1	55.5	43.1	54.0
All	30.5	10.7	25.6	59.5	45.7	57.8
Sample	347,869	110,996	458,865	183,127	26,715	209,842

Table 4: Multivariate Estimates of the Mining Area Effect

Table 4: Multivariate Estimates of the Mining Area Effect								
	Overall Effect		Overall With Region Fixed Effects		Where Unions are Present		Where Present with Region Fixed Effects	
	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value
All Sectors								
Overall Mining Effect								
Mining	ref.		ref.		ref.		ref.	
Non-Mining	0.685	0.00	0.807	0.00	0.756	0.00	0.835	0.00
R-squared	0.28		0.28		0.12		0.13	
Sample	455,925		455,925		209,055		209,055	
Distance from Coalfields								
Mining	ref.		ref.		ref.		ref.	
0/5 km	0.922	0.00	0.891	0.00	0.932	0.00	0.900	0.00
5/10 km	0.852	0.00	0.843	0.00	0.878	0.00	0.862	0.00
10/20 km	0.808	0.00	0.785	0.00	0.858	0.00	0.819	0.00
20/50 km	0.751	0.00	0.780	0.00	0.792	0.00	0.796	0.00
50/100 km	0.595	0.00	0.726	0.00	0.689	0.00	0.794	0.00
100+ km	0.535	0.00	0.680	0.00	0.628	0.00	0.750	0.00
R-squared	0.28		0.28		0.12		0.13	
Sample	455,917		455,917		209,052		209,052	
Non-Traded Sectors								
Overall Mining Effect								
Mining	ref.		ref.		ref.		ref.	
Non-Mining	0.759	0.00	0.848	0.00	0.881	0.00	0.895	0.01
R-squared	0.17		0.17		0.08		0.08	
Sample	110,073		110,073		26,575		26,575	
Distance from Coalfields								
Mining	ref.		ref.		ref.		ref.	
0/5 km	0.940	0.17	0.906	0.03	0.983	0.76	0.936	0.24
5/10 km	0.875	0.01	0.856	0.00	0.947	0.37	0.910	0.13
10/20 km	0.874	0.00	0.840	0.00	0.930	0.20	0.868	0.01
20/50 km	0.845	0.00	0.862	0.00	0.932	0.17	0.907	0.07
50/100 km	0.648	0.00	0.736	0.00	0.776	0.00	0.820	0.00
100+ km	0.631	0.00	0.733	0.00	0.823	0.00	0.874	0.05
R-squared	0.17		0.17		0.08		0.08	
Sample	110,073		110,073		26,575		26,575	

Table 5: Regional Variance in the Effect of Living within a Mining Area

	Overall Effect		Controlling for Region Fixed Effects		Where Unions Present	
	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value
Regional Variance – All Sectors						
North East						
Mining	1.916	0.00				
Non-mining	1.822	0.00	0.951	0.23	0.927	0.13
North West						
Mining	2.130	0.00				
Non-mining	1.692	0.00	0.795	0.00	0.837	0.00
Yorkshire and Humberside						
Mining	1.749	0.00				
Non-mining	1.408	0.00	0.805	0.00	0.855	0.00
West Midlands						
Mining	1.605	0.00				
Non-mining	1.158	0.00	0.721	0.00	0.764	0.00
East Midlands						
Mining	1.617	0.00				
Non-mining	1.283	0.00	0.793	0.00	0.831	0.00
Southern England						
Mining	1.626	0.00				
Non-mining	ref.		0.615	0.00	0.779	0.06
Wales						
Mining	2.448	0.00				
Non-mining	1.841	0.00	0.752	0.00	0.723	0.00
Strathclyde						
Mining	1.797	0.00				
Non-mining	2.031	0.00	1.130	0.16	1.190	0.12
Rest of Scotland						
Mining	1.785	0.00				
Non-mining	1.547	0.00	0.866	0.01	0.901	0.09
R-squared	0.28		0.28		0.13	
Sample	455,925		455,925		209,055	

Table 6: Regional Estimates of Geographical Spill over

		All Workers		Where Unions Present	
		Odds Ratio	P-value	Odds Ratio	P-value
North East	Mining	ref.		ref.	
	0-5 km	1.015	0.76	0.989	0.85
	5-10 km	0.837	0.01	0.791	0.00
	10-20 km	0.801	0.00	0.810	0.01
	20+ km	1.049	0.46	1.014	0.85
North West	Mining	ref.		ref.	
	0-5 km	0.892	0.02	0.939	0.30
	5-10 km	0.875	0.01	0.926	0.21
	10-20 km	0.770	0.00	0.826	0.00
	20+ km	0.743	0.00	0.768	0.00
Yorkshire and Humberside	Mining	ref.		ref.	
	0-5 km	0.925	0.09	0.966	0.52
	5-10 km	0.779	0.00	0.853	0.00
	10-20 km	0.805	0.00	0.885	0.02
	20+ km	0.763	0.00	0.790	0.00
West Midlands	Mining	ref.		ref.	
	0-5 km	0.754	0.00	0.770	0.00
	5-10 km	0.843	0.00	0.867	0.01
	10-20 km	0.753	0.00	0.782	0.00
	20+ km	0.642	0.00	0.701	0.00
East Midlands	Mining	ref.		ref.	
	0-5 km	0.898	0.08	0.861	0.04
	5-10 km	0.867	0.01	0.873	0.05
	10-20 km	0.829	0.00	0.879	0.05
	20+ km	0.735	0.00	0.791	0.00
Southern England	Mining	ref.		ref.	
	0-5 km	0.729	0.03	0.981	0.91
	5-10 km	0.721	0.02	0.822	0.25
	10-20 km	0.665	0.00	0.773	0.10
	20+ km	0.613	0.00	0.778	0.06
Wales	Mining	ref.		ref.	
	0-5 km	0.821	0.00	0.789	0.00
	5-10 km	0.734	0.00	0.679	0.00
	10-20 km	0.715	0.00	0.682	0.00

	20+ km	0.718	0.00	0.725	0.00
Strathclyde	Mining	ref.		ref.	
	0-5 km	1.176	0.10	1.191	0.17
	5-10 km	1.210	0.07	1.329	0.03
	10-20 km	1.050	0.60	1.126	0.32
	20+ km	1.146	0.13	1.196	0.12
Rest of Scotland	Mining	ref.		ref.	
	0-5 km	0.976	0.71	0.974	0.73
	5-10 km	0.909	0.17	0.959	0.61
	10-20 km	0.691	0.00	0.653	0.00
	20+ km	0.834	0.00	0.888	0.07
	R-squared	0.28		0.13	
	Sample	455,917		209,052	