Competition and market power in UK labour markets

CMA Microeconomics Unit

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1. Foreword: Employer market power in the UK

1.1 Competition agencies and policymakers have traditionally focused on market power in product markets but are increasingly interested in the market power firms exercise in labour markets. Not only can market power in the labour market reduce the wages of workers affected, but it may also distort labour supply and production decisions, reducing economic efficiency and possibly worsening consumer outcomes.

1.2 In the words of David Card, 2021 Nobel Prize winner for his work on labour markets, “the time has come to recognise that many - or even most - firms have some wage-setting power” (Card, 2022). In his Nobel speech he expressed his optimism that “the field of labour economics will become more like the field of industrial organisation where the existence of some degree of price setting power is taken for granted” (Card, 2021).

1.3 Employer market power is the ability of firms to pay workers less than the value of their contribution to their firm's output. Economists tend to think of employer market power as operating in two main ways. First, job opportunities may not be good substitutes for each other, either because skills are specialised or because workers value certain amenities, such as closeness to their home. Because jobs are not all the same to workers, employers who are happy to demand less labour are able to pay a lower wage. In the language of economics, labour supply for these firms is not perfectly elastic.

1.4 Second, searching for new jobs takes time and is costly for workers. The more difficult it is to find out about new opportunities, the more market power employers have. When searching for jobs is costly or time-consuming, workers are less likely to leave. Knowing this, employers can pay them less.

1.5 Although often used interchangeably, employer market power and labour market concentration are not one and the same. A more concentrated labour market (that is, one with fewer employers) may afford firms greater employer market power. However, other factors such as the technologies firms use, the mobility of workers and existing employment laws (including the existence of employment contract clauses like non-compete agreements) may all influence both concentration and market power.

1.6 There is mounting evidence that employer market power, and increases in labour market concentration, can lead to lower wages.

1.7 What is more, when firms also have market power in product markets, employer market power not only harms workers, but may also harm consumers. To exercise employer market power and lower wages, firms reduce the amount of labour they demand. Because they now use fewer inputs, they also produce less, reducing output and increasing the prices consumers pay.

1.8 To date, most evidence about the state of employer market power comes from the US. In the US, employer market power in the aggregate has been increasing over recent decades and explains a significant share of rising overall market power.

1.9 This raises questions for UK policymakers: Is employer market power a concern in the UK too? Has it increased in recent years? And how does the changing nature of labour markets, including the growth of gig work and hybrid working, changing pay practices and employment contracts, play into these trends?

1.10 The CMA Microeconomics Unit has produced this report to inform two live areas of policy debate:

(a) The CMA would like to better understand employer market power in the UK and the impact of competition in UK labour markets.

(b) HM Government has signalled that improving the functioning of labour markets and enabling all workers to use their talents effectively are key priorities.

1.11 The report finds that in contrast to the US, aggregate employer market power has not increased in the UK in recent decades. However, large differences across workers, firms and labour markets persist. For affected workers, employer market power lowers wages and employment. Finally, the report surveys the complex ways in which changes to technology and differences in wage bargaining norms can impact how labour markets function.

2. Executive summary

2.1 We have analysed the degree of employer market power and labour market concentration in the UK economy and the relationship between employer power, labour market institutions and labour market outcomes. We have also assessed the impact of four trends driving the changing nature of work that could potentially impact employer market power: working-from-home and hybrid working, the rise of the gig economy (defined as labour services contracted through digital platforms), restrictive covenants (contract clauses that restrict what workers can do after they leave their current employer) and changes in pay-setting policies.

2.2 We find that in the UK, employer market power and labour market concentration have not increased over the last twenty years, in contrast to the US. Nonetheless, there are large and persistent differences in both measures across regions, occupations, and firms.

2.3 For affected workers, concentrated labour markets have a very real cost: comparing similar workers, wages are on average 10% lower in the most concentrated 10% of labour markets compared to the least concentrated 10%.

2.4 Finally, changes to technology (including the rise of hybrid work and the emergence of the gig economy) and differences in wage bargaining norms (such as employment contract clauses, pay setting policies, and the role of unions) all have the potential to affect employer market power in complex ways.

2.5 In particular, we find the following in relation to employer market power in the UK:

(a) Overall, labour market concentration in the UK has been roughly constant or declining between 1998 and 2023. This finding holds regardless of the data source and labour market definition.

(b) Consistent with this finding, the wage markdown (the difference between a worker's contribution to revenue and their wage, a direct measure of employer market power) has also been constant or declining between 2008 and 2021, in contrast to the US. This suggests that if anything UK workers receive a slightly higher share of their contribution to output than fifteen years ago.

(c) Whether firms with market power in the product market (as measured by price markups) are the same firms as those that hold market power in the labour market (as measured by wage markdowns) depends on the relative degree of competitiveness in labour and intermediate input markets. Further research is needed on this important question.

(d) The overall stable or declining level of employer market power masks systematic, persistent and large variation across labour markets.

(e) Geographically, labour markets are much more concentrated outside London and the South East. This means that for a given occupation, fewer businesses account for a larger share of jobs within an area most people consider their relevant job market, a so-called Travel to Work Area (TTWA). Differences between TTWAs have not shrunk over time. If anything, some rural labour markets have become more concentrated.

(f) White-collar workers such as managerial and administrative workers have faced roughly constant concentration, while concentration for blue-collar workers like plant operatives, skilled trade and care professionals has decreased on average since 2012 as relative labour demand has outstripped supply.

(g) There is substantial industry variation in labour market concentration. Manufacturing, transport and storage and financial services are particularly concentrated.

2.6 In relation to employer market power and labour market outcomes, we find:

(a) For comparable workers working in comparable firms, a move from a market with many employers (in the least concentrated 10% of labour markets) to a highly concentrated labour market with few employers (in the most concentrated 10% of labour markets) is associated with a roughly 10% decrease in a worker's wage.

(b) However, for workers covered by collective bargaining agreements, this negative relationship between labour market concentration and their wage effectively disappears.

(c) Over time, the negative relationship between labour market concentration and workers' wages has fallen steadily and substantially. By 2021, the size of the wage-concentration penalty has decreased by three-quarters compared to 2001. This fall in the wage-concentration penalty is consistent with a tightening labour market over this period.

(d) For two comparable workers, the worker in a more concentrated labour market also tends to work fewer hours compared to her counterpart in a less concentrated market. This is consistent with monopsony theories of labour markets, which assume that firms in concentrated labour markets reduce labour use in order to decrease wages.

2.7 On the topic of labour market power and the changing nature of work, we find:

(a) Roughly 15% of firms use restrictive covenants (contract clauses that prohibit workers from certain actions after they leave their employment).

(b) Non-compete clauses are currently a focus for policy, but firms also use many other clauses (such as non-disclosure agreements and no-solicitation agreements) that can similarly restrict worker mobility.

(c) Roughly 26% of workers are covered by non-compete clauses specifically.

(d) While such clauses are more common in managerial and scientific occupations, they are found across all occupations and industries, and across the whole income distribution.

(e) One reason firms might require non-compete agreements is to protect investments they make in developing workers. Indeed, on average workers with a non-compete agreement are slightly more likely than those without to receive formal on-the-job training, but not other forms of training. Non-competes are still common for workers and firms even where training tends to be less common.

(f) About 24% of surveyed workers with a non-compete clause believe it has made it harder for them to leave their current employer to join a competitor.

(g) The gig economy has increased in importance over the last few years in the UK, but still only accounts for about five percent of total employment, according to the most robust sources.

(h) Workers in the gig economy often supplement their income with other jobs and sources of income. They also move more across the income distribution, in both directions, than workers in traditional employment.

(i) Overall, low-pay jobs are common in the gig economy, with eight percent of workers earning below or at the minimum wage, compared to five percent in the traditional economy.

(j) The share of job postings that offer remote and hybrid working has increased dramatically since the pandemic and appears to have stabilised at about a fifth of all job postings since.

(k) On average surveyed workers see hybrid work as an amenity worth about five to ten percent of their wage but the impact on productivity and wages is ambiguous both in theory and empirically.

(l) In the UK, there is no clear evidence that hybrid working opportunities are related to the level of labour market concentration in a given labour market, except at very low levels of concentration, where the most hybrid-working opportunities exist.

(m) Performance-related pay (as opposed to standardised pay) is associated with higher average wages, and more unequal wages within a firm. Wages are not only higher at the upper end of the within-firm wage distribution, but also lower at the lower end.

(n) For firms with union representation, however, the difference in wage inequality between performance pay and standardised pay disappears.

2.8 The remainder of the report is structured as follows:

(a) Chapter 3 surveys the wider structural context of UK labour markets.

(b) Chapter 4 examines labour market trends in the last twenty years and geographical, occupational and industry variation in employer market power.

(c) Chapter 5 provides evidence on the relationship between labour market concentration and labour market outcomes, for both individual workers and wider labour markets.

(d) Chapter 6 examines four specific labour market trends often discussed in the context of changing employer market power: restrictive covenants, the gig economy, remote and hybrid working and the decline of standardised pay setting.

(e) Chapter 7 places the results in the context of the emerging evidence worldwide and highlights some remaining questions.

2.9 At the end of the report, a glossary explains key terms and three appendices describe the data sources and methodologies used and provide additional figures and tables.

3. Structural trends in UK labour markets

UK labour markets have become tighter in recent years

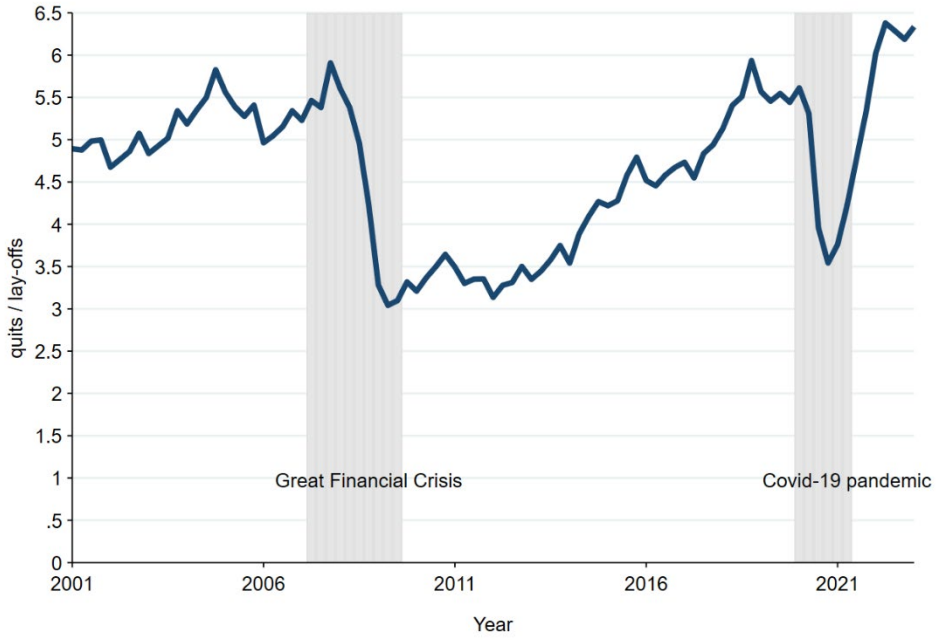
3.1 Changes in employer market power take place in the wider context of structural labour market forces: supply and demand and the technologies firms use to produce output from labour and other inputs. This section reports how the tightness of labour markets (the relative strength of labour demand to labour supply) has increased since the Great Financial Crisis, fallen in the pandemic and bounced back to historically high levels. It also shows that wages generally trend with labour productivity but that the closeness of this relationship depends on industry characteristics.

3.2 Labour markets are considered tight where firms compete to fill a relatively high numbers of vacancies with a relatively low number of job seekers. Labour market tightness can be measured in several ways. For instance, we can compare the number of job seekers to the number of vacancies. Figure 1 plots one such measure, the labour leverage ratio (first introduced for the US by the Upjohn Institute). The labour leverage ratio compares voluntary job separations (or quits, for short) to involuntary job separations (or lay-offs). It therefore measures how attractive outside opportunities are for workers and firms, respectively.

3.3 In the UK, the labour leverage ratio fell in the aftermath of the Great Financial Crisis, meaning labour markets became less tight. The labour leverage ratio has since returned to historically high levels (indicating tight labour markets), with the notable exception of the pandemic period. In recent years, the UK labour leverage ratio has exceeded six. This means there are six voluntary quits for every laid-off worker. A high labour leverage ratio will tend to indicate a shift in power in labour markets from employers to employees.

Figure 1: Since 2008 the UK labour leverage ratio has increased to historically high levels

Quarterly ratio of quits to lay-offs from the UK Labour Force Survey, UK, 2001-2023



Source : Labour Force Survey data

3.4 Industries also vary significantly in their average labour tightness on this measure, as figure E.4 in the appendix shows. Education, health and social care, agriculture and construction have had particularly tight labour markets over the last fifteen years. Workers in these industries were in relatively high demand. By contrast, mining, manufacturing, information and communication services and finance were characterised by a low labour leverage ratio on average.

3.5 Other measures of labour market tightness present a similar picture. For instance, the labour force participation rate, the share of working-age adults in the labour force, has risen steadily over the last twenty years, from 78% to about 82%. However, after reaching a peak in the Covid-19 pandemic, the labour force participation rate has since stagnated. Across industries, the ratio of vacancies to total employment has also risen, and notably so since the pandemic. In some sectors, like accommodation and food services or administrative and support services, the ratio of vacancies to total employment has doubled, to 60 and 40 vacancies per 100 jobs respectively (Figures E.1 in the appendix).

Labour productivity and wages broadly move together

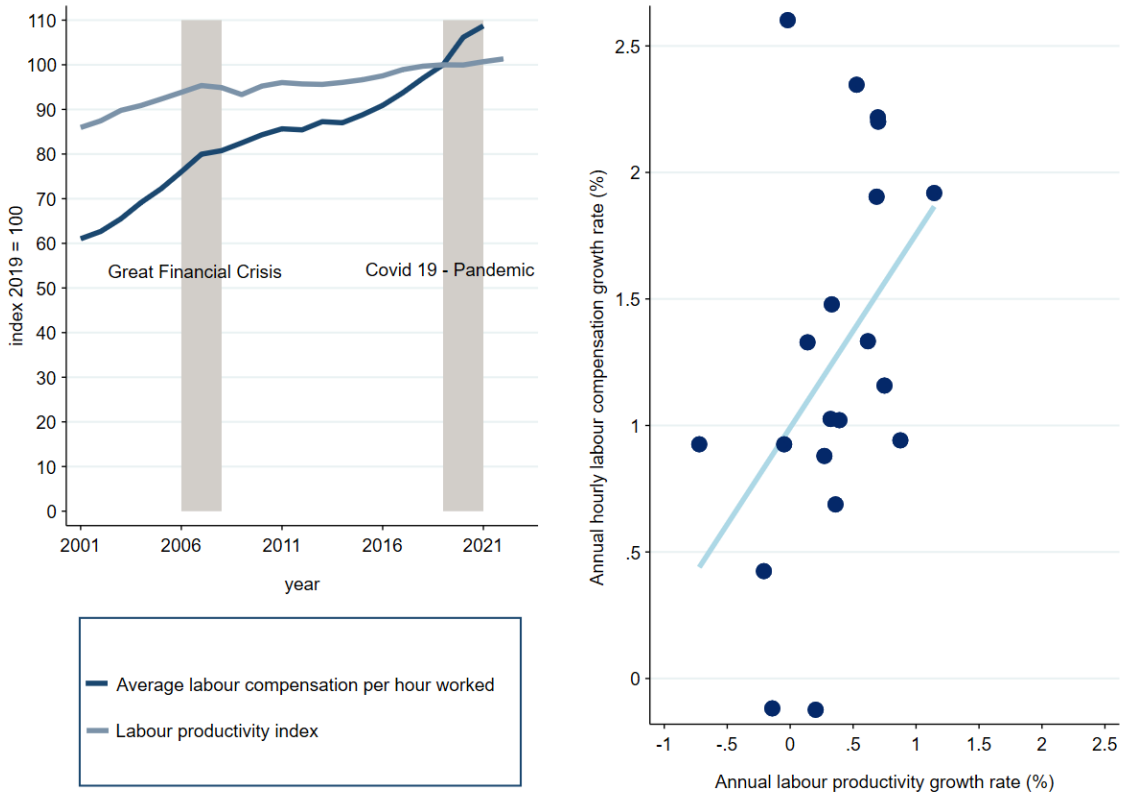
3.6 Labour productivity measures how much value added a worker contributes to a firm and is defined as the amount of output produced per unit of labour. This measure depends not only on the skill the worker brings to the job, but also the amount of capital workers have to work with as well as the technologies used by the firm.

3.7 Figure 2 shows how labour productivity trends across broadly-defined industries moved with average labour compensation per hour worked over the last twenty years. Across industries, average compensation generally tracks labour productivity (the relationship shown in the industry-level scatterplot is positive). In the long run, how much value-added workers create determines how much they can be paid in wages. Over the period observed, wage growth outpaces productivity growth, as might be expected when labour market conditions tighten.

Figure 2: Wages increase with labour productivity, but industries show persistent differences

Panel 1: Average labour compensation per hour worked and average labour productivity (2019 values = 100), from published ONS data, 2001-2023

Panel 2: Scatterplot of average annual growth rates in labour productivity and hourly labour compensation by industry (at Section-level of 2007 Standard Industrial Classification (SIC)), from published ONS data, UK, 2001-2023



3.8 However, industries vary in how tightly these labour productivity and wages move together (many are far away from the 45-degree line in the scatterplot in Figure 2). For instance, in real estate, wages have grown while productivity has stagnated. Differences in this relationship can be driven by many factors, including the structure of the labour market and how employers and workers bargain over the value added created together.

3.9 Figure 3 shows the evolution of the labour income share. The labour income share measures the percentage of Gross Domestic Product (GDP) that goes to labour, as opposed to capital. Labour income includes wages and other forms of labour compensation and benefits. Capital income includes dividends

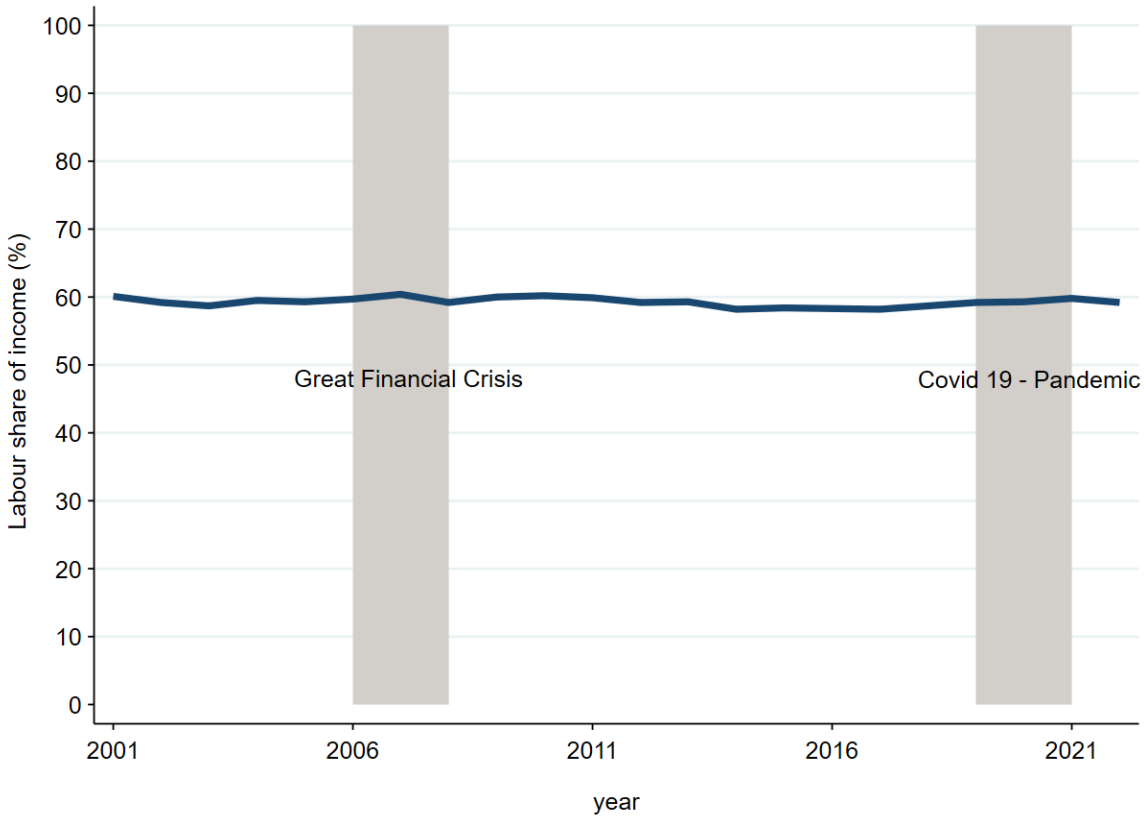
and interest payments. The labour income share is therefore a readily available aggregate measure of labour market power.

3.10 The labour income share has stayed remarkably stable over time in the UK, at about 60%. Of course, employers and employees may bargain fiercely over the surplus created even as the labour share changes little, as the number of industrial labour disputes in the UK attests (Figure E.5, appendix).

3.11 The evolution of the UK labour income share contrasts with that of the US and other countries, many of which have experienced a substantial fall over time (Karabarbounis and Neiman, 2014).

Figure 3: The UK labour income share has remained constant over the past twenty years

The UK labour share of Gross Domestic Product (GDP), from published ONS data, UK, 2001-2022



3.12 As the panel 2 of Figure 2 shows, a constant share overall may involve substantial variation across industries, occupations, or regions. Figure 4 plots labour market concentration for selected industries (as measured by the Herfindahl Hirschman Index or HHI for short, explained in more detail below)

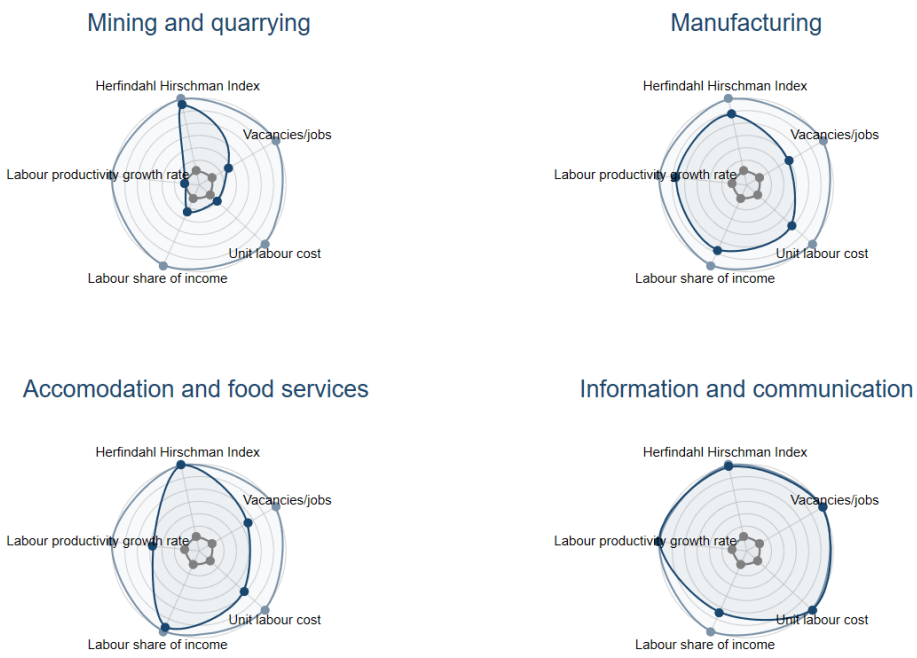
at the industry level alongside the labour income share, average labour productivity growth, the vacancy rate (a measure of labour market tightness) and the unit labour cost (a measure of labour productivity).

3.13 Mining and quarrying are characterised by high labour market concentration, a low labour share of income and low labour productivity growth, low unit labour costs and intermediate labour market tightness. Manufacturing on the other hand features less concentrated labour markets, a high labour share of income, high labour productivity growth, high unit labour costs and intermediate labour market tightness.

3.14 Together, these measures give a fuller picture of the market structure across the economy. As Figure 4 shows, industries vary significantly across all of these measures of labour market health and relative employer market power. Figure E.1 in the appendix shows the remaining industrial sectors for completeness.

Figure 4: UK industries vary significantly in the structure of their labour markets

Plots of five labour market indicators from published ONS data, for four selected industries (section-level of SIC2007), UK, 2002-2021



Note: Values are normalised between 0 and 1; the dark line indicates industry values, & the outer grey line indicates maximum values across industries and the inner grey line indicates minimum values across industries; Data corresponds to average values for the period 2002-2021

3.15 The rest of this report explores how employer market power has evolved over the last twenty years, how it differs across industries, occupations and regions, how it is related to employees' labour market outcomes and how recent labour market developments, including the expansion of the gig economy and hybrid working, have affected these trends.

4. Trends in labour market concentration and employer market power

How we measure labour market concentration

4.1 Just as product market concentration measures how much of an industry's total sales are concentrated in the hands of a few sellers, labour market concentration measures how much employment in each labour market is concentrated in the hands of a few employers. Economists often measure labour market concentration using the Herfindahl-Hirschman index (HHI) which takes the employment shares of all firms in a labour market, squares them (to give more weight to larger employers) and then sums them. The employment HHI can take values between 0 (in perfectly competitive markets) and 10,000 (in market with a single employer). In parallel with product market definitions, labour markets are often called moderately concentrated when the HHI is above 1,500 and highly concentrated when the HHI is above 2,500.

4.2 If labour markets are more concentrated, this might indicate that employers have more market power. Like a monopolist in output markets, a monopsonist (a firm that is the only employer in its labour market) might be able to offer lower wages to workers and capture some of their surplus this way.

4.3 However, high levels of concentration do not necessarily reflect weak competition. The technologies firms use to produce outputs and the career choices of workers in a certain location might both lead to concentrated labour markets without necessarily presenting competition concerns.

4.4 For instance, if workers have skills that translate well between occupations, the option to switch occupations may constrain employer market power. A software engineer might only find one software engineering company in her labour market, but if she could get work as a data scientist in another service business, her employer cannot reduce her wages without pushing her to leave.

4.5 To measure labour market concentration, we need to define what a labour market is. Workers might be willing to travel some distance (but not without limits) for the right job. They might be willing to retrain, or switch industry, or be unwilling to do so. Such choices will impact the size of their relevant labour market.

4.6 In our baseline results, we assume that workers are willing to travel some distance but not very far (remaining in what the Office for National Statistics calls Travel to Work areas, TTWAs). We also assume that they are fairly set in their occupations: for instance, a nurse is not likely to retrain as an accountant. And we assume that they are willing to exercise their chosen profession in any industry: an accountant might leave his accounting job at a manufacturing company to join an accounting firm. However, the appendix shows across a range of figures (see Figures E.8 and E.36, appendix) that the overall trends are not particularly sensitive to these assumptions.

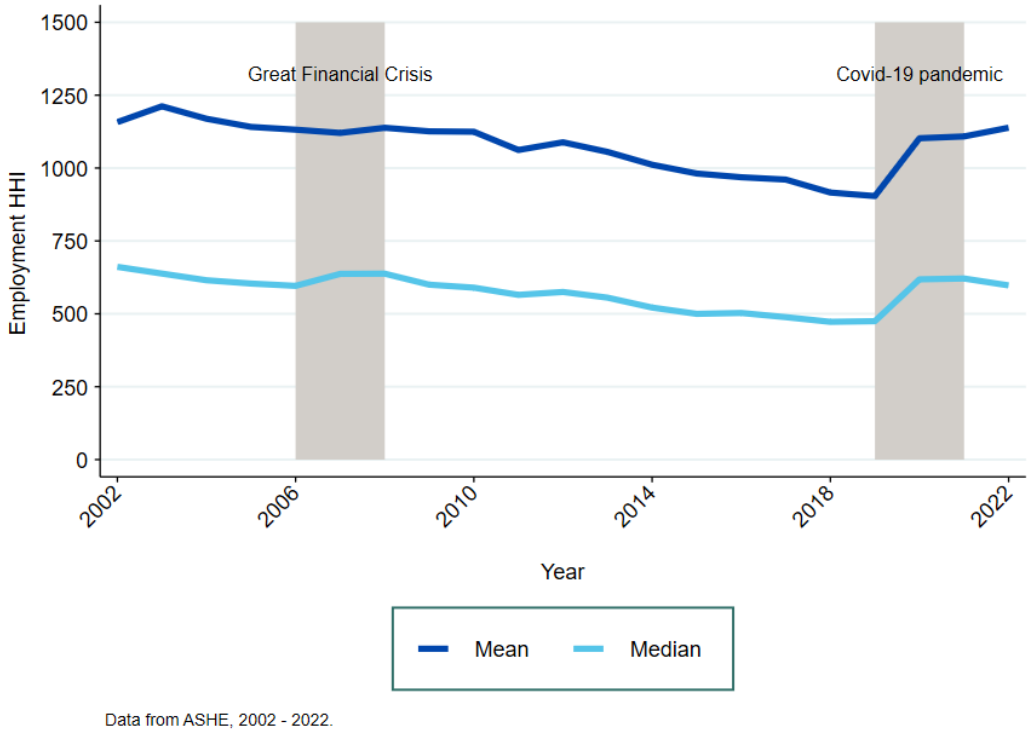
4.7 Finally, we can measure concentration for existing jobs, or for advertised job vacancies. This report does both. Existing jobs have the advantage of being more stable, and perhaps more accurately reflecting the true situation in a labour market. Job vacancies on the other hand are timelier, and often provide additional information about employment opportunities that we cannot measure in traditional survey or administrative sources.

Overall UK labour market concentration has stayed constant

4.8 Median and mean labour market concentration is roughly the same today as twenty years ago. Figure 5 shows that the mean labour market concentration as measured by the HHI fell from over 1200 in 2002 to almost 900 prior to the Covid-19 pandemic, before rising towards 1100 in 2022. The median concentration followed a similar trend, starting from 650 in 2002 and dropping below 500, before rebounding to 600 in 2022. The stable gap between the mean and median suggests the distribution of concentration faced by workers has not changed drastically, and this is supported by graphs of the full distribution in the appendix (see Figures E.17 & E.18).

Figure 5: Labour market concentration has been steady or declining over the past twenty years

Whole-economy mean and median labour market Herfindahl Hirschman Index (HHI) for Great Britain at the 3-digit Standard Occupational Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022

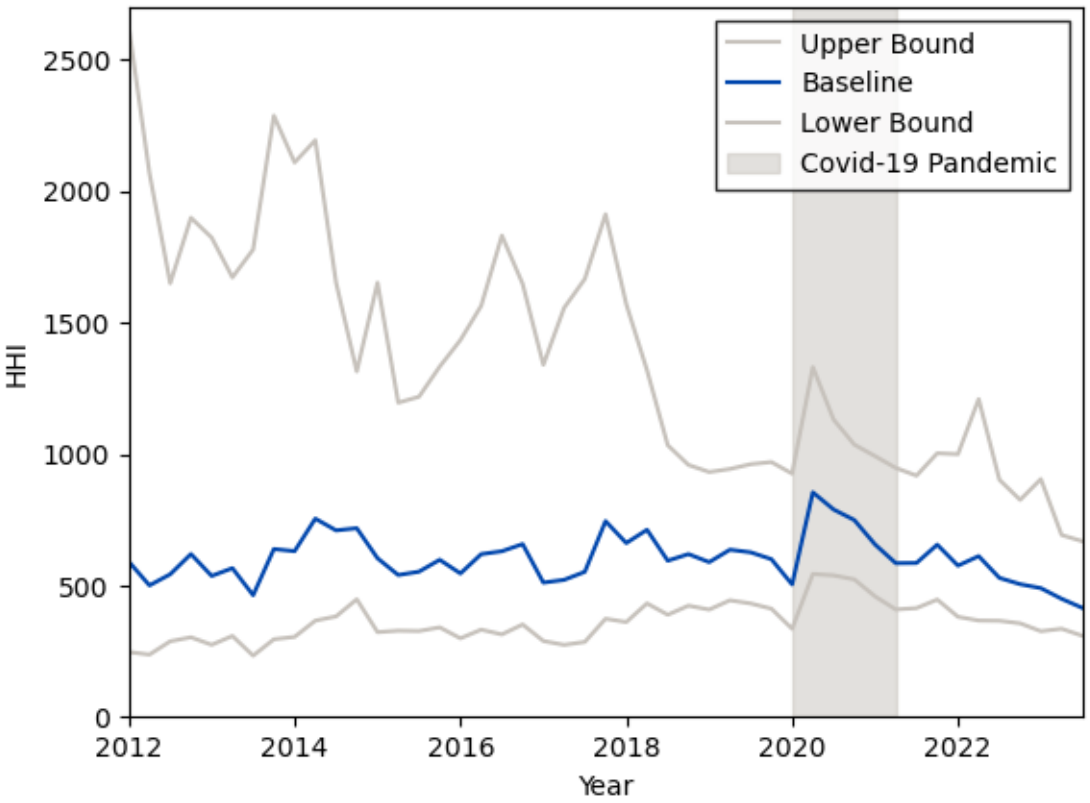


4.9 An additional figure in the appendix compares mean HHI for both our preferred labour market definition (using TTWAs and narrower occupation definitions) and wider labour market definitions (that define labour markets over broader geographical nomenclature of territorial units for statistics NUTS2 regions and broader occupations, see Figure E.8). Defining labour markets slightly differently, for instance over industries, does not significantly change this picture either.

4.10 We can also look at the labour market concentration in posted vacancies, which are a more volatile and not necessarily representative, but potentially timelier measure of the state of the labour market. Figure 6 shows that vacancy labour market concentration also hovered around 600 for the last ten years (which is the period for which this data is available). Because of some issues with assigning posted job vacancies to firms, especially in the earlier years of the data, we show an upper and a lower bound in addition to our preferred baseline measure.

Figure 6: Vacancy labour market concentration has also been roughly constant for the last ten years

Whole-economy mean quarterly Herfindahl Hirschman Index (HHI) at three-digit Standard Occupational Classification by Travel to Work Area level, from Lightcast job vacancy data, UK, 2012Q1-2023Q3



Data from Lightcast, January 2012 - September 2023. HHI calculated at the Travel to Work Area x 3-digit Standard Occupational Classification level for each quarter. Weighted mean using number of job posts in the labour market as weight.

Wage markdowns have decreased slightly since 2008

4.11 Labour market concentration is perhaps indicative of employer market power, but the two are not the same. A more direct measure of employer market power is the wage markdown, or markdown for short.

4.12 The wage markdown is analogous to the price markup. A price markup measures the difference between the price a firm charges for the product it sells and the cost of producing it. It therefore gives a measure of the pricing power a firm has in its output market.

4.13 Similarly, the wage markdown measures the difference between the contribution of a worker to a firm's revenue and the wage they are paid: a higher markdown (a bigger difference between revenue contribution and

wage) is therefore suggestive of the employer having more market power in the labour market.

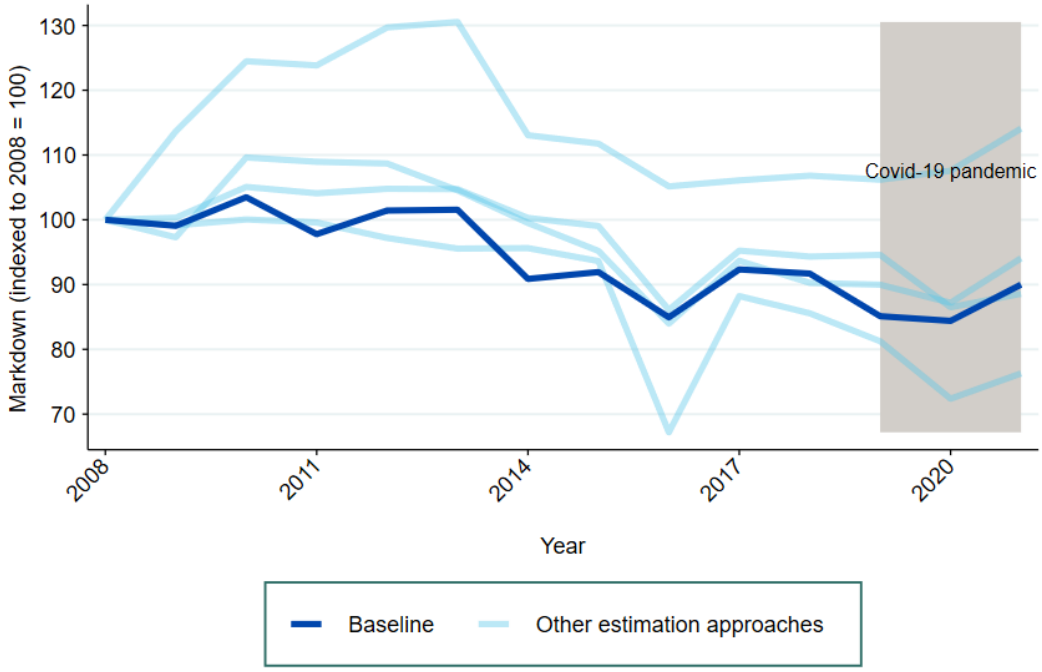
4.14 In practice, we do not observe the additional contribution of any individual worker to a firm's revenue (what economists call the marginal revenue product of labour). Instead, we need to estimate it from production data. While the methods to do so are by now widely used and well established, other market imperfections such as frictions in the labour market might also influence these estimates.

4.15 Figure 7 shows the evolution of the average wage markdown for the UK market economy. Wage markdowns increase slightly from 2008 to 2010, then decreased again. Overall, they have decreased slightly over the last fifteen years. The levels in the chart have been standardised to make comparison of the trends easier.

4.16 The absence of a strong trend in markdowns is consistent with the constant labour income share and concentration measures over the same period but stands in contrast to the well-documented increase in markdowns in the US and other countries over the same period.

Figure 7: Employer market power measured via wage markdowns is constant or declining

Whole-economy mean markdown series from a variety of production function estimation approaches (100 = 2008 values), from the Annual Business Survey, GB, 2008-2021

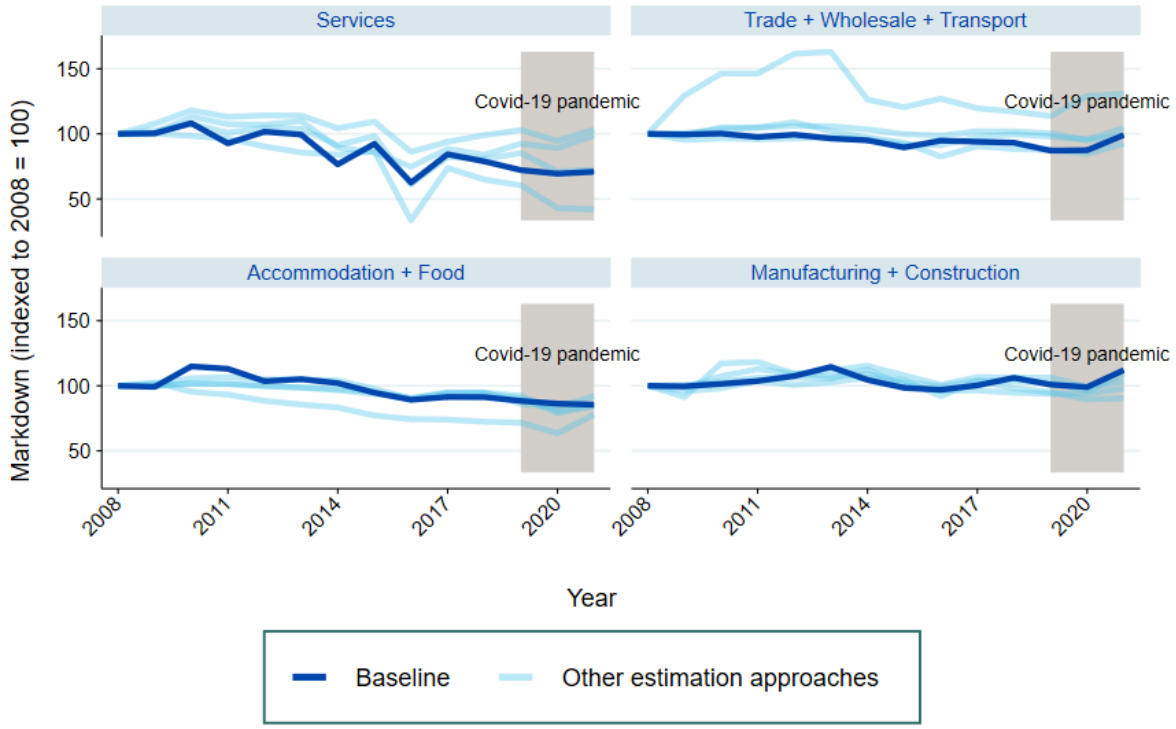


Baseline estimation method is Ordinary Least Squares (OLS) with a translog (TL) production function.
Alternative methods are different production functions, with/without control function approaches. Details in the appendix.
Data from Annual Business Survey, 2008 - 2021.

4.17 Figure E.44 in the appendix shows that depending on the methods employed, the estimated level of the markdown is between 15% and 45% on average. In other words, between 15% and 45% of the marginal contribution of workers is captured by employers. However, given the wide range of the estimates these numbers should be treated with caution: some of the difference may be due to other labour market frictions or aspects of their employment contract (for instance, workers may accept a lower wage if they dislike risk, and their employer is willing to bear some income risk on their behalf by paying a fixed salary).

Figure 8: Sectoral markdowns are constant or declining over the past fifteen years

Broad industrial sector average markdown from a variety of production function estimation approaches (2008 values = 100), from the Annual Business Survey, GB, 2008-2021

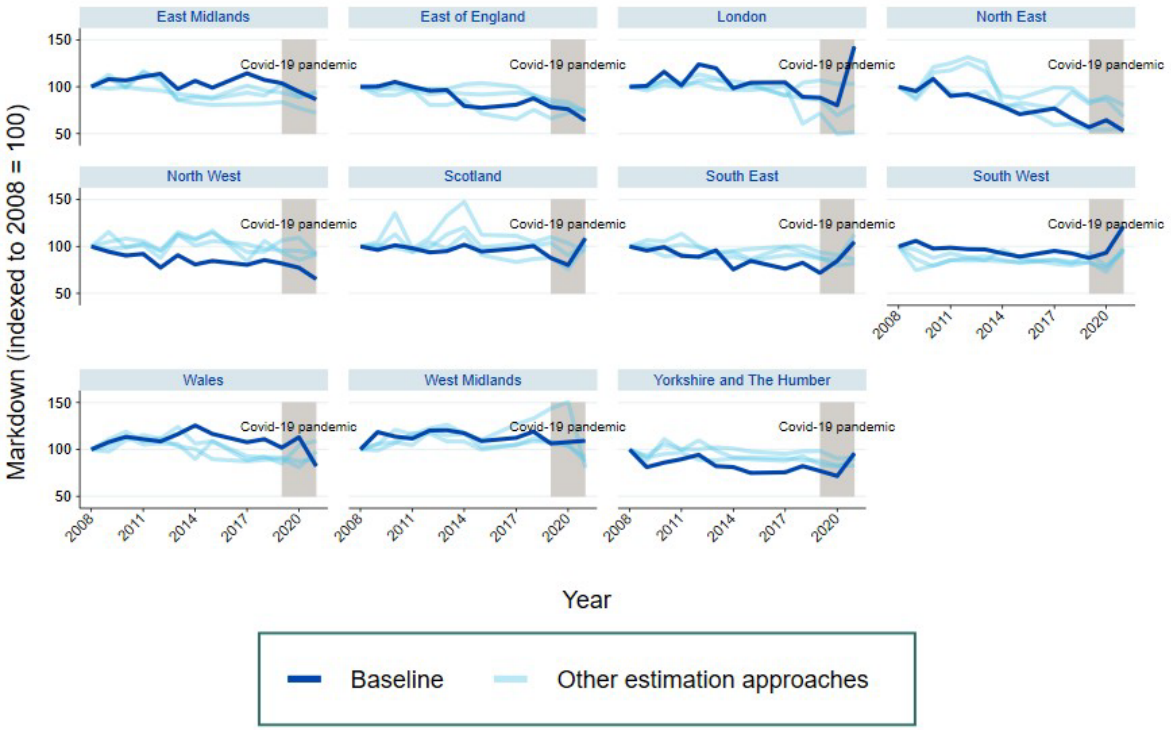


Baseline estimation method is Ordinary Least Squares (OLS) with a translog (TL) production function.
Alternative methods are different production functions, with/without control function approaches. Details in the appendix.
Data from Annual Business Survey, 2008 - 2021.

4.18 Figure 8 shows the trends in average markdowns by large sectors of the economy. Markdowns have decreased most for accommodation and food workers and in the service sector. In other words, workers in these sectors are taking home a larger share of their contribution to output as wages than they did thirteen years ago. By contrast, markdowns in manufacturing and construction, and trade, wholesale and transport have been relatively constant. The assumptions required for this estimation approach (particularly the use of materials as the flexible input) may however not be a good fit for the service sector. This might explain why estimates are particularly variable for services.

Figure 9: Regional markdowns are constant or declining over the past fifteen years

Regional average markdown from a variety of production function estimation approaches (2008 values = 100), from the Annual Business Survey, GB, 2008-2021



Baseline estimation method is Ordinary Least Squares (OLS) with a translog (TL) production function.
Alternative methods are different production functions, with/without control function approaches. Details in the appendix.
Data from Annual Business Survey, 2008 - 2021.

4.19 Figure 9 shows that markdown trends are similar across regions of Great Britain. With our preferred measure of the markdown, we observe steady declines up to 2020 in the North East and North West, East of England, and much of the South of England. London, Yorkshire, Scotland and the South see a sharp uptick towards the end of the pandemic. A longer time series is necessary to establish if this uptick represents a real change in employer market power or other pandemic-era adjustment and measurement issues.

4.20 In addition to the overall trends and levels of employer market power, it is important to understand how employer market power is distributed across firms in the economy. The distribution of labour market power across firms has implications for how the economic surplus created in the UK economy is shared, and how competition agencies can best use their resources to increase efficiency and help consumers.

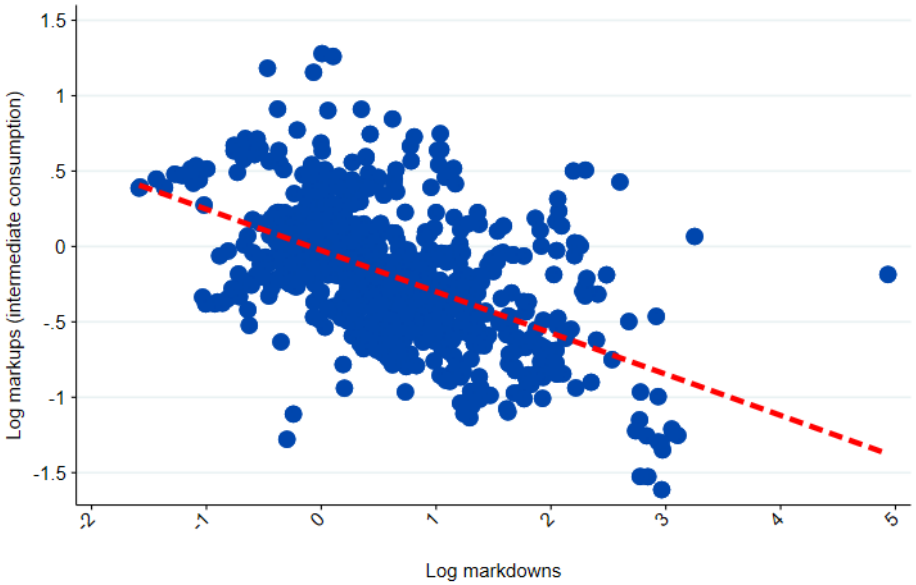
4.21 Figure 10 shows how product market power and labour market power are correlated at the industry level. To estimate price markups, we need to decide which flexible input market (labour or materials) we believe is more competitive. This is because having one input whose price is determined competitively is what makes it possible to distinguish between product markups and labour markdowns.

4.22 Traditionally, economists have used labour as the flexible input (De Loecker and Warzynski, 2012). More recently, they have shifted to materials (Raval, 2023). If we believe there is substantial employer market power, we might not want to use labour as the flexible input (Mertens and Mottironi, 2023). Nonetheless, there is also evidence of market power in materials markets (Morlacco, 2019). Which input is more competitive could also vary from industry to industry. We therefore show both sets of results.

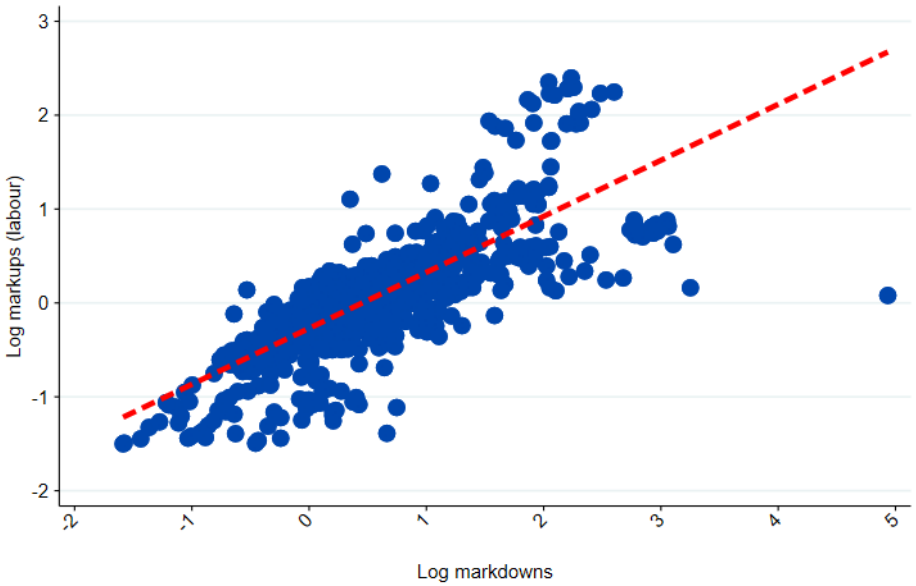
4.23 Figure 10 has two panels: the first shows the correlation between industry-level product market power under the assumption that materials markets are more competitive than labour markets. The second shows the correlation for the opposite assumption. The correlation in panel 1 is negative: industries with more market power in output markets have less market power in labour markets. In panel 2, the correlation is positive: industries with more market power in output markets also have more market power in labour markets.

Figure 10: At the industry level, the relationship between product market and labour market power depends on what we believe about relative market power in labour and materials markets

Scatterplot between mean price markup (panel 1: intermediate consumption markup; panel 2: labour markup) and wage markdown levels at two-digit Standard Industrial Classification, estimated via product function approach from the Annual Business Survey, GB, 2008-2021



Markups and markdowns estimated with Ordinary Least Squares (OLS) and a translog (TL) production function.
Data from Annual Business Survey, 2008 - 2021.
Each point is a 2-digit SIC x year.
Weighted from firm-level by employment.



Markups and markdowns estimated with Ordinary Least Squares (OLS) and a translog (TL) production function.
Data from Annual Business Survey, 2008 - 2021.
Each point is a 2-digit SIC x year.
Weighted from firm-level by employment.

4.24 The same relationships also hold at the firm level. Markups and markdowns are strongly and significantly positively correlated at the firm level if we assume labour markets are more competitive than materials markets, even when we control for industry, region and firm characteristics to make the

comparison more like-for-like. Conversely, markups and markdowns are strongly and significantly negatively correlated at the firm level if we assume materials markets are more competitive than labour markets.

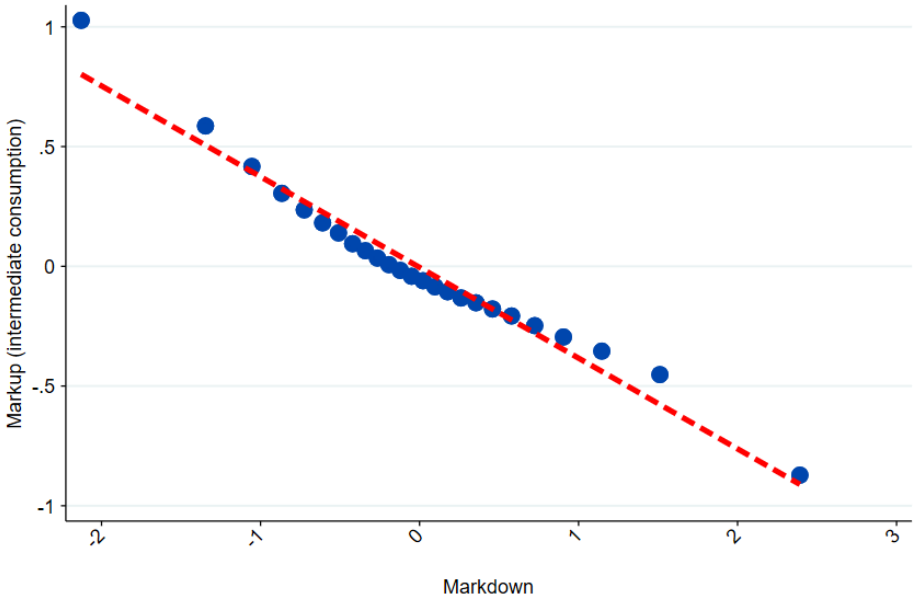
4.25 Figure 11 shows the residual relationship between firm-level markups and markdowns after controlling for year fixed effects, sector fixed effects, a firm's size, a firm's revenue share and firm fixed effects for both assumptions. Each dot in the graph represents the average of all the firms at that point in the markdown distribution once the effect of other determinants of markups is netted out. Alternative estimation methods also do not change the picture.

4.26 Assuming competitive materials markets or competitive labour markets yield opposing results. Further research is needed to answer which of these two identifying assumptions is more likely valid, and therefore whether labour market power and product market power are generally found in the same firms or not. If market power or other frictions are present in both input markets, both markup and markdown estimates may be affected.

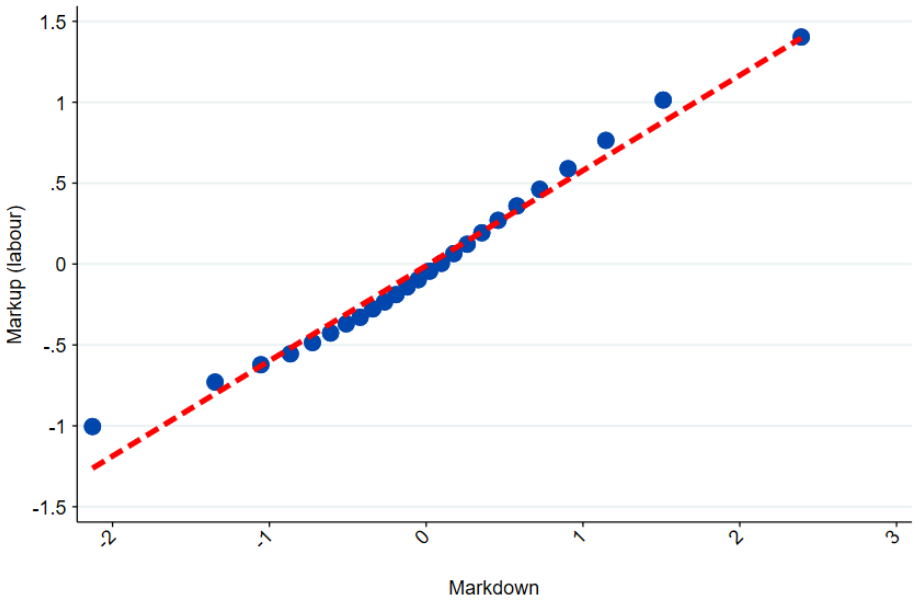
4.27 Theoretically, market power in output and labour markets need not be correlated: a firm may be a locally important employer but sell on a globally competitive product market. Conversely, a firm with product market power may be located in a dense labour market with many other opportunities for its employees. Some recent evidence even suggests that in some settings, where bargaining arrangements are strong, firms may share monopoly rents with workers (Treuren, 2022, link), consistent with a negative relationship between market power in labour and product markets.

Figure 11: At the firm level, the relationship between product market and labour market power depends on what we assume about relative market power in labour and materials markets

Binned scatterplot of markup (panel 1: intermediate consumption markups; panel 2: labour markups) and markdown residuals at the firm level after controlling for industry, year and firm characteristics, from the Annual Business Survey, GB, 2008-2021



Markups and markdowns estimated with Ordinary Least Squares (OLS) and a translog (TL) production function.
Markups are estimated with intermediate consumption as the flexible input.
Data from ABS, 2008 - 2021.



Markups and markdowns estimated with Ordinary Least Squares (OLS) and a translog (TL) production function.
Markups are estimated with labour as the flexible input.
Data from ABS, 2008 - 2021.

Labour markets are more concentrated outside the South East

4.28 While overall labour market concentration is broadly constant and few labour markets meet the definition of 'highly concentrated', places, occupations and industries vary systematically in their labour market concentration. Often, these places and occupations are also different on other dimensions. For

instance, these labour markets might be poorer or more rural, or they might require different types of skills.

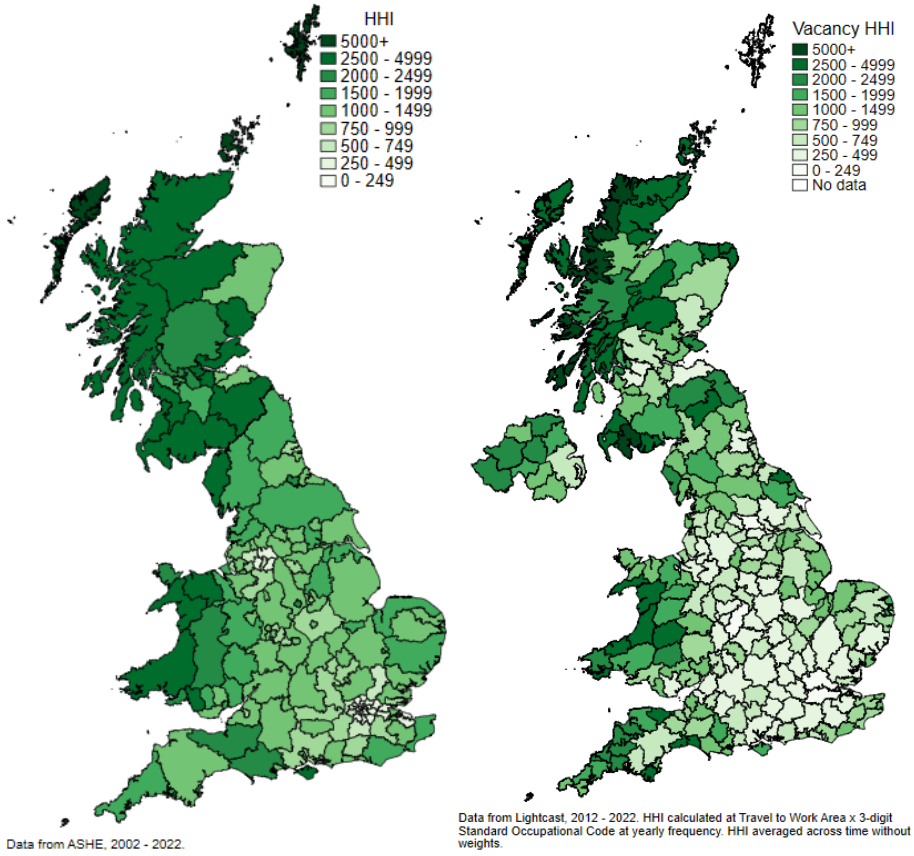
4.29 Figure 12 shows a map of average labour market concentration across all TTWAs in the UK, for both employment and vacancies. The darker an area, the more concentrated on average its labour markets are. While labour markets in London and the South East show low levels of concentration, labour markets are much more concentrated in Scotland, Wales, Northern Ireland and the South West. A comparison of the nomenclature of territorial units for statistics NUTS1 regions (the standard division of the UK into large regions) in the appendix confirms this picture (see Figure E.11).

4.30 For comparison, the left panel of Figure 12 shows labour market concentration in employment, and the right panel shows labour market concentration in vacancies. The overall picture is strikingly similar across the two.

Figure 12: There are big geographical differences in labour market concentration

Mean labour market Herfindahl Hirschman Index (HHI) at the three-digit Standard Occupational Classification by Travel to Work Area level, for Great Britain from the

Annual Survey of Hours and Earnings, 2002-2022, aggregated to NUTS3 (panel 1) and for the UK from Lightcast job vacancy data, 2012-2022 (panel 2)



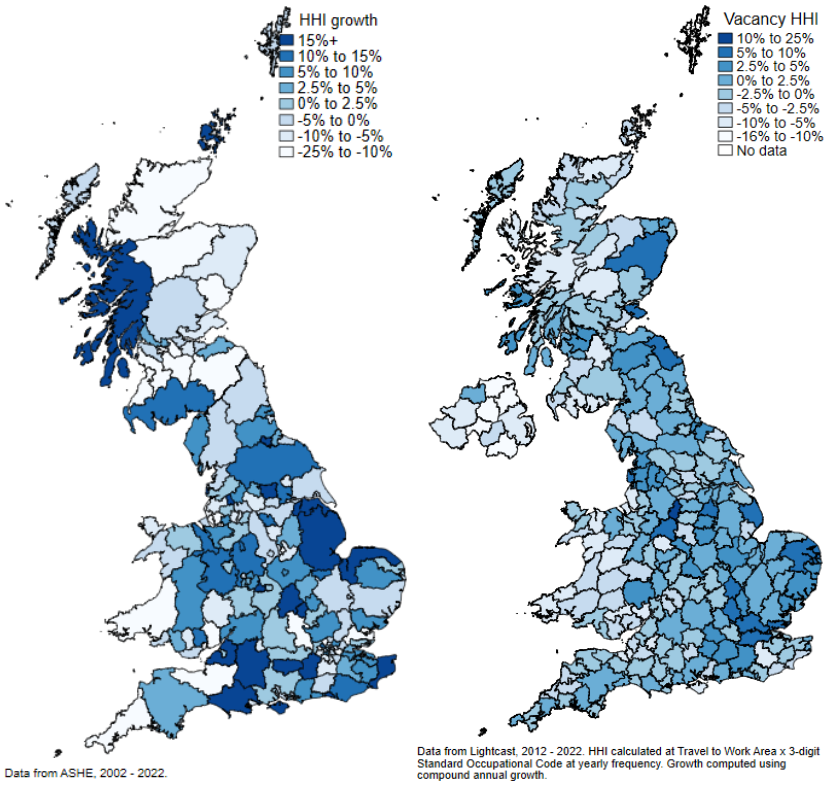
4.31 If labour markets showed a tendency to converge over time, initial differences between regions may not matter much. However, geographical differences in labour market concentration have also been broadly stable. Figure 13 shows how labour market power has changed over the last decade, for both employment and vacancies. The darker an area, the more concentration in this area has increased on average. Overall, there is no evidence of convergence. Instead, there are pockets of increasing labour market concentration, mostly in rural labour markets, along with a slight decrease in labour market concentration across most other labour markets.

4.32 Figure E.29 in the appendix shows the scatterplot of initial concentration levels across TTWAs against subsequent changes. There too we find no indication of convergence (as there is no strong negative relationship between the two).

Figure 13: Concentrated labour markets have not converged to lower levels of concentration

Changes in mean labour market Herfindahl Hirschman Index (HHI) at the three-digit Standard Occupational Classification by Travel to Work Area level, for Great Britain

from the Annual Survey of Hours and Earnings, 2002-2022, aggregated to the nomenclature of territorial units for statistics NUTS3 (panel 1) and for the UK from Lightcast job vacancy data, 2012-2022 (panel 2)

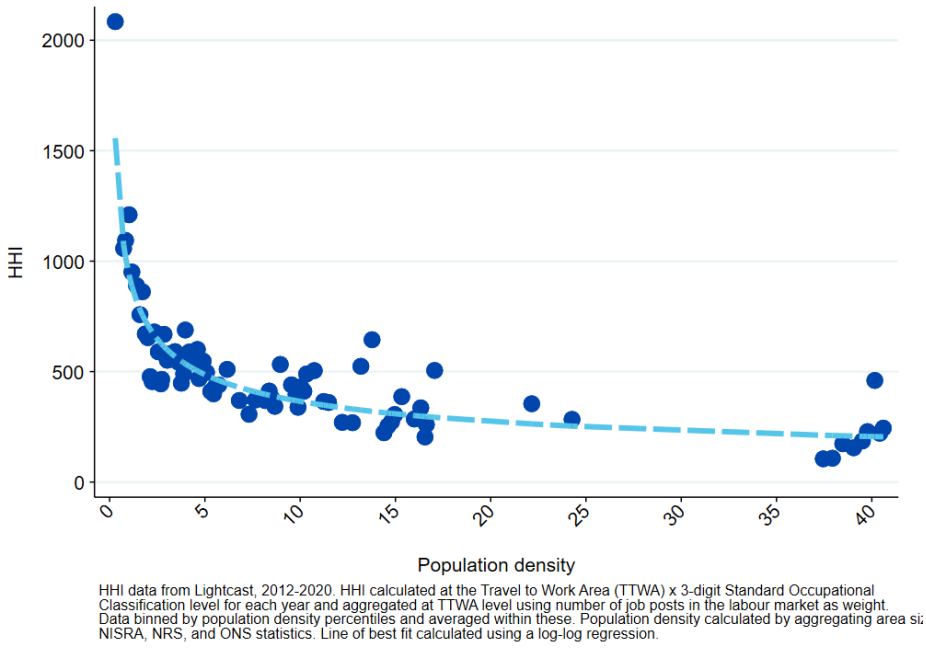


4.33 Areas that have more highly concentrated labour markets are not just geographically distinct, they are also different demographically and socio-economically. Figure 14 shows that more sparsely populated areas are more likely to be concentrated. Dense labour markets tend to attract a wide range of employers, thereby bringing concentration down.

4.34 It does not seem to be the case that more deprived areas have more concentrated labour markets: Figure E.23 in the appendix shows that in the UK, the percentage of residents claiming benefits in a Travel to Work Area is negatively correlated with labour market concentration. This correlation is small and turns slightly positive once accounting for year and TTWA fixed effects (see Table F.9, appendix). Overall, the effect is economically insignificant. In other words, at least on the basis of this measure, it is not necessarily more deprived areas that face more concentrated labour markets.

Figure 14: Less densely populated areas face higher labour market concentration

Binned scatterplot of population density against mean yearly labour market concentration, at the Travel to Work Area level, from Lightcast job vacancy data and published NISRA, NRS and, ONS data, UK, 2012-2020



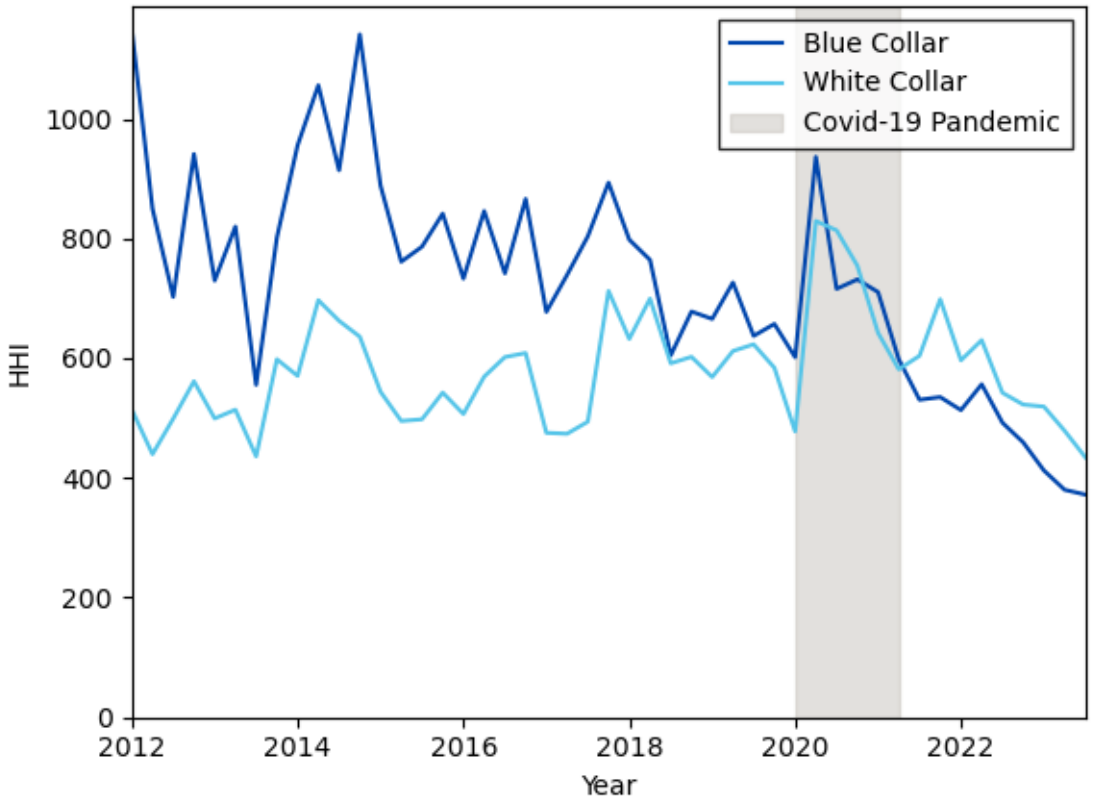
Blue-collar concentration has fallen while white-collar concentration has stayed the same

4.35 Equally, some occupations are more concentrated than others. Up until around 2018, employment concentration was higher on average for blue-collar professions such as plant operatives, skilled trade and care professionals and lower on average for white-collar professions such as managerial and administrative workers.

4.36 Figure 15 shows that white-collar labour market concentration in job vacancies has held steady since 2012. Blue-collar labour market concentration, while initially higher, has been falling steadily since 2014 and is now lower than white-collar labour market concentration. Employment concentration figures (Figures E.10, E.12, and E.15) in the appendix confirm this result.

Figure 15: Blue- and white-collar concentration have converged over time

Mean quarterly Herfindahl Hirschman Index (HHI) at the three-digit Standard Occupational Classification by Travel to Work Area level, from Lightcast job vacancy data, UK, 2012-2023

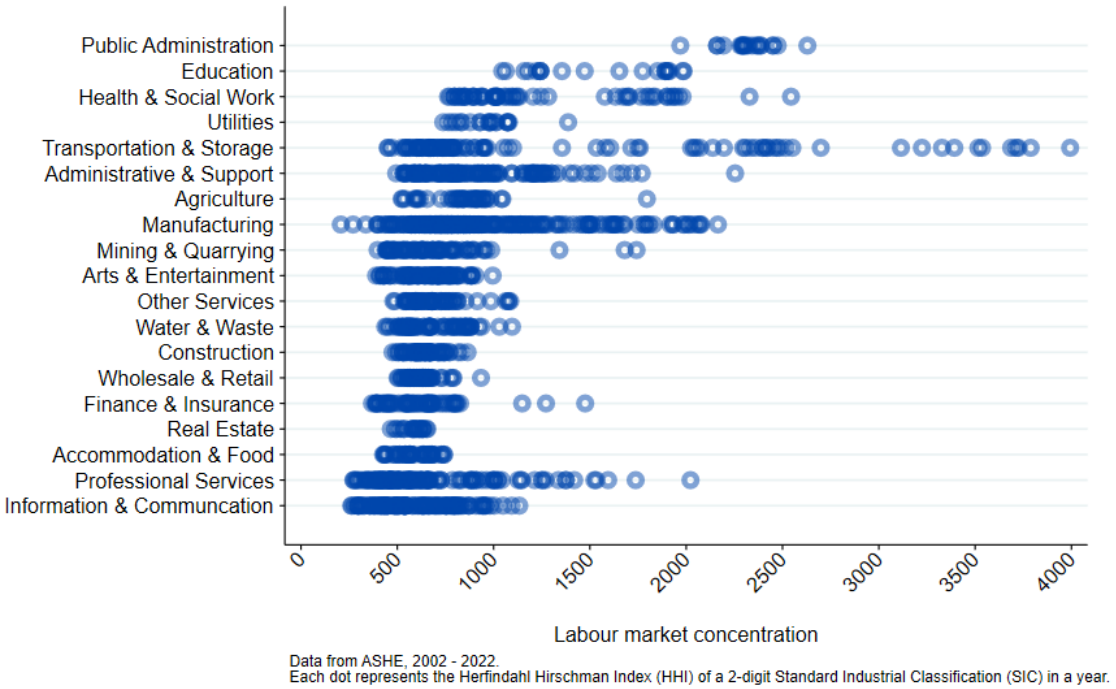


Data from Lightcast, January 2012 - September 2023. HHI calculated at the Travel to Work Area x 3-digit Standard Occupational Classification level for each quarter. Weighted mean using number of job posts in the labour market as weight.
Blue Collar includes Caring, Leisure and Other Service Occupations; Elementary Occupations; Process, Plant and Machine Operatives; and Skilled Trades Occupations.White Collar includes Administrative and Secretarial Occupations; Associate Professional and Technical Occupations; Managers, Directors and Senior Officials; Professional Occupations; and Sales and Customer Service Occupations.

4.37 There is substantial variation in labour market concentration both within and across industries. Figure 16 shows a summary of the distribution within large industries. Each dot represents the mean concentration in a two-digit industry, grouped by broad industrial sectors. Across sectors, employment in public administration, education, health and social work and the utilities is on average most heavily concentrated. Health and social work, transport and storage and administrative and support services all vary substantially in labour market concentration. Figure E.9 in the appendix presents additional evidence on industry differences in markdowns.

Figure 16: Public administration has the highest average labour market concentration

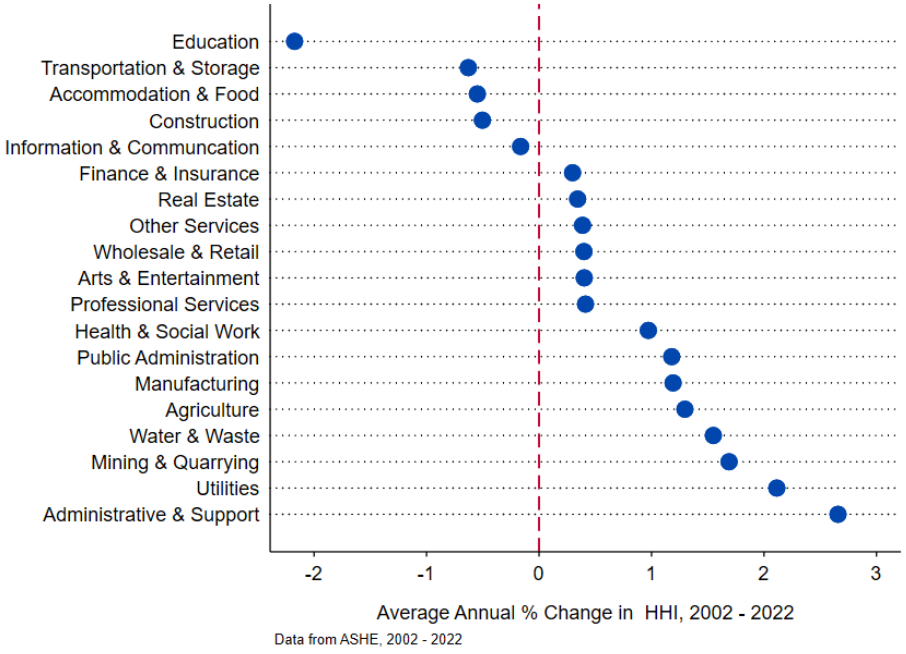
Mean two-digit Standard Industrial Classification labour market Herfindahl Hirschman Index (HHI) from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



4.38 Although labour market concentration has been relatively constant within most industries, there are some that have experienced significant changes. Figure 17 shows the average annual growth in labour market HHI across sectors. Between 2002 and 2022, only the education sector experienced a large percentage decline in HHI. Labour market concentration rose substantially in administration and support services, utilities, and mining and quarrying.

Figure 17: Industry changes in labour market concentration

Average annual sector-level rates of change in the Herfindahl Hirschman Index (HHI) from the Annual Survey of Hours and Earnings, GB, 2002-2022



4.39 To sum up, the UK has not seen dramatic overall changes in wage markdowns and labour market concentration measures in the last twenty years, unlike the US. Blue collar professions, while initially more concentrated than white-collar professions, are now less so. Rural labour markets and some industries (most notably administrative and support services) have seen increases in concentration, but overall levels are stable. This contrasts with the evidence for the US, where markdowns, and by some measures of concentration, have increased quite steeply over the same period.

4.40 Nonetheless, concentration remains systematically higher outside London and the South East. More concentrated labour markets tend to be less densely populated but are not necessarily more deprived than less concentrated labour markets.

5. Labour market concentration and labour market outcomes

Wages are lower in more concentrated labour markets

5.1 The previous sections of this report have documented that while on average wage markdowns and labour market concentration have not changed significantly over the last twenty years, some workers face much more concentrated labour markets than others. While concentration is not the same as market power, many studies around the world have documented negative relationships between concentration and wages, including for the UK.

5.2 In this section, we report that labour market concentration is negatively related to wages for a given British worker. To make this comparison like-for-like, we use regression techniques to remove the influence of other worker, firm, year and region characteristics.

5.3 We take data on wages and individual worker characteristics in the Annual Survey of Hours and Earnings (ASHE), a large and representative survey of workers. We match workers to their labour markets based on their location and occupation, and to their employer in the Business Structure Database (BSD). In doing so, we follow previous work by Abel, Tenreyro and Thwaites (2018, link).

5.4 Many other characteristics might differ between individuals who work in more or less concentrated labour markets. They might have different types of skills, different preferences over the types of job they want to do and might face a different set of potential employers. Some of these characteristics are inherently unobservable to anyone except the workers themselves. Therefore, while we report the observed relationship between concentration and wages, this relationship is not necessarily causa

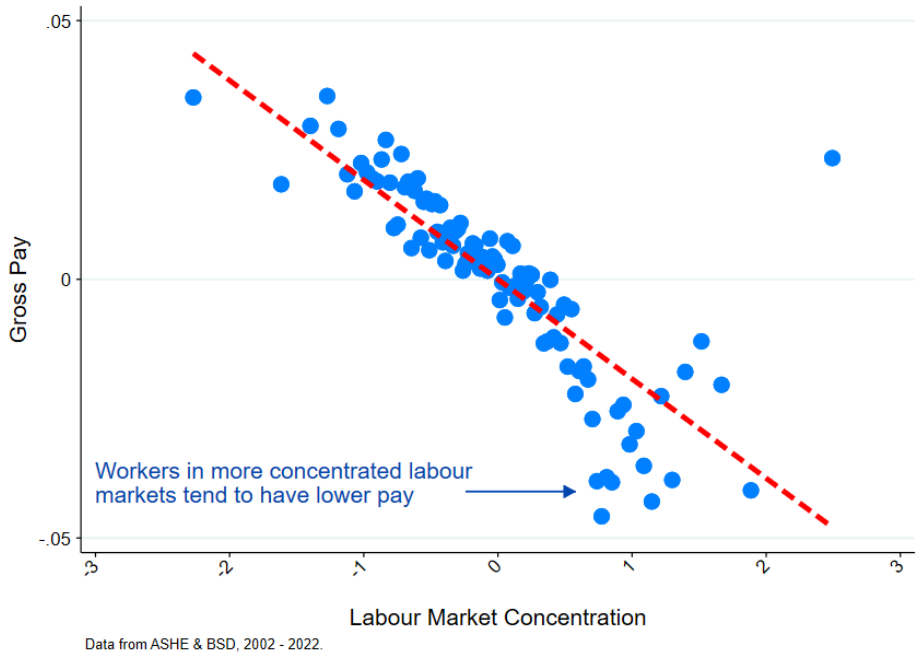
5.5 We find that wages and labour market concentration are negatively correlated: the higher labour market concentration, the lower worker wages are on average. This relationship holds even when we include additional controls specific to a worker, firm, region and time. Figure 18 shows the relationship between wages and labour market concentration after removing the influence of these other variables: this allows us to compare workers on a more like-for-like basis. To reduce statistical noise, observations have been grouped into ‘bins’ based on the degree of concentration, and bin averages

plotted instead. In other words, instead of plotting all observations, those with similar labour market concentration values are averaged, and this average is plotted instead.

5.6 The relationship between wages and concentration is negative, statistically significant and stable across the different sets of control variables we include. While labour market concentration has not increased overall, in concentrated labour markets wages of comparable workers are lower than in less concentrated labour markets.

Figure 18: Wages and labour market concentration are negatively correlated

Binned scatterplot of residuals from regression of worker-level gross pay on labour market Herfindahl Hirschman Index and worker, firm, region and time controls, from the Annual Survey of Hours and Earnings and the Business Structure Database, GB, 2002-2022



5.7 The magnitude of the wage-concentration relationship is also economically significant. On average and holding other worker, firm, and labour market characteristics constant, going from the bottom quartile to the top quartile of concentration is associated with 4% lower wages. For a move from the bottom decile to the top decile, wages on average are 10% lower.

5.8 To make this more concrete, take the example of a customer service supervisor in the highly concentrated Birmingham labour market (in the top 25% of labour markets by concentration for this profession). He would earn

4% more by moving to the more competitive labour market of Manchester (in the bottom 25% of labour markets by concentration for this profession). Similarly, a construction worker in highly concentrated Chester (in the top 10% of labour markets by concentration for this profession) would earn 10% more if she moved to the more competitive Chelmsford (in the bottom 10% of labour markets by concentration for this profession).

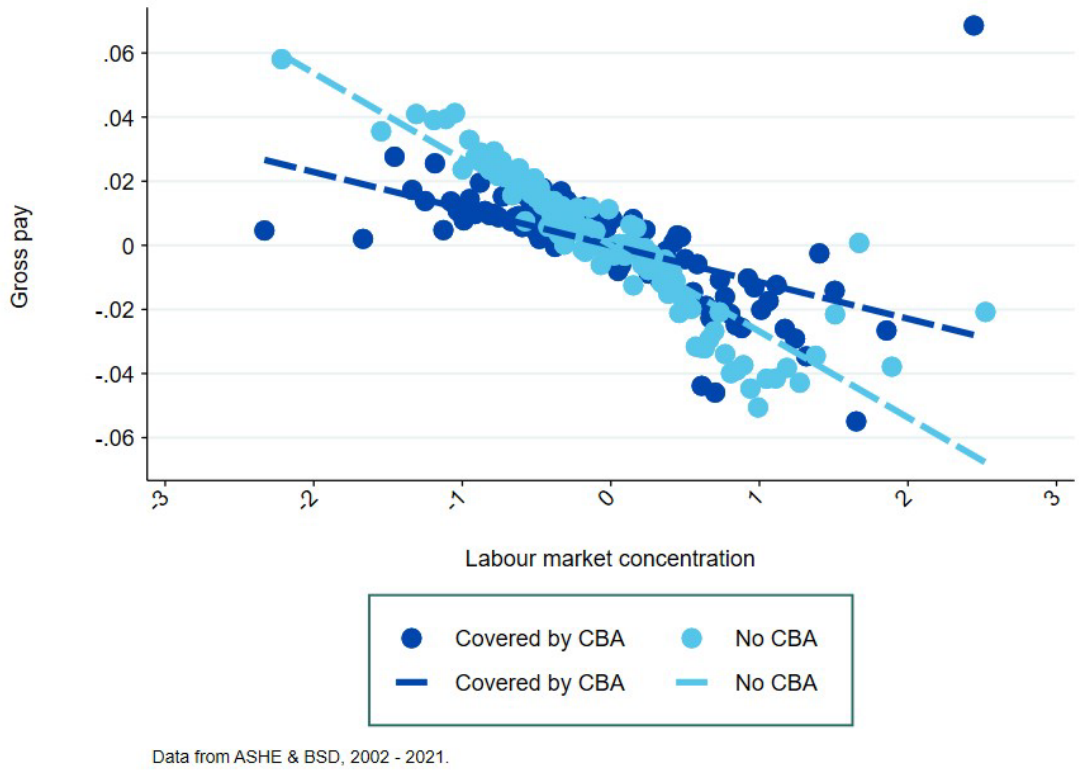
5.9 When employer market power is balanced by employee market power, this negative relationship disappears. For a worker covered by a collective bargaining agreement, the negative association between wages and labour market concentration becomes quantitatively small and statistically insignificant as regression table T.7 in the appendix shows.

5.10 This result is highlighted in Figure 19 which plots the relationship between wages and labour market concentration, for two groups of workers: those who are covered by Collective Bargaining Agreements (CBAs), and those who are not. We remove the influence of worker, firm, region and time specific controls in each. This shows that the negative relationship between wages and concentration is substantially steeper when workers are not covered by such agreements.

Figure 19: The relationship between wages and concentration is less negative for workers covered by a Collective Bargaining Agreement

Binned scatterplots for workers with and without Collective Bargaining Agreements of residuals from regression of worker-level gross pay on labour market Herfindahl

Hirschman Index and worker, firm, region and time controls, from the Annual Survey of Hours and Earnings and the Business Structure Database, GB, 2002-2022



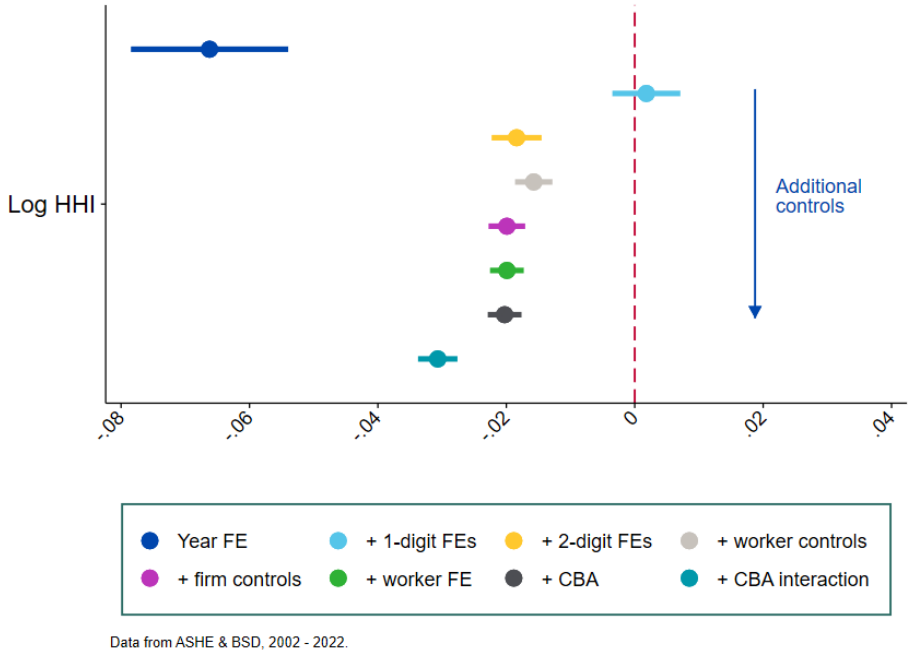
5.11 Another way to think about this relationship is to ask: by what percentage do wages decrease with a 1% increase in concentration? Economists call this measure the elasticity of the wage with respect to concentration. Figure 20 shows how our estimate of the elasticity changes as we control for more and more factors that might influence the wage.

5.12 We start with by controlling for the year the wage is measured in, and at first very broad and then increasingly more detailed industry controls. We add controls for worker characteristics like age and education, and firm characteristics like productivity. We even add a worker fixed effect (this means we look at how wage changes for the same worker as the concentration in their labour market changes over time) and controls for collective bargaining coverage.

5.13 Across our most demanding specifications, the elasticity of the wage with respect to concentration is -0.02. This means that if concentration increases by 10%, on average a worker's wage will decrease by 2%.

Figure 20: As concentration increases by 10%, wages decrease by 2%

Coefficient plot of the wage-concentration elasticity from regressions with year, industry, worker and firm controls, from the Annual Survey of Hours and Earnings and the Business Structure Database, GB, 2002-2022



5.14 However, the negative relationship between employer concentration and wages has steadily decreased in magnitude over time, as can be seen in Figure 21. In 2002, at the start of our sample, we estimate an elasticity of -0.04. By 2021, the coefficient is -0.01. In other words, an increase in concentration increased by 10% in the early 2000s was associated with a 4% fall in worker earnings. More recently, the same rise in concentration would be associated with just a 1% fall in wages.

Figure 21: The negative relationship between wages and labour market concentration has diminished over time

Coefficient plot of the wage-concentration elasticity from regressions for each year, with industry, worker and firm controls, from the Annual Survey of Hours and Earnings and the Business Structure Database, GB, 2002-2022

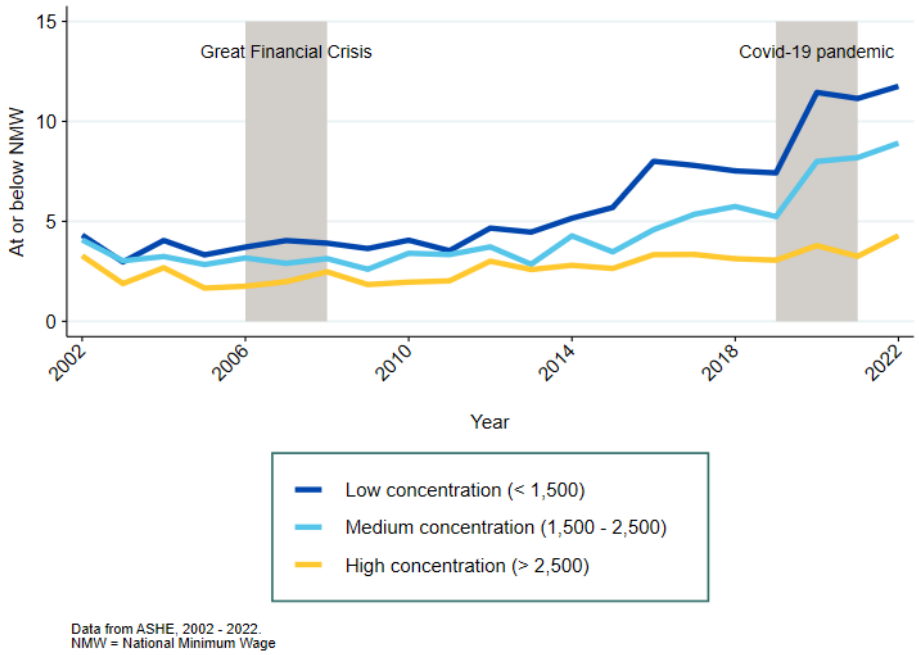
Data from ASHE & BSD.
Computed from worker-level regression of log wage on log employment HHI, alongside controls and fixed effects.
Estimated coefficients are sum of that on log(HHI) and its interaction with each year; standard error from delta method.

5.15 Concentration may not matter for wages if workers are protected in other ways, for instance by the National Minimum Wage (NMW). Nationally, between six and eight percent of workers above the age of 25 earn at or below the NMW in 2021 (Forth, Bryson, Phan, Ritchie, Singleton, Stokes and Whittard, 2023, link).

5.16 Figure 22 shows that workers in the most concentrated labour markets are the least likely to be working at or below the NMW. Recent increases in the NMW have not significantly affected this share in the most concentrated labour markets, in contrast to markets with low or intermediate levels of concentration.

Figure 22: Workers in the least concentrated labour markets are most likely to be paid close to the National Minimum Wage, and this phenomenon has increased over time

Share of workers earning close to the National Minimum Wage over time, by the level of concentration in their labour market, from the Annual Survey of Hours and Earnings, Great Britain, 2002-2022



Data from ASHE, 2002 - 2022.
NMW = National Minimum Wage

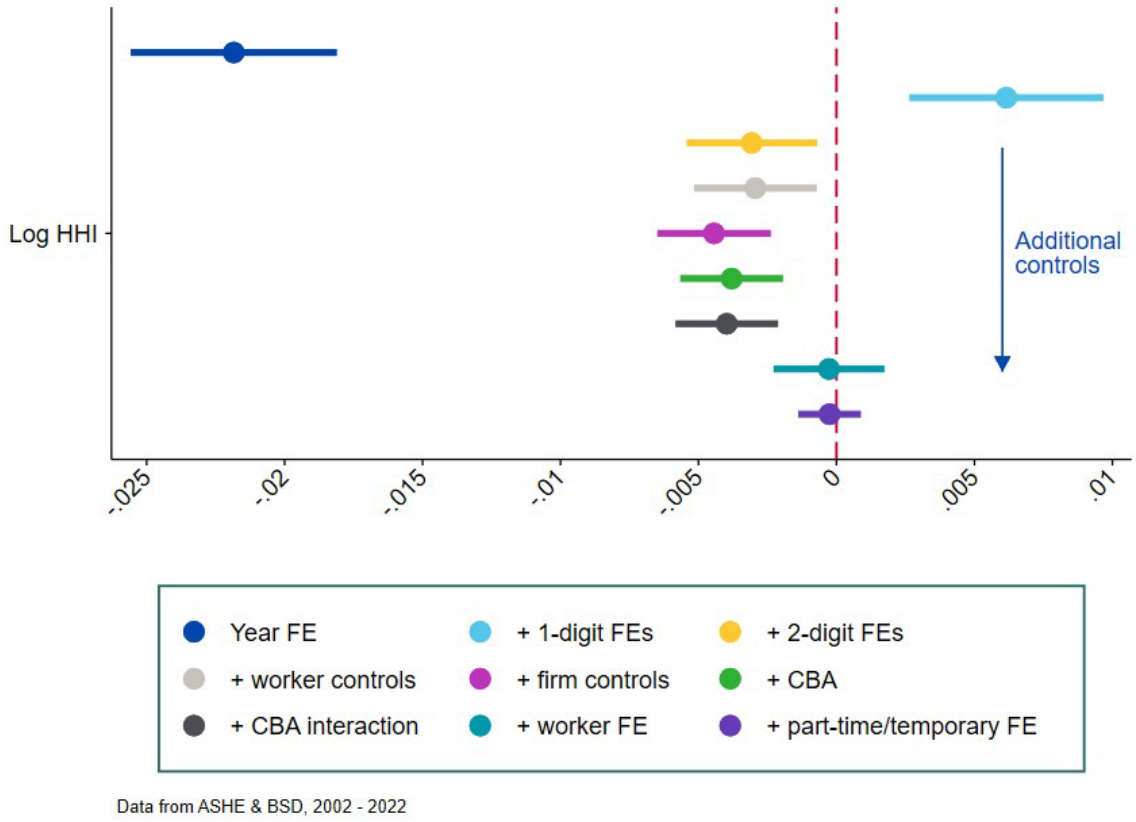
Hours worked and concentration are negatively correlated

5.17 Labour market concentration might also be related to other labour market outcomes, such as the number of hours worked, the unemployment rate and the rate at which workers change jobs and employers. When workers have fewer outside options, they might for instance not be able to work as many hours as they would like.

5.18 We repeat the previous regressions, but look at the number of hours worked, instead of wages as the outcome. We find that similar workers will work fewer hours in more concentrated labour markets. Figure 23 plots our estimates for the elasticity between hours worked and labour market concentration, for an increasing set of controls. We estimate an elasticity of –0.004 with the full set of controls. This is consistent with a monopsony explanation of labour market power: to reduce wages, employers demand less labour. As a result, both equilibrium wages and hours are lower than they would be if the labour market was competitive.

Figure 23: Hours worked are lower in more concentrated labour markets

Coefficient plot of the hours worked-concentration elasticity from regressions for each year, with industry, worker and firm controls, from the Annual Survey of Hours and Earnings and the Business Structure Database, Great Britain, 2002-2022



5.19 Labour market concentration and labour market institutions also interact in complex ways. For instance, Azar, Huet-Vaughn, Marinescu, Taska and von Wachter (2019, link) argue that, while minimum wage policies generally decrease employment, in the presence of concentrated labour markets they may increase employment. Similar results are found by Wiltshire, McPherson and Reich (2023, link).

5.20 In the appendix we replicate this analysis as closely as possible with existing UK data and find similar results (see Table T.8 and Figure E.43). Workers who earn the NMW work fewer hours, and workers in more concentrated labour markets work fewer hours, but the effect of the minimum wage on employment is balanced out by labour market concentration.

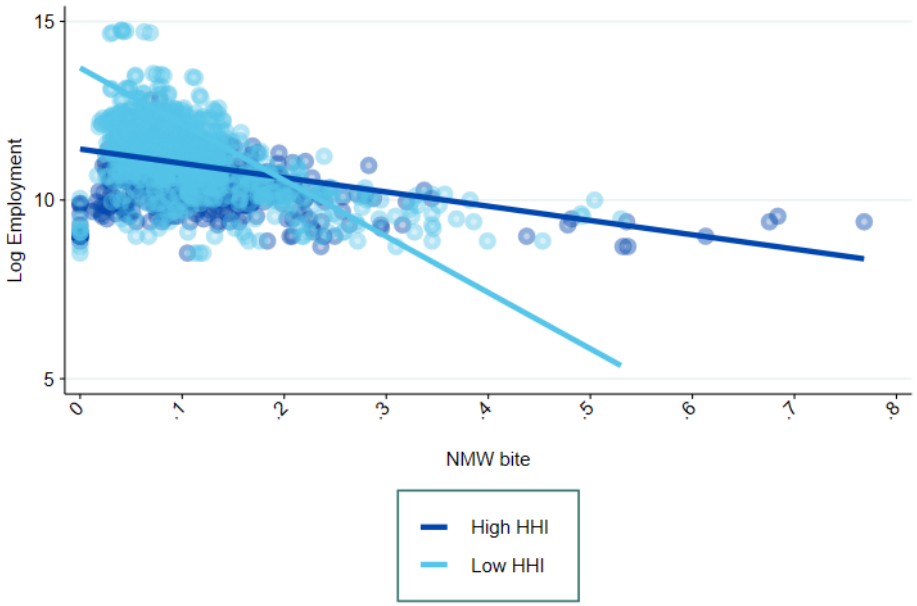
5.21 Since our labour-market outcomes for this analysis are only observed at the TTWA level in the data we use, we cannot control for individual worker

characteristics. Therefore, additional caution needs to be taken in interpreting these results.

5.22 Figure 24 shows a scatterplot of the relationship between total employment and the share of workers covered by the National Minimum Wage after controlling for time and area fixed effects, and labour market characteristics. For both Travel to Work Areas with high (above-median) and low (below-median) labour market concentration, employment is negatively related to the National Minimum Wage "bite" (that is, how many individuals in a given labour market are affected by the National Minimum Wage). However, this relationship is weaker in more concentrated labour markets. This is consistent with the existing US studies.

Figure 24: In concentrated labour markets, minimum wages decrease employment by less

Scatterplot of Travel to Work Area total employment against the share of individuals affected by the National Minimum Wage, by above- and below-median labour market concentration, from the Annual Survey of Hours and Earnings, Great Britain, 2014-2021



Data from ASHE, 2014 - 2021.
NMW bite = share of workers with pay at/below the NMW.

5.23 In summary, we find that wages are negatively related to labour market concentration, even after accounting for the characteristics of each worker and the firm they work for. This negative relationship disappears for workers covered by collective bargaining agreements, and generally weakened over the past twenty years. Labour market concentration is also negatively related

to hours worked. Employment effects may depend on complex interactions between different labour market characteristics. For instance, employment is less negatively related to the minimum wage in more concentrated labour markets.

6. Employer market power and the changing nature of work

Labour market institutions and the changing nature of work

6.1 Workers' wages are not set in a vacuum. Labour market institutions like unions, collective bargaining and minimum wage policies not only influence wages directly, but also what outside options workers have and how easy it is for them to move between jobs and employers. The technologies available for work and job seeking influence these options too.

6.2 This section provides some early evidence on two ways technology has impacted the nature of labour markets and on two aspects of wage bargaining that might affect labour market power.

6.3 Working from home and hybrid working has changed labour markets for many, loosening the link between the location of the worker and the location of the firm. This has implications for productivity and workers' employment options that are yet to be fully understood.

6.4 The gig economy likewise provides new opportunities for workers to flexibly sell their labour and thus smooth transitions between full-time jobs or supplement income. At the same time, there are concerns that gig platforms may hold disproportionate market power vis-à-vis workers, especially since gig workers are often treated as self-employed contractors.

6.5 With respect to wage bargaining, competition agencies and governments around the world are increasingly concerned about so-called 'restrictive covenants', or clauses in employment contracts that limit the mobility of workers. Competition agencies have been especially concerned about direct clauses such as non-compete agreements that restrict workers from seeking employment at a competitor or starting their own competing business. The Department for Business and Trade (DBT) recently proposed legislation that would limit the use of non-compete agreements (link).

6.6 But businesses also use a wide range of indirect clauses like non-disclosure agreements that restrict workers from sharing confidential information, and non-solicitation agreements that restrict workers from approaching existing clients when changing employer.

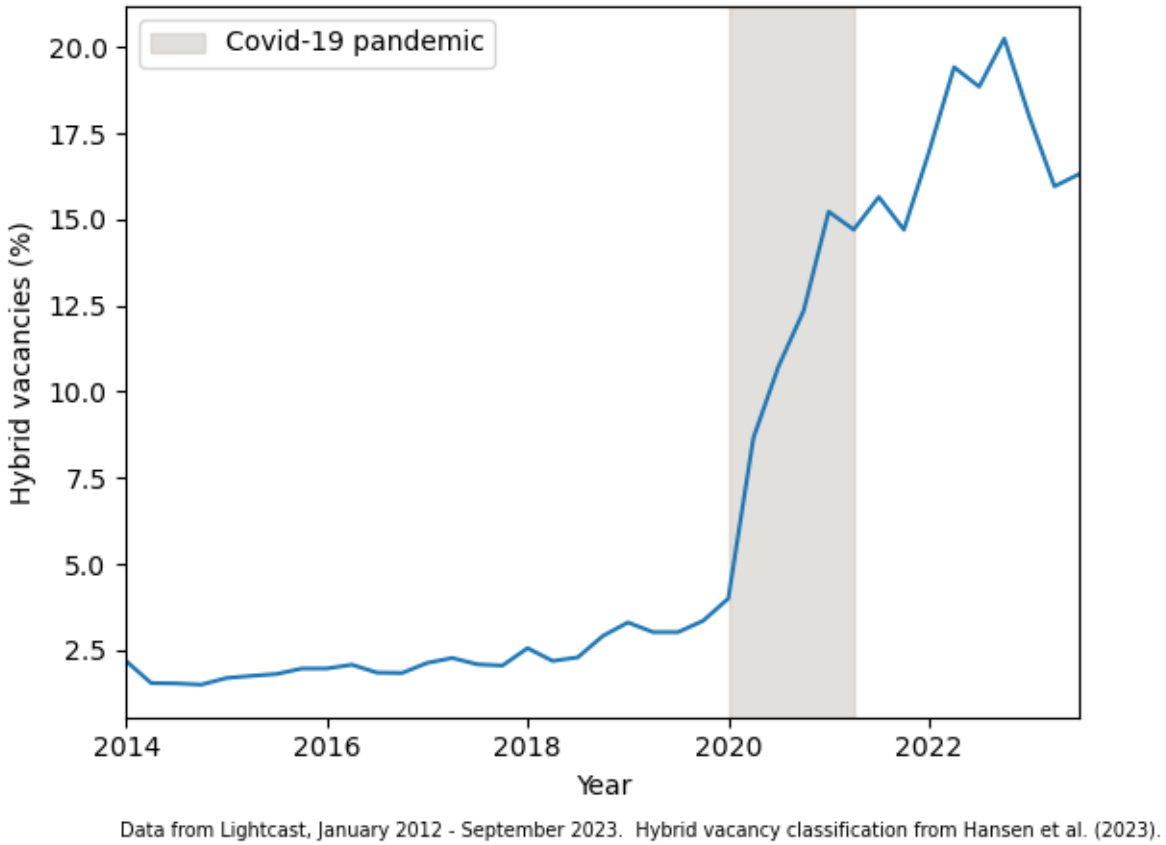
6.7 Finally, pay setting policies and labour unions can both affect the level and dispersion of pay for workers within a firm. While ample evidence of the role of these labour market institutions exists for the US, institutional details differ in the UK. This section provides new, UK-specific evidence.

Remote work is now common but not in all labour markets

6.8 By all measures, remote working has exploded since the pandemic: first by necessity, then because some workers and some employers saw value in it. Figure 25 shows the percentage of advertised online vacancies that explicitly offer remote or hybrid working since 2012. In 2020, the hybrid rate almost quadrupled from about four percent to fifteen percent. Since 2022, it has risen further to about 18 percent. Figure E.46 in the appendix, using a different classification of hybrid and fully remote jobs shows the same pattern for both categories.

Figure 25: Remote and hybrid working opportunities have exploded since the pandemic

Percentage of remote and hybrid vacancies using working-from-home classifications in Hansen et al. (2023), from Lightcast job vacancies data, UK, 2012-2023

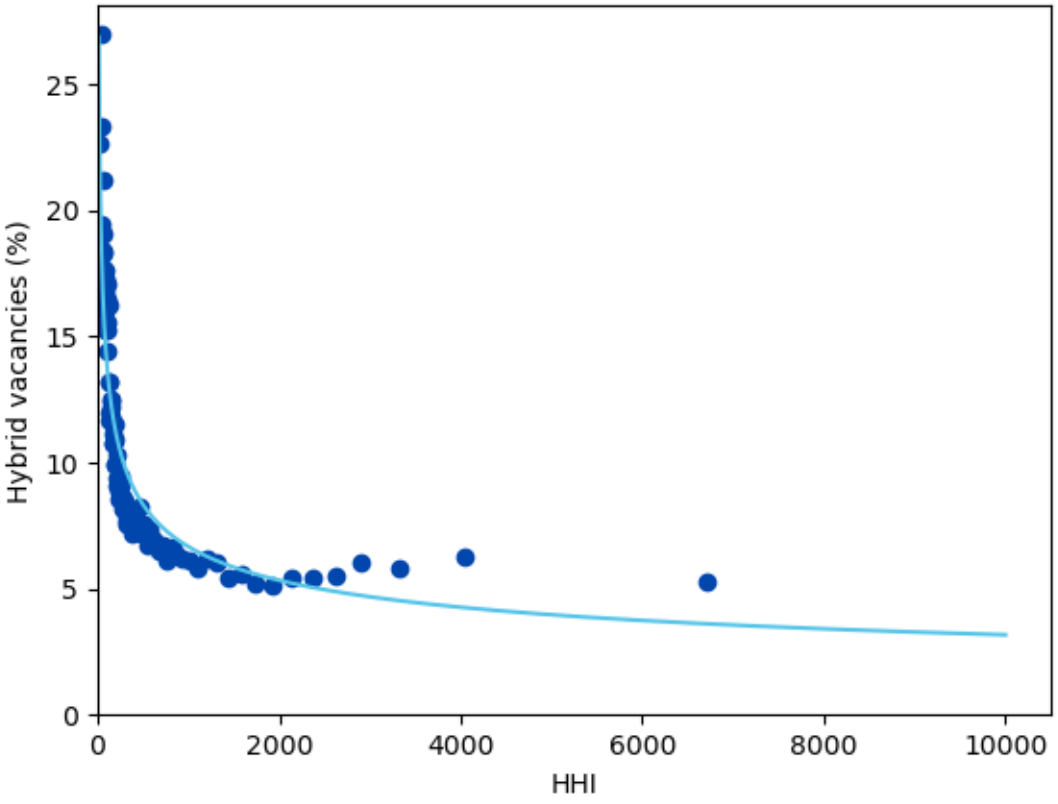


Data from Lightcast, January 2012 - September 2023. Hybrid vacancy classification from Hansen et al. (2023).

6.9 These new working pattern opportunities are not equally distributed across labour markets. As Figure 26 shows, in less concentrated job markets, the lower the concentration, the higher the percentage of remote vacancies. However, above an Herfindahl Hirschman Index (HHI) of about 1,000, the share of remote and hybrid jobs is unrelated to the level of labour market concentration. This result holds when controlling for occupation, labour market, time, and region characteristics, Table F.15 and Figures E.47-E.48 in the appendix show.

Figure 26: Remote and hybrid jobs are more frequent in less concentrated labour markets

Binned scatterplots of the remote job share, using the Hansen et al. (2023) classifications, against vacancy Herfindahl Hirschman Index (HHI) calculated at the three-digit Standard Occupational Classification by Travel to Work Area level, from Lightcast job vacancy data, UK, 2012-2023



HHI calculated at the Travel to Work Area x 3-digit Standard Occupational Classification level for each quarter. Labour markets have been sorted by HHI and averaged across percentiles. Line of best fit calculated using log-log regression. Data from Lightcast, January 2014-September 2023.

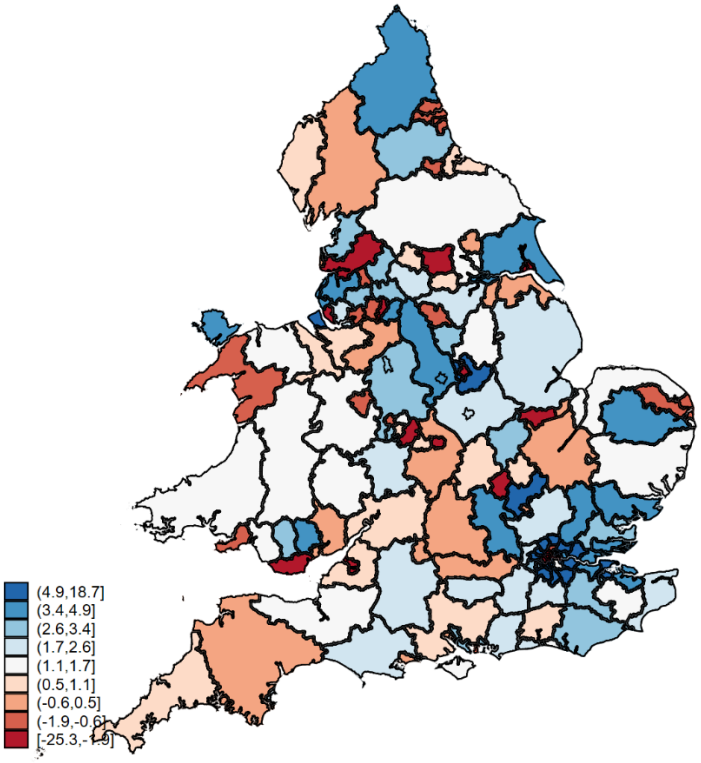
6.10 Figure 27 shows the impact of remote and hybrid working practices on the number of individuals working in each geographic area between 2019 and

2022, using data from the UK Survey of Working Arrangements and Attitudes. Residential areas have generally experienced an increase in the number of workers working in them, as some individuals who used to commute to a workplace outside the area they live in now spend some time working from home. Conversely, geographic areas with few residents but many workers (like city centres and commercial districts) have generally experienced decreases in the number of workers working in them, since the same workers now spend less time in the office.

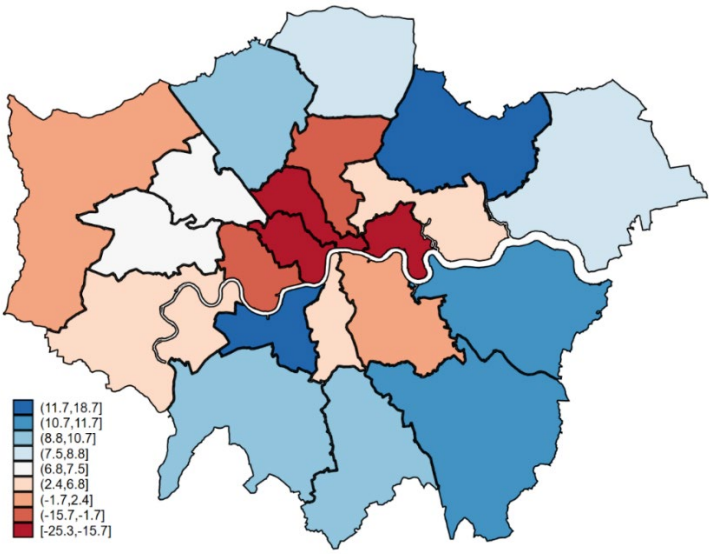
Figure 27: The changes in work location since the pandemic have been geographically uneven

Panel 1: The change in the number of individuals working in England and Wales between 2019 and 2022 due to remote working as a percentage of the number of workers based there in 2019, data from UK Survey of Working Arrangements and Attitudes and ONS Census

Panel 2: The change in the number of individuals working in Greater London between 2019 and 2022 due to remote working as a percentage of the number of workers based there in 2019, data from UK Survey of Working Arrangements and Attitudes and ONS Census



Each geographic area represents a NUTS 3 region
Source: UK Survey on Working Arrangements and Attitudes and ONS census
Methodology from: Remote Working and the New Geography of Local Service Spending (De Fraja et al., 2022)



Each geographic area represents a NUTS 3 region
Source: UK Survey on Working Arrangements and Attitudes and ONS census
Methodology from: Remote Working and the New Geography of Local Service Spending (De Fraja et al., 2022)

6.11 The same pattern can be seen on smaller geographical scales as well. Panel 2 of Figure 27 shows the large decrease in the number of individuals working, relative to the number of workers based there in 2019, in Camden and the City of London, Westminster and Tower Hamlets and the corresponding

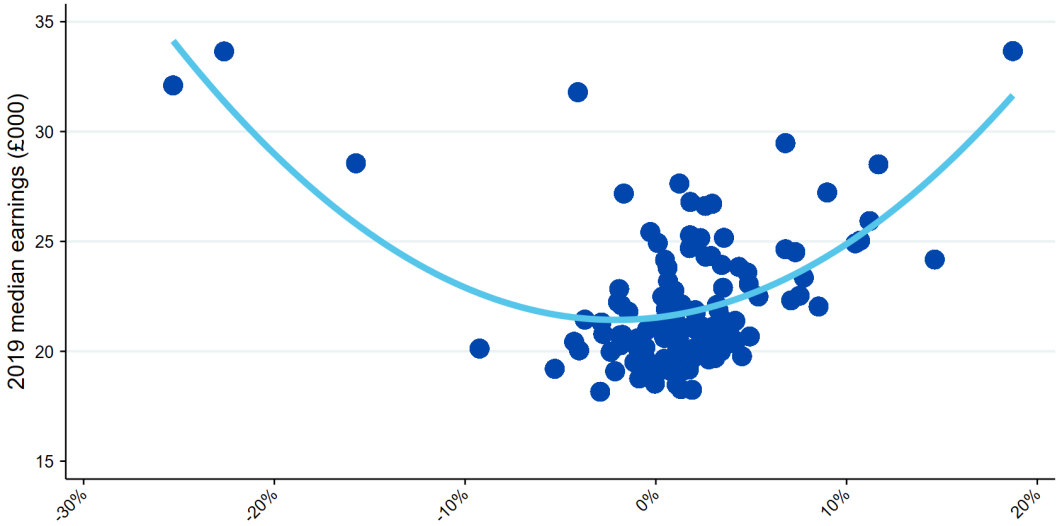
increase in primarily residential areas such as Redbridge and Waltham Forest and Wandsworth.

6.12 The impact of hybrid working on wages is potentially ambiguous, with many forces at play. First, hybrid working may either increase or decrease the productivity of workers. The latest evidence finds conflicting results (Angelici and Profeta, 2023, link; Atkins, Schoar and Shinde, 2023, link). Second, it may change the pool of workers who are applying for a given role (Emanuel and Harrington, 2023, link). Third, if workers value the flexibility of hybrid working, hybrid working arrangements might be offered to them as a perk instead of higher wages even where it does not increase productivity. Some studies show it can improve job satisfaction and happiness and reduce quit rates (Bloom, Han and Liang, 2022, link).

6.13 Finally, not all occupations and regions are equally affected by the increase in opportunities for remote and hybrid working. Figure 28 shows that geographic areas with high pre-pandemic earnings have seen the largest relative swings in remote working, both positive and negative. This relationship follows a U-shape: areas with low pre-pandemic earnings therefore see the smallest changes in either direction.

Figure 28: Areas with high pre-pandemic earnings saw the largest relative movements in and out of them due to the rise of remote working

Scatterplot of 2019 median earnings against the change in the number of individuals working in a geographic area from 2019 to 2022 due to remote working as a percentage of the number of workers based there in 2019, data from UK Survey of Working arrangements and Attitudes, ONS Census and ONS earnings from PAYE RTI



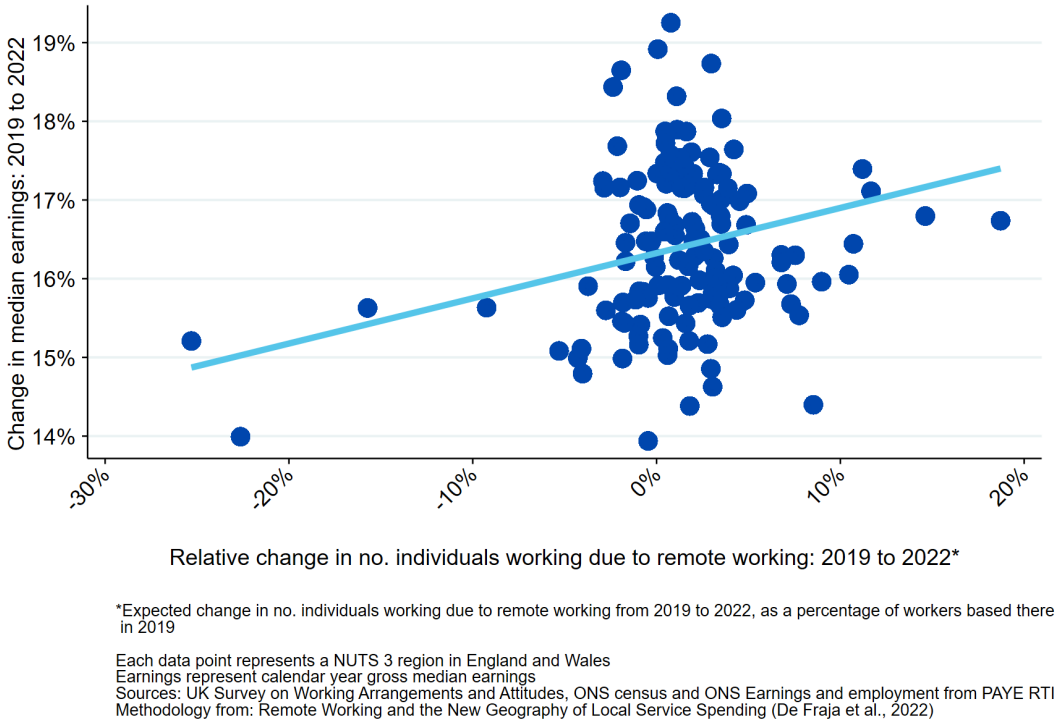
*Expected change in no. individuals working due to remote working from 2019 to 2022, as a percentage of workers based there in 2019

Each data point represents a NUTS 3 region in England and Wales
Earnings represent calendar year gross median earnings
Source: UK Survey on Working Arrangements and Attitudes, ONS census and ONS Earnings and employment from PAYE RTI
Methodology from: Remote Working and the New Geography of Local Service Spending (De Fraja et al., 2022)

6.14 We can also examine the opposite direction: what happens to wage growth in an area when remote or hybrid working becomes available? Figure 29 shows that the change in remote working has been correlated with increases in median earnings since 2019. Areas with more remote working opportunities have seen larger increases in median salaries. In both graphs, the lines of best fit are weighted by total employment in each area to ensure the average is representative of the average worker.

Figure 29: Wage changes increase where remote working increases job opportunities

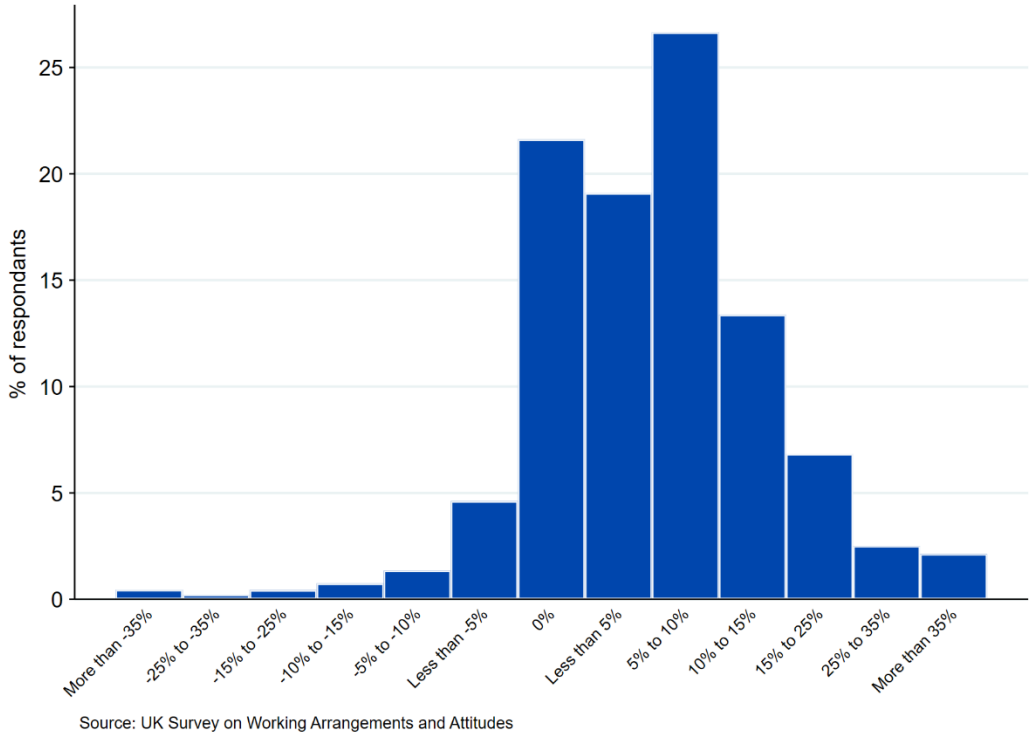
Scatterplot of the change in median earnings from 2019 and 2022 against the relative change in the number of individuals working in a geographic area in England and Wales from 2019 to 2022 attributable to remote working, data from UK Survey of Working Arrangements and Attitudes, ONS Census and ONS earnings from PAYE RTI



6.15 Evidence from around the world indicates that workers do value the option to work from home in and of itself (Aksoy, Barrero, Bloom, Davies, Dolls and Zarate, 2022, link). Figure 30 shows that UK workers too generally view the option to work from home positively. About 70% of surveyed workers value the option to work remotely two to three days a week as equivalent to a modest increase in pay if working full-time from the office. Eight percent of workers see it as equivalent to a reduction in pay, and 22% are indifferent.

Figure 30: Most workers view the option to work from home as a benefit or equivalent to extra pay

Histogram of respondents' willingness-to-pay for the option to work from home 2-3 days a week as a percentage of current pay, from the UK Survey of Working Arrangements and Attitudes, 2022-2023



6.16 Hybrid and remote working practices exploded during the pandemic and have remained at similarly high levels since. These new remote working opportunities are distributed unequally across space, but beyond low levels of HHI are not significantly related to labour market concentration. Since the pandemic, remote job opportunities have changed the geography of work, particularly in high earnings areas and have been accompanied by larger earnings growth. While this report does not provide new estimates of the productivity impact of remote working, it finds that most workers value hybrid working at somewhere between zero and ten percent of their salary.

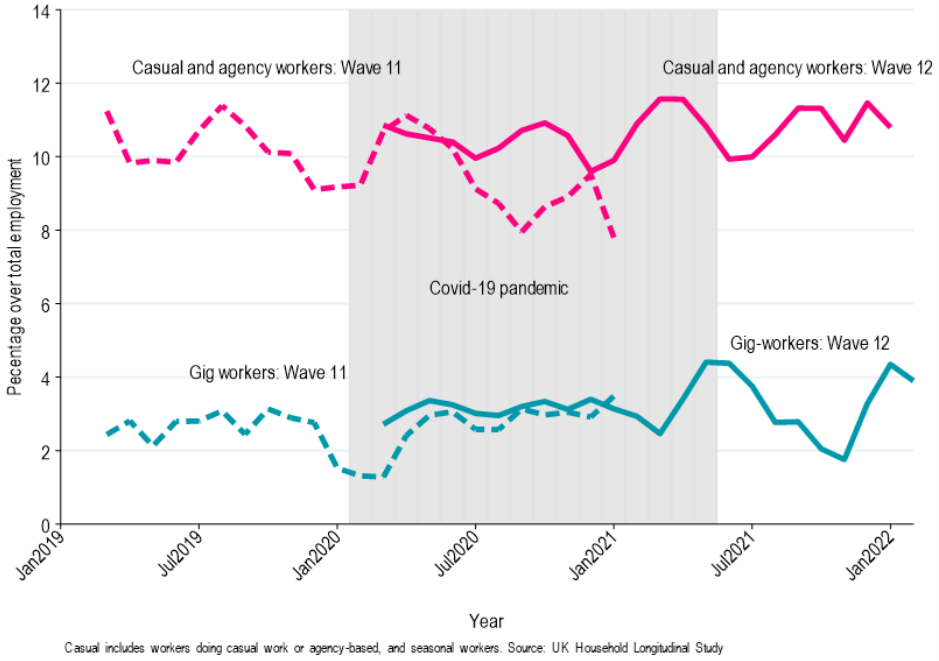
Gig workers often work multiple jobs and long hours

6.17 The ‘gig’ economy is often described as a substantial and growing part of the UK economy even if no official estimates or agreed definition of what constitutes gig work exist. In this report, we define gig workers as anyone who sells their labour services via digital platforms. This is a narrow definition that does not include other types of casual or temporary work. We show that for this definition of the gig economy, gig work is a small but growing part of the UK economy. Gig workers often work long hours and multiple jobs. Gig workers experience more income mobility than traditional workers but often earn comparable incomes overall.

6.18 Figure 31 shows that up to five percent of total employment is accounted for by gig workers, as defined in this report. Wider definitions of casual work put this figure closer to 10-12% of workers.

Figure 31: A rising percentage of UK workers work in the gig economy (up to 5% since the pandemic)

Gig workers and casual workers as a share of total employment, from the UK Household Longitudinal Study, UK, 2019-2022



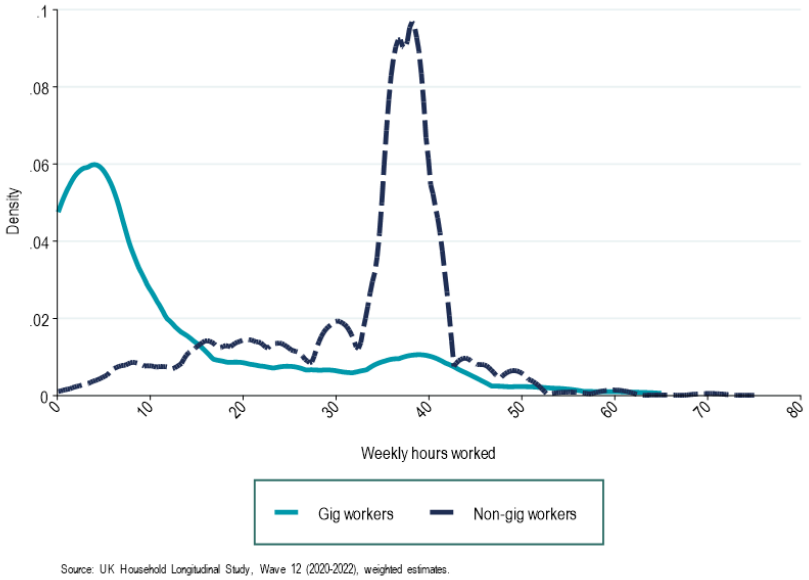
6.19 Gig workers often work across multiple jobs, within and outside the gig economy, and tend to combine gig earnings with other sources of income. The fraction of gig workers who work multiple jobs has been increasing over time. Figure 32 shows the average weekly hours worked by gig workers in the gig economy, compared to the overall population.

6.20 In addition, the figure shows total hours worked by gig workers in all types of jobs, compared again to the overall population. While most workers work just short of 40 hours a week, gig economy workers on average work less than ten hours in the gig economy. However, this fails to recognise that gig workers often have multiple jobs in parallel. In the second panel, we see that overall gig workers work weekly hours much closer to, and in some cases significantly above, the rest of the economy.

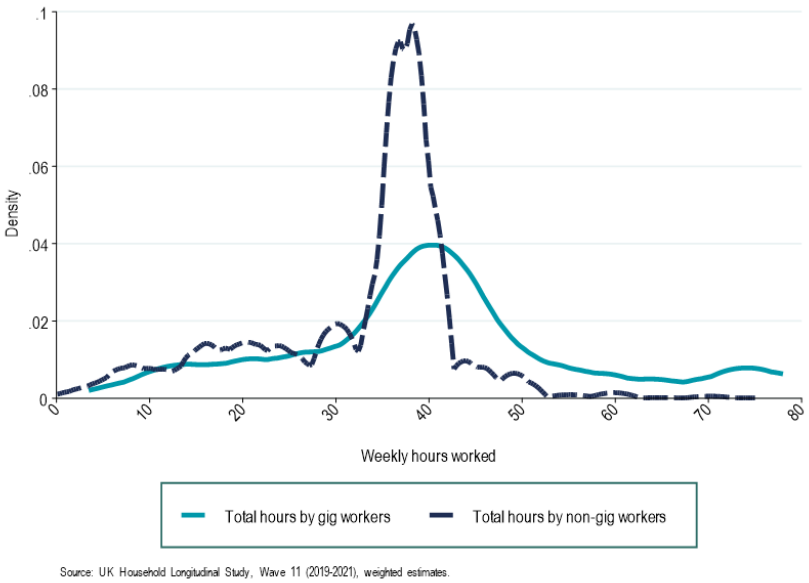
Figure 32: UK gig workers work fewer hours in the gig economy than traditional workers, but have multiple jobs

Panel above: Distribution of weekly hours worked by gig workers in the gig economy and non-gig workers, from the UK Household Longitudinal Study, UK, 2020-2022

Panel below: Distribution of weekly hours worked in total for gig workers and non-gig workers, from the UK Household Longitudinal Study, UK, 2020-2022



Source: UK Household Longitudinal Study, Wave 12 (2020-2022), weighted estimates.



Source: UK Household Longitudinal Study, Wave 11 (2019-2021), weighted estimates.

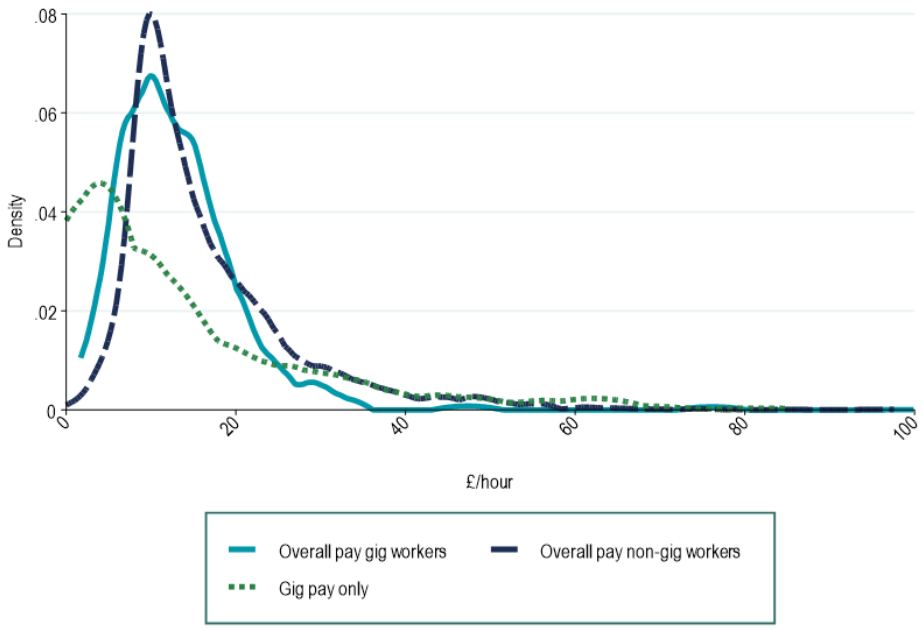
6.21 Figure 33 shows that average hourly earnings of gig workers are broadly comparable to the rest of the economy, although there is a much larger number of gig workers with earnings below the average £11 per hour. The figure also highlights the importance of considering both gig and non-gig

incomes of gig workers. Figures E.49 & E.50 in the appendix show weekly income figures for gig workers and traditional workers. They corroborate that a substantial share of gig workers earn below £200 a week in gig work but complement this with other sources of income.

6.22 Of course, non-wage benefits may differ between gig workers and workers in the traditional economy. Moreover, there is significant variation in the earnings of gig workers. While overall labour income in the gig economy is somewhat lower, there are also small pockets of gig-workers with highly paid jobs. These are generally found in non-manual tasks (for instance, web and software development, writing and translation, accounting, legal and administrative services, marketing and media, audio and visual services).

Figure 33: Hourly gig earnings are often low, but the overall hourly pay of gig workers is comparable to that of traditional workers on average

Distribution of hourly pay for gig workers in the gig economy and overall and for non-gig workers, from the UK Household Longitudinal Study, UK, 2020-2022



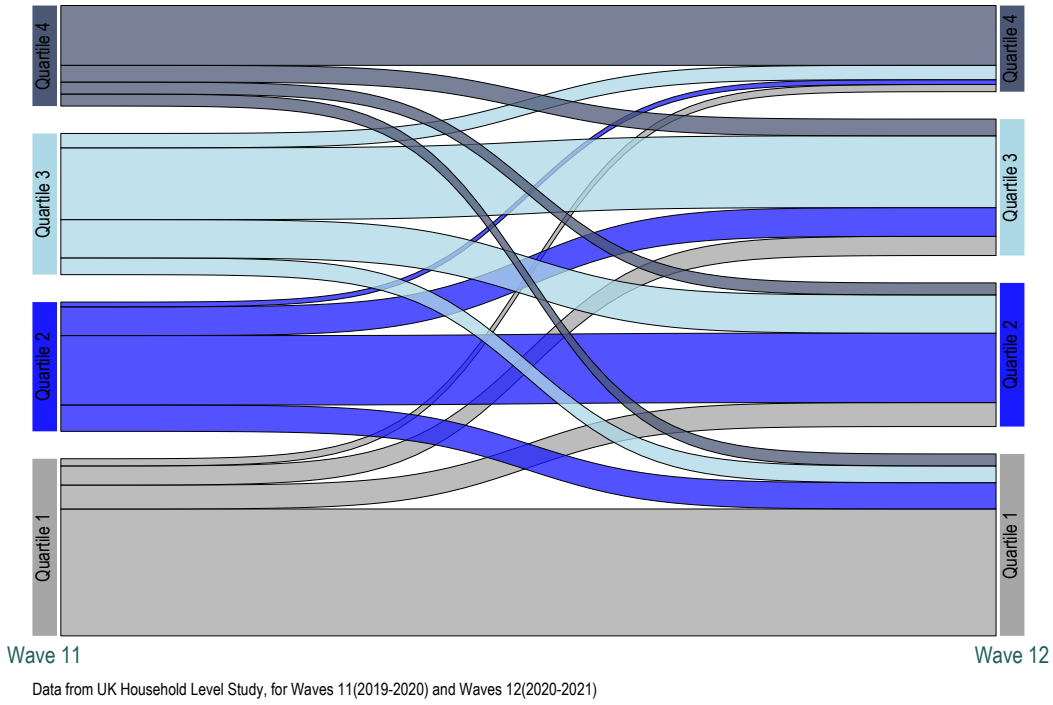
Source: UK Household Longitudinal Study, Wave 12 (2020-2022), weighted estimates.

6.23 Much of the concern around the gig economy relates to how it affects workers' economic mobility. On the one hand, workers might resort to gig work to bridge periods of under- or unemployment and thereby stabilise their income. On the other, gig work can potentially absorb workers and prevent them from developing the skills that enable them to pursue a more financially rewarding career in the long term.

6.24 Figure 34 plots the flows across the quartiles of the overall income distribution for workers newly engaged in the gig economy. These flows are larger than for traditional workers and indicate substantial economic mobility, especially in the middle of the distribution. For instance, a worker who finds herself in the second quartile of the overall income distribution is more likely to grow her earnings and move up to the third quartile in the gig economy than the traditional economy. However, she is also more likely to lose earnings and slip into the lowest quartile instead.

Figure 34: Workers in the gig economy are mobile across the income distribution

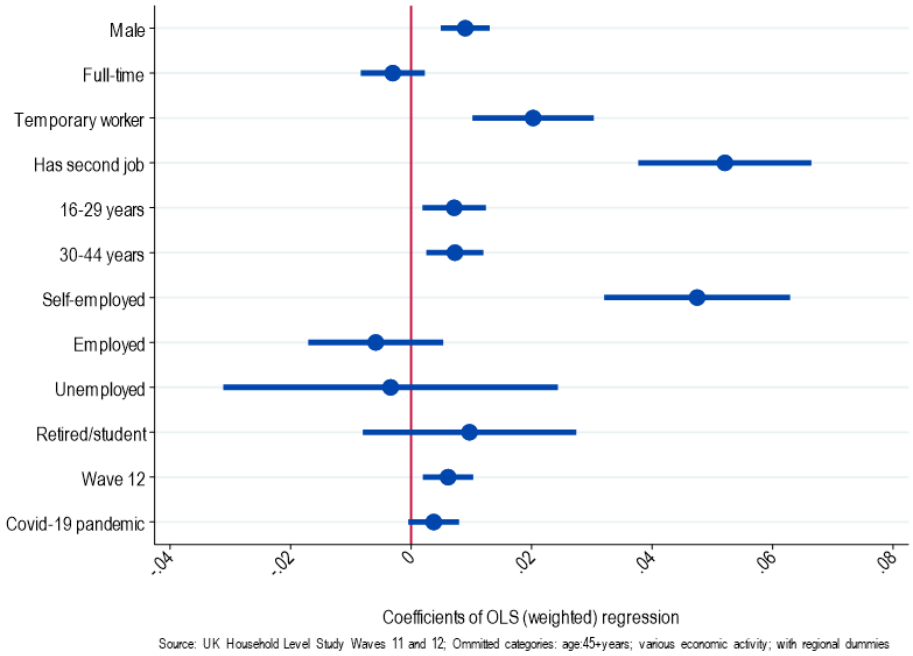
Sankey diagram of income quartile to income quartile flows for gig workers, from the UK Household Longitudinal Study, UK, 2020-2022



6.25 Figure 35 shows the characteristics of gig workers. Gig work is becoming more common over time (shown by the fact that the “Wave 12” coefficient on gig economy participation is positive and significant) and has also risen after the Covid-19 pandemic. Gig workers tend to be significantly younger, more likely to be male, but not more likely to be students or retired than the general population. They tend to be self-employed, temporary or short-term workers and often have more than one job.

Figure 35: UK gig workers are younger and often work multiple jobs

Regression coefficients from an OLS regression of gig worker status on worker characteristics, from the UK Household Longitudinal Study, UK, 2020-2022



6.26 This section provides some early evidence on the UK gig economy. While small compared to wider casual work, the gig economy is a growing part of the economy, particularly for young men since the Covid-19 pandemic. While gig workers earn comparable incomes to traditional workers, this parity often comes at the cost of working multiple jobs and long hours.

Restrictive covenants are common across the UK economy

6.27 The ability to move to other employers gives workers a degree of countervailing labour market power. Restrictive covenants are employment contract clauses that limit what employees can do while at their current employer, or after leaving their employment. As a result, these contract clauses may restrict worker mobility.

6.28 Examples of restrictive covenants are non-compete agreements (which limit which firms an employee can join, or whether they can start a competing firm of their own), confidentiality agreements (which limit what information an employee can share with others, also known as non-disclosure agreements) and non-solicitation agreements (which limit whether employees can approach co-workers or clients after leaving their current employer).

6.29 Firms might use restrictive covenants for benign reasons. A firm might be more likely to invest in training for its employees (especially for skills that are useful at other firms too) if employees could not then take these skills immediately to a competitor. Equally, firms might be more willing to share confidential client relationships with employees if those employees were prevented from poaching these clients in the future. Both investment in general human capital and client relationships may make employees more productive and therefore increase their earnings.

6.30 There are no standard data sources that provide information on restrictive covenants in the UK. In this section, we present evidence from several new worker and firm survey sources, often for the first time. On the employee side, we report statistics from a YouGov survey commissioned by the LSE and CMA in 2022 as well as a survey commissioned by the Department for Business and Trade (DBT) in 2022. On the employer side, we report statistics from a module placed on the ONS Business Insights and Conditions Survey (BICS) in 2023 and two surveys commissioned by DBT in 2021.

6.31 Given the sensitivity and the complexity of the subject matter, different surveys will give somewhat different results. Surveys vary based on the type of respondents selected and the wording of the questions.

6.32 It should be noted that methods used when analysing the DBT non-compete surveys in this report differ to those used in the DBT Impact Assessment of restricting the use of non-compete clauses (link), resulting in slightly different results. Namely, this report does not drop “Don’t know” responses for both the YouGov employer (2021) and YouGov employee (2022) surveys and re-weighs the IFF employer survey (2021) by firm size. All graphs produced using data from the DBT YouGov surveys have been reproduced in the appendix, dropping “Don’t know” responses for consistency with the DBT Impact Assessment (see Figure E.73).

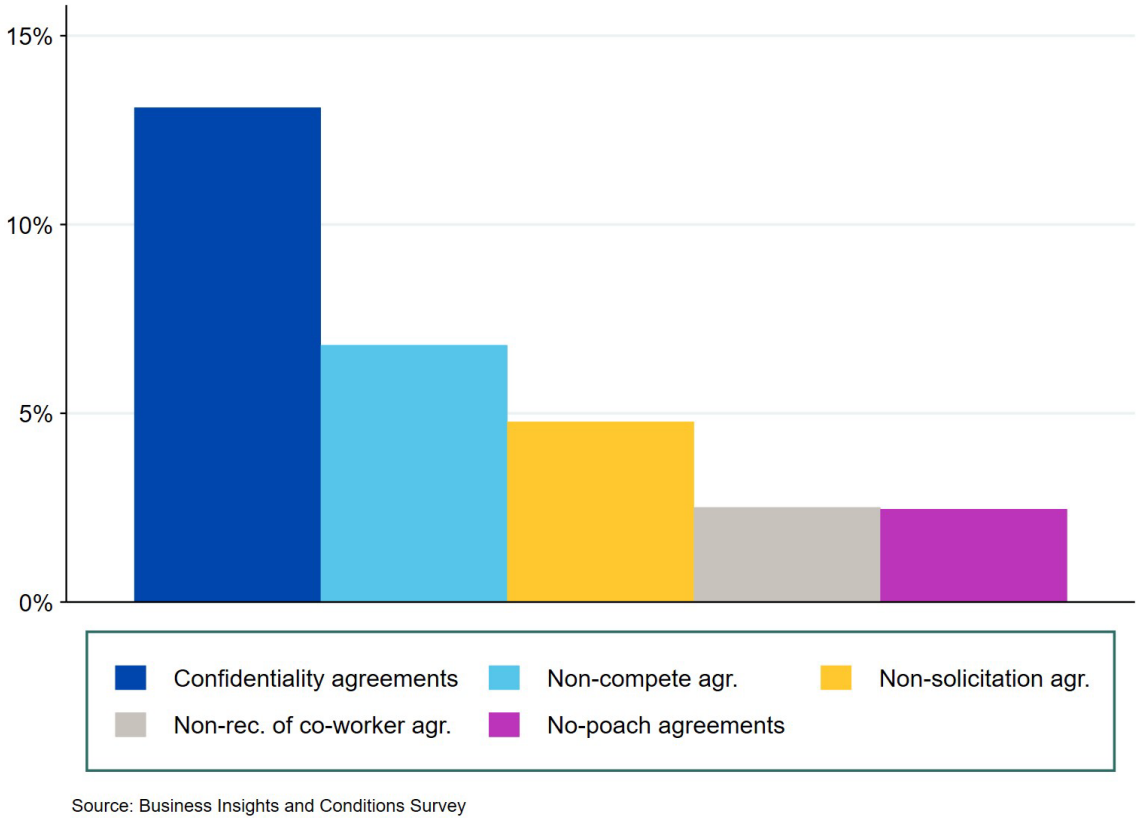
6.33 Overall, restrictive covenants are common for UK firms of all sizes and prevalent in all industries. Figure 36 shows that just over 13% of firms in the UK report using confidentiality agreements in some employee contracts, roughly 7% report using non-compete clauses, five percent report using non-solicitation agreements and between two and three percent use non-recruitment of co-worker and no-poaching agreements.

6.34 Across industries, the proportion of firms that use confidentiality agreements range between roughly six percent (in Transportation and storage activities) and 23% (in Information and communication activities). Figures E.54, E.55 and E.58 in the appendix show that these results are broadly similar across firm size bands and industries, and that just over 15% of firms use any

restrictive covenants, while seven percent of firms use multiple restrictive covenants.

Figure 36: Employment clauses limiting the mobility of workers are common in the UK

Proportion of firms that report using restrictive covenants, from the Business Insights and Conditions Survey, UK, 2023



Source: Business Insights and Conditions Survey

6.35 The 2021 DBT employer surveys reported that respectively 16% (IFF survey) and 47% (YouGov survey) of firms use non-compete agreements in employee contracts, which is significantly higher than the BICS figure (see figure E.72, appendix). These differences reflect differences in question wording, response options, timing and sampling design. For instance, 12% of BICS respondents stated that they were “not sure” if they used any of the five listed types of restrictive covenants in employee contracts. This response was particularly prevalent amongst larger firms, with 40% of respondents with 250+ employees responding “not sure”. Table F.18 in the appendix shows this breakdown by firm size, turnover, region and industry. This pattern is common

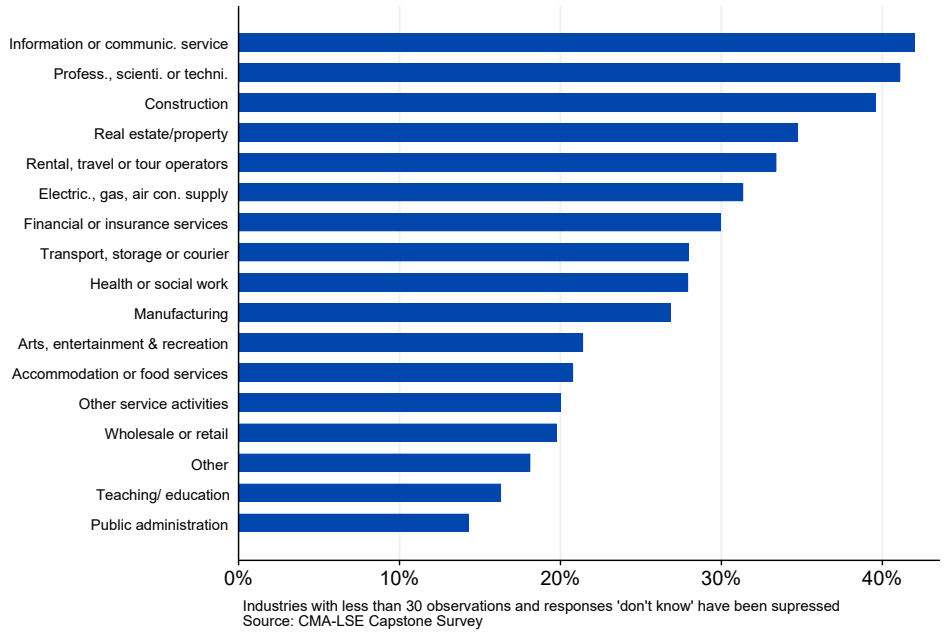
when new, one off, questions are added to the BICS survey and is not unique to restrictive covenants.

6.36 For non-compete agreements (but not for other types of restrictive covenants), we have additional evidence from the employee side. Employee responses provide a broadly similar picture. Roughly 26% of employees believe they have a non-compete clause in their employment contract, with a further 23% unsure (see Figure E.65, appendix). The 2022 DBT employee survey in comparison found that over 15% of employees believe they have a non-compete in place with their employer (see Figure E.70, appendix).

6.37 Figure 37 shows that non-compete agreements are particularly common in information and communication technologies and professional and scientific services where they cover 40% of workers. Even in retail, food services and education however about 20% of workers have a non-compete clause in their contract. Studies for the US (Starr, Bishara and Prescott, 2015, link) and Western Europe (Boeri, Garnero and Luisetto, 2023, link) find similar rates of prevalence.

Figure 37: Non-compete agreements are particularly common in Information and communication technology and professional services industries

Proportion of workers with a non-compete agreement by one-digit Standard Industrial Classification industry, from the 2023 YouGov CMA-LSE Capstone Survey, UK



6.38 Non-compete agreements are associated with slightly more opportunities for formal on-the-job training but not other types of training, as shown by Figure

38. Additional regression results in Table F.16 in the appendix confirm that these results hold even where we compare workers who are similar in terms of income, experience and other relevant characteristics.

6.39 When we link data on non-competes at the firm level to data on general training, we find firms using non-competes are more likely to provide workers five or more annual training days on average compared to firms not using non-competes. Regression analysis shows this relationship holds even when controlling for various firm level characteristics, such as size and industry. These figures are also included in the appendix (see Figures E.60 and E.61).

Figure 38: Workers with non-competes receive more formal training

Percentage of respondents that received formal and other training, for respondents with and without non-compete agreements, from the 2023 YouGov CMA-LSE Capstone Survey, UK

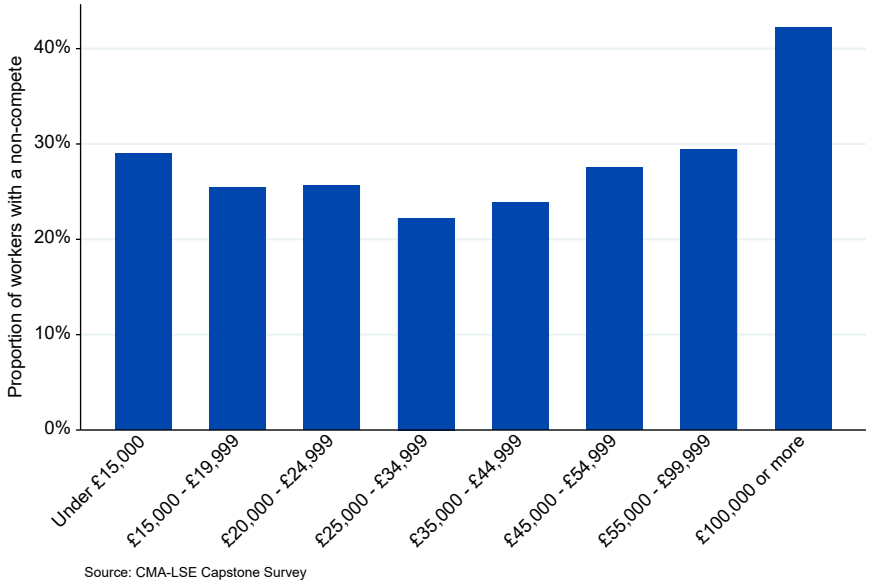
Formal training= training towards a professional qualification
Other training= training unrelated to role

Source: CMA-LSE Capstone Survey

6.40 Figure 39 shows that non-competes are slightly more common in higher-paid jobs. However, even in lower-paid jobs 20-30% of workers believe they are covered by non-competes. The relatively similar levels of training and the widespread prevalence across industries and across income levels suggest that not all non-competes in the UK necessarily protect substantial training or client relationship investments.

Figure 39: Even at low income levels, more than 20% of workers have non-compete clauses

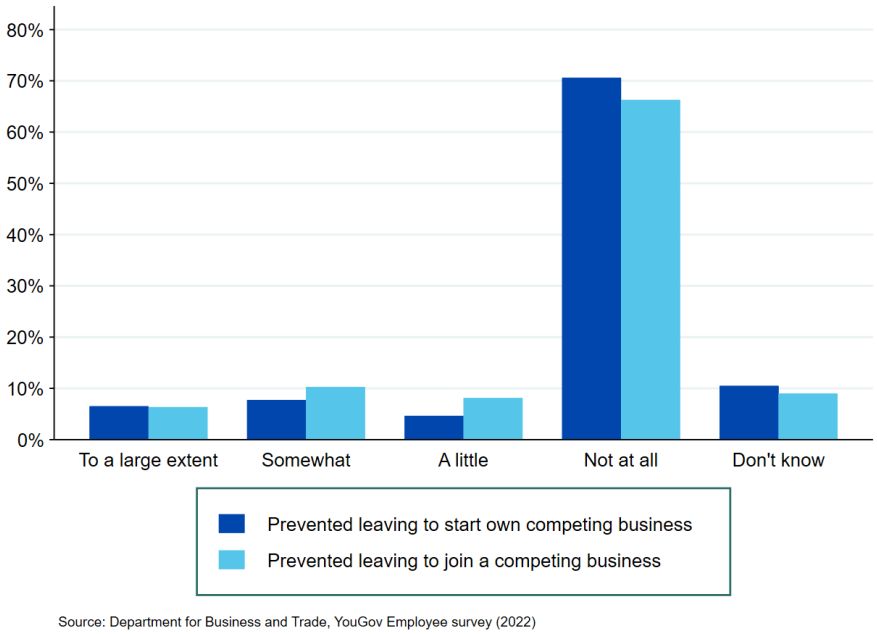
Percentage of workers with a non-compete agreement by income level, from the 2023 YouGov CMA-LSE Capstone Survey, UK



6.41 Figure 40 examines to what extent workers with non-competes see their mobility as restricted. Approximately 24% of employees with a non-compete agreement reported that they were to some extent prevented from leaving their current employer to join a competitor, whereas 19% reported they were prevented from leaving to start a competing business.

Figure 40: A quarter of respondents say their non-compete has to some extent prevented them from leaving to join a competitor

Percentage of respondents with a non-compete agreement reporting it prevented them from leaving their current job, from a 2022 DBT YouGov employee survey, UK



Source: Department for Business and Trade, YouGov Employee survey (2022)

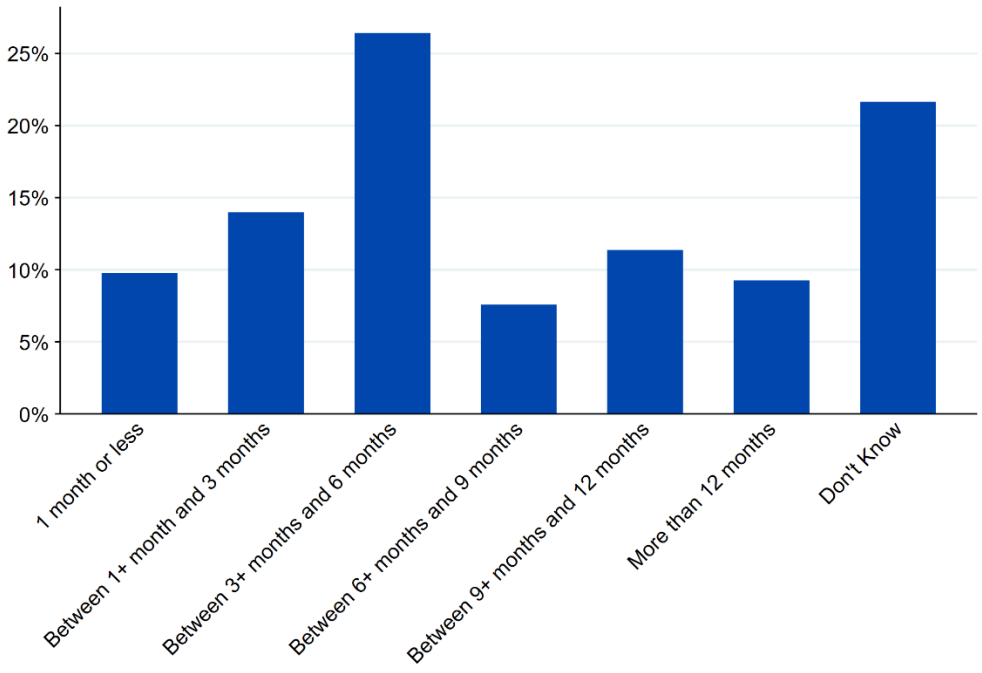
6.42 When we compare broad industry job-to-job transition rates (the rate at which workers move between employers) and the proportion of firms using non-competes, we similarly find a negative correlation. However, this seems to be driven entirely by accommodation and food services, which has both high job-to-job rates and low non-compete coverage (see Figure E.62, appendix). Data constraints limit this analysis to thirteen industry sectors.

6.43 Finally, Figure 41 presents evidence on the length of typical non-compete clauses in the UK. According to surveyed workers, about 26% of non-competes last between three and six months. 28% of non-competes last longer than six months. Similarly, responses from employers that use non-competes in the contracts of their employees indicate that the most common average duration of an employee's non-compete clause is six months, in about 43% of cases. Year-long non-compete clauses are also common, for about 33% of employers who use non-competes.

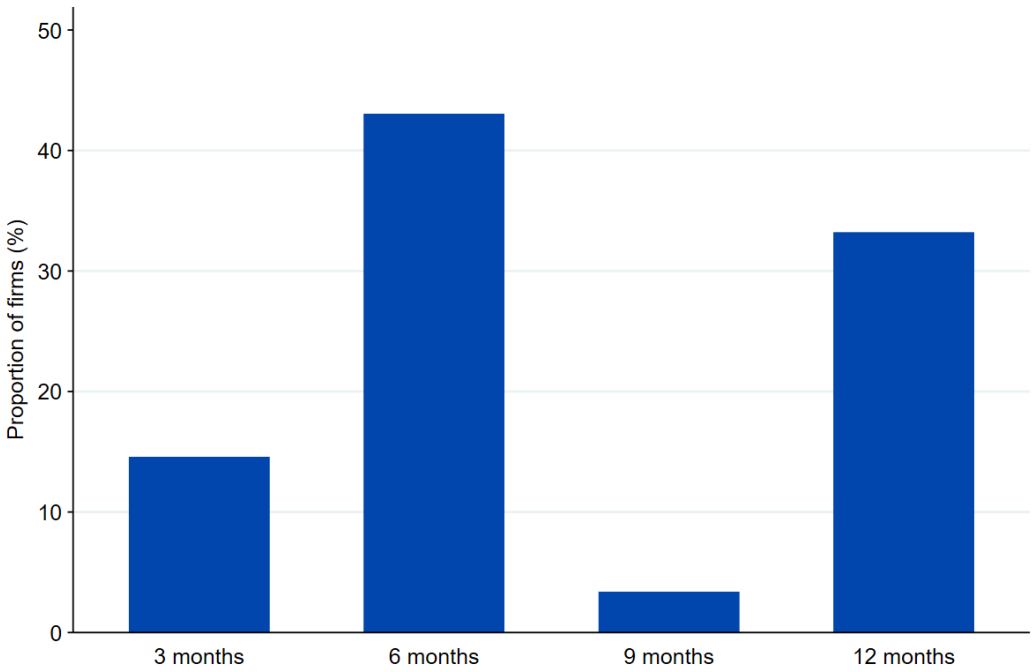
Figure 41: Most non-competes last around six months

Panel 1: Length of non-compete period after leaving employer, from a 2022 DBT YouGov employee survey, UK

Panel 2: Length of non-compete period after leaving employer, from a 2021 DBT IFF research employee survey, UK



Department for Business and Trade, YouGov Employee survey (2022)



Department for Business and Trade, IFF Research Employee Survey (2021), with CMA analysis

6.44 Overall, employment contract clauses that restrict worker mobility are common in the UK, as they are abroad. Non-compete agreements, a direct form of mobility restriction, are common across income brackets, industries and regions. A significant share of workers with non-compete clauses believe

they have been prevented from joining or starting as a competitor as a result. There is also evidence that non-competes are associated with slightly higher levels of formal training.

Pay-setting policies and collective bargaining affect wage levels

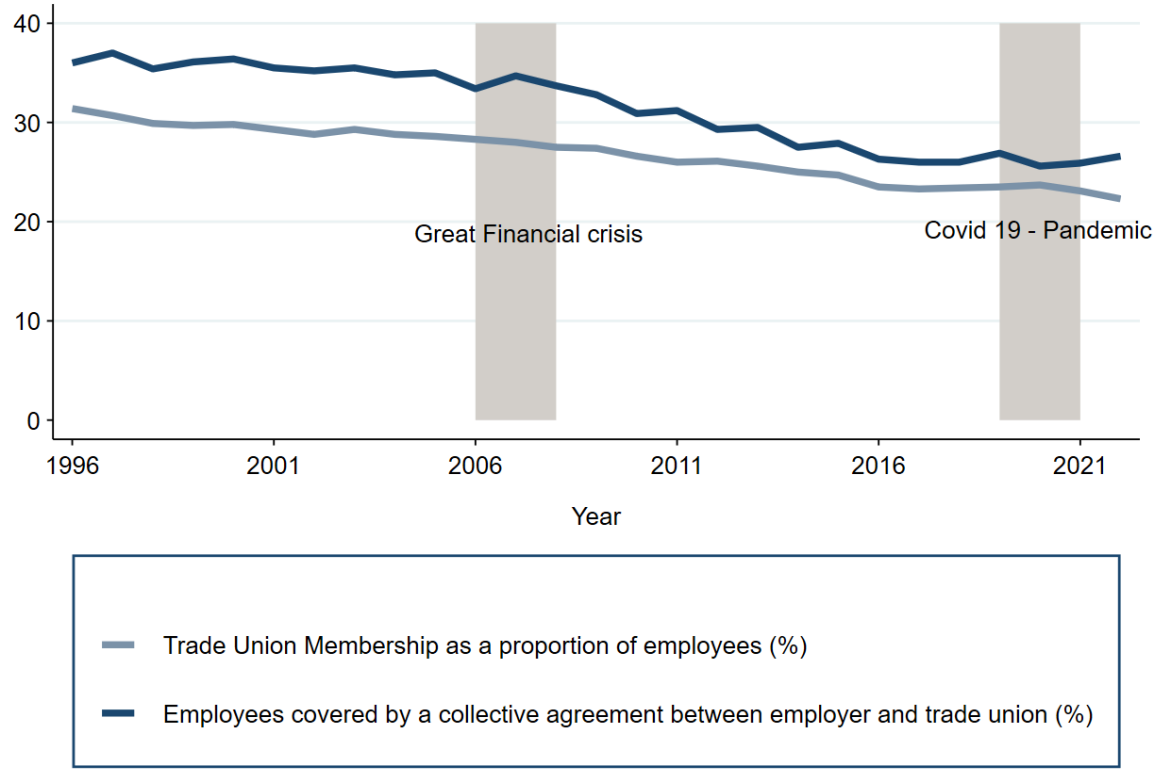
6.45 Labour market power arises from the combination of structural labour market forces (the technologies firms are using, the structure of the market and the mobility of workers across occupations and space) and the specific labour market institutions that govern how firms and workers interact with each other. These institutions include labour market policies such as the minimum wage and unemployment benefits, but also unions and the wider accepted norms and rules around pay setting. They influence the outside options for firms and workers, and the process by which the two sides bargain over the surplus created together.

6.46 This section explores the role of pay setting policies in the UK across firms and over time. Workers may be part of a union even where the union does not bargain collectively on their behalf. Likewise, a worker may be covered by a collective bargaining agreement without being a member of a union.

6.47 Countries vary widely in their unionisation rates and collective bargaining coverage. The decline of unionisation in the US has been widely documented and linked to lower pay and widening inequality for affected workers (Farber, Herbst, Kuziemko and Naidu, 2021, link). Figure 42 shows collective bargaining coverage over time for the UK. Just over 20% of employees are members of a trade union, down from 30% at the turn of the millennium. Just under 30% of employees are covered by a collective bargaining agreement, down from around 35% in 2000.

Figure 42: Collective bargaining coverage has declined somewhat in the UK

Trade union membership and collective bargaining coverage as a percentage of employees, from ONS data, UK, 1995-2023



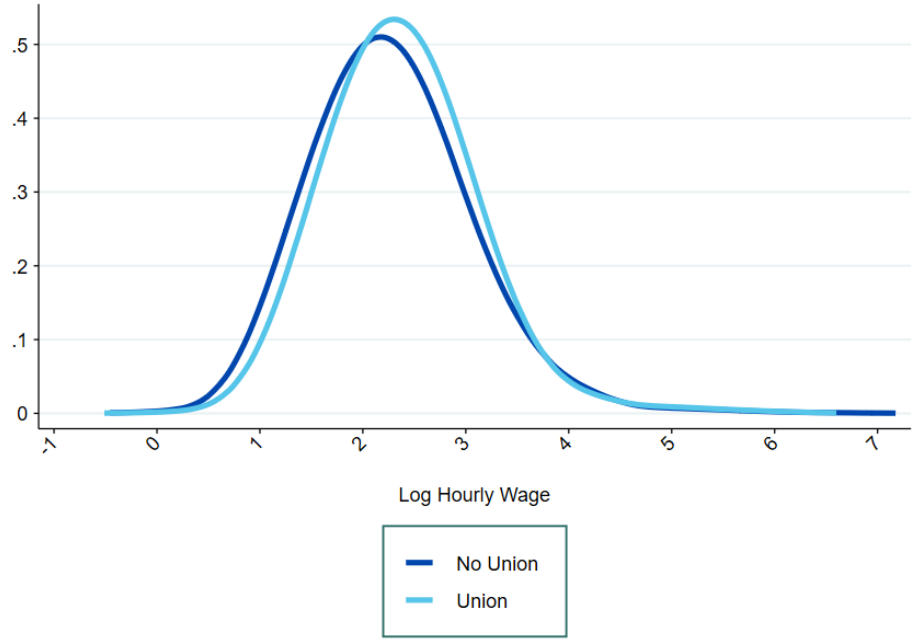
Source : Labour Force Survey

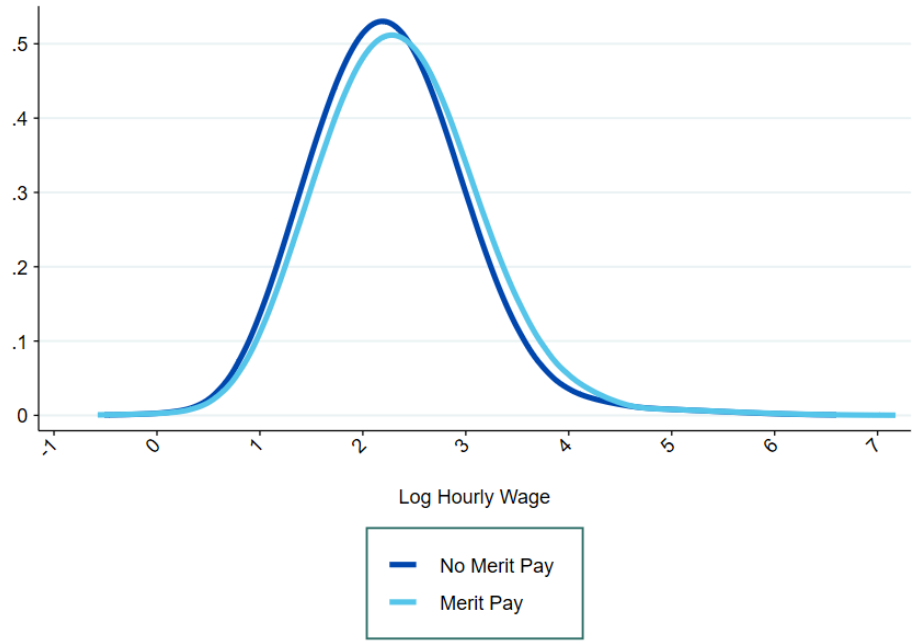
6.48 Likewise, standardised pay setting has become less common in recent decades, often phased out in favour of performance or merit pay. Merit pay allows firms to reward performance, potentially enhancing productivity, but also makes workers more vulnerable to pay cuts when labour market conditions worsen. Research for the US documents that the move from standardised to merit pay has led to lower pay at the lower end of the pay distribution within establishments (Massenkoff and Wilmers, 2023, link). The UK lacks a comparable time series, but Figure 43 provides a snapshot using data from 2004 and 2011 from the UK Workplace Employment Relations Study (WERS)

Figure 43: Pay is higher in firms with union coverage, and firms with merit pay policies

Panel 1: The distribution of wages by employee union status, from the Workplace Employment Relations Study, GB, 2004-2011

Panel 2: The distribution of wages by pay setting policy status, from the Workplace Employment Relations Study, GB, 2004-2011





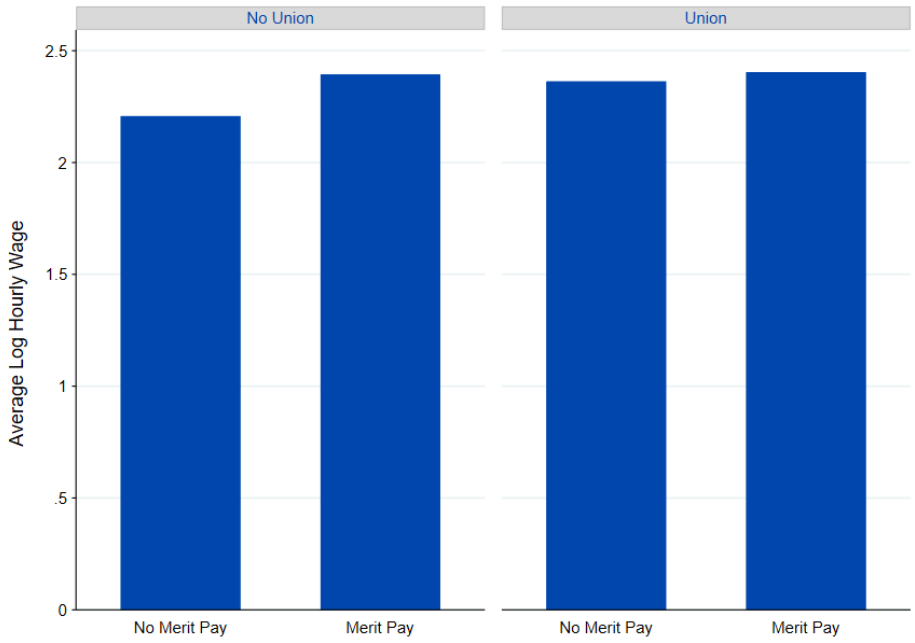
6.49 In the UK, wages are higher for workers at organisations that use merit pay and for those belonging to unions. This is true along the whole wage distribution. Firms with merit pay policies pay more on average but also exhibit greater wage inequality. This is particularly the case in non-unionised establishments.

6.50 Merit pay is associated with higher average wages, but this is not the case for unionised workers. Figure 44 plots the average hourly wage, splitting out whether a firm has merit pay, and for unionised and non-unionised workers. Wages are higher when merit pay is offered (left panel), but the gap is much smaller when employees are unionised (right panel).

6.51 Regression results in Table F.5 in the appendix confirm these results. Wages are increasing in firm size and the number of workers in the same occupation at the same firm. Wages are higher under merit pay, and when workers belong to unions. The relationship between higher wages and performance pay is almost completely offset in the presence of unions, even when we control for occupation, industry, region, and employee characteristics.

Figure 44: Merit and standardised pay setting gives the same average wage in unionised firms

The average logarithm of hourly wages, by union status and pay setting policy, from the Workplace Employment Relations Study, GB,2004-2011



6.52 Firms and workers do not bargain over employment and wages in a vacuum. Changes in technology, and changes in labour market institutions, will affect the degree of employer market power in an economy. This section provides some first evidence on the impact of two technology-driven labour market changes and two changes to labour market institutions.

6.53 Hybrid and remote working can provide additional opportunities for some workers. These opportunities are not distributed equally across space but do not seem to be correlated with existing labour market concentration, except at very low levels. Workers on average value hybrid working but the impact on wages is potentially more ambiguous. The gig economy likewise can provide flexibility to workers in transition or unable to find suitable full-time employment but concerns about wages remain. This report shows that gig workers often combine income from multiple sources but that there is also considerable movement across the income distribution for gig workers.

6.54 Non-compete agreements have recently been in the sights of competition agencies and governments worldwide. This report shows that they are also common in the UK, alongside similar if indirect clauses like non-disclosure agreements. Non-compete clauses are common even for firms and workers where productivity-enhancing explanations appear unlikely. Workers report that these clauses often deter them from seeking alternative career opportunities. Finally, performance pay policies and unionisation are both positively correlated with wage levels. Performance pay also increases wage inequality within the firm but this is counteracted by the presence of collective bargaining.

7. Employer market power globally and open questions

7.1 Other recent research for the UK is consistent with the findings in this report. Manning and Petrolongo (2022, link) measure employment concentration in the UK between 2000 and 2019 and find evidence of a steady decline in the Herfindahl Hirschman Index (HHI) from approximately 1000 to 700, other than a small reversal around 2010. They also find a negative relationship between wages and local labour market concentration.

7.2 Abel, Tenreyro and Thwaites (2020, link) define labour markets differently (by two-digit industry and the nomenclature of territorial units for statistics NUTS2 region) but arrive at similar results. They find a rise in the HHI from 1998 to 2004, before a steady decline to the end of their time series in 2018. They also document a negative relationship between wages and employment concentration, but the magnitude is smaller than we find, likely due to the different labour market definition.

7.3 Most of the academic literature focuses on the US, where the picture is somewhat different. Studies agree that the US labour share has declined (Karabarbounis and Neiman, 2014, link; Piton and Gutierrez, 2020, link) and that markdowns have risen in recent years. Yeh, Macaluso and Hershbein (2022, link) estimate markdowns in the US manufacturing industry and find declining labour markdowns from the late 1970s to the early 2000s, but a sharp rise ever since. Kirov and Traina (2022, link) find rising markdowns in US manufacturing from 1972 to 2014.

7.4 Sokolova & Sorensen (2021, link) review 1,320 estimates of labour elasticities from 53 separate studies. They find strong evidence for labour market power, with an average labour elasticity estimate across the literature of between 6.4 and 9.9. Azar, Berry and Marinescu (2022, link) find firm labour elasticities of about 4.8, which imply a 21% wage markdown.

7.5 There is plenty of evidence of a negative relationship between employer concentration and wages in the U.S. (for instance, Rinz, 2022, link; Azar, Marinescu, Steinbaum and Taska, 2020a, link; Azar, Marinescu, Steinbaum, 2020b, link; Benmelech, Bergman and Kim, 2022, link; Handwerker and Dey, 2022, link). This literature is often criticised as not measuring the causal effect of concentration on wages since concentration and wages are both determined at the same time by decisions of workers and firms.

7.6 Prager and Schmitt (2021, link) therefore use hospital mergers to isolate the impact of labour market concentration on wages and find that wages fall for skilled nurses after large mergers, but not otherwise. This is likely because for skilled nurses, the only feasible alternative employment option is other local hospitals. When local hospitals consolidate, they therefore have more market power over nurses. Less skilled hospital employees on the other hand can move to other employers without much income loss.

7.7 Similarly, Arnold (2021, link) finds that large mergers in the US are associated with a decrease in wages while small mergers have a negligible effect. However, regardless of their size, mergers are consistently associated with reductions in employment.

7.8 The evidence on trends in U.S. employment concentration is less clear because so much depends on how labour markets are defined. Benmelech, Bergman and Kim (2022, link) find evidence of rising labour market concentration in manufacturing from the late 1970s to 2010, defining labour markets at the three-digit and four-digit industry by county level. However, Rinz (2022, link) finds declining local concentration over the same period across all U.S. employer establishments, when defining local labour markets at the four-digit industry and commuting zone level. Likewise, Rossi-Hansberg, Sarte and Trachter (2018, link) document declining regional employer concentration at the same time as national employer concentration is rising.

7.9 For many other countries, the evidence is just in its infancy. Martins (2018, link) finds that in Portugal, labour market concentration has been decreasing overall but increasing for new hires. They define the labour market as very narrow six-digit occupations by region, dividing Portugal into 14,500 labour markets each year. From the late 1990s labour market concentration fell on average from an HHI of around 900 to an HHI of around 700. For new hires, employer concentration rose in the 1990s before stabilising at an HHI between 1000 and 1100. They also find a negative relationship between wages and employer concentration.

7.10 Dodini, Lovenheim, Salvanes and Willén (2020, link) find that Norwegian workers subjected to mass layoffs have worse labour market outcomes if they are in more concentrated markets. They also find that women in Norway tend to work in more concentrated occupations than men.

7.11 The relationship between market power in product and input markets (including labour) has also received some attention lately. Different theories could yield distinct results. For example, it might seem intuitive that large firms in a particular geographic area are able to leverage market power in both their

output and inputs markets. However, if firms bargain and share rents with workers, any increase in surplus from markups would have to be shared with labour. Mertens and Mottironi (2023, link) find a negative relationship between firm-level markups and markdowns across 16 other European countries, consistent with this theory. They use the production function approach to estimate market power in the input and output markets. Tortarolo and Zarate (2020, link) also find a negative relationship with Colombian data, estimating markdowns from labour supply elasticities.

7.12 One concern on this markup-markdown relationship is how best to estimate markups, and how this relates to markdown estimation. Typically, researchers assume one input is flexible to obtain markups and markdowns for the other input, choosing either labour or intermediate inputs (for example, de Loecker, 2011, link;). Markdowns are often estimated as the ratio of markup estimates using each of these inputs (Yeh, Macaluso, Hershbein, 2022, link). To the extent that intermediate inputs exhibit no input market power, this ratio will yield the labour wedge, which can be interpreted as the markdown. However, there is evidence that markups estimated using labour and intermediate consumption are negatively correlated (Raval, 2023, link). This suggests the markup-markdown relationship may be sensitive to assumptions on the relative flexibility and market power of inputs. The contrasting results merit further investigation.

7.13 Researchers are also increasingly looking into the interplay between employer market power and other labour market policies and institutions. Farber, Herbst, Kuziemko and Naidu (2018, link) find that unions played a role in the mid-century fall in US wage inequality. Dodini, Salvanes and Willén (2022, link) suggest that unions can help counter the downward wage effects of employers' labour market power. By exploiting a change in tax policy, they argue concentrated markets tend to be more unionised and that the union wage premium is higher in more concentrated markets.

7.14 Azar, Huet-Vaughn, Marinescu, Taska and von Wachter (2019, link) investigate how the impact of minimum wages on employment is related to labour market concentration in the US. More concentrated labour markets exhibit positive employment effects from the minimum wage, while less concentrated markets experience negative employment effects. Wiltshire, McPherson and Reich (2023, link) also find positive employment effects from the sharp increase in minimum wages in California and New York, focusing on the low-wage fast food restaurant sector. They provide additional evidence of monopsony power in this industry, by analysing the relationship between minimum wages and separation rates.

7.15 Manning (2021, link) provides a recent in-depth overview of not just the wide-ranging evidence of labour monopsonies, but also the intricate ways in which employer market power interacts with other labour market institutions and policies, including immigration, minimum wage and antitrust policies.

7.16 Regulators have increasingly taken an interest in employer market power too. In the US, no-poaching clauses became the focus of civil enforcement actions starting in 2010. Since 2016, US agencies have taken criminal enforcement actions against clear no-poaching cases. In Europe, several competition authorities have taken labour market cases, predominantly against no-poaching agreements.[1] The European Commission has recently announced that it is investigating alleged no poach agreements alongside wider anticompetitive conduct[2] and officials have signalled increasing scrutiny of employer market power.[3]

7.17 This report brings together UK evidence on various aspects of employer market power, often for the first time. It underscores the importance of country and market-specific evidence for policymaking. Aggregate trends in wage markdowns and concentration differ from those found for the US. Meanwhile, UK labour markets face persistent regional differences in concentration. The long-term consequences of recent labour market developments, such as hybrid working and the gig economy, remain to be seen.

7.18 The analysis in this report has also uncovered open questions for researchers and policymakers: what lies behind the geographical differences in labour market concentration? How do mergers and acquisitions affect labour market concentration and wages in the UK? What would the impact of changing labour market policies (for example, on non-compete agreements, pay setting and the minimum wage) be for worker mobility and wages? These questions present opportunities for researchers and government analysts to further build the evidence base for labour market policies.

[1] Competition authorities have investigated security companies (link) in Belgium, IT companies (link) in Croatia, supermarkets (link) and medical personnel (link) in the Netherlands, floor coverings companies (link) in France, , HR consulting companies (link) in Hungary, real estate agencies (link) and basketball teams (link) in Lithuania, automobile associations (link) and basketball teams (link) in Poland, football teams (link) in Portugal, and schools (link) and freight forwarders (link) in Spain.
[2] See the following announcement (link).
[3] See, for instance, comments by Margarethe Vestager (link) and Olivier Guersent (link).

Appendix A: Acknowledgements

1. This report was written by Joel Kariel, Renisha Rana, Max Read, Ana Rincon Aznar, Jakob Schneebacher and Nicole Scholz on behalf of the CMA Microeconomics Unit. Luke McWatters contributed to the literature review.

2. The authors are extremely grateful to Stephen Hansen, Peter Lambert, Nick Bloom, Steven Davies, Raffaella Sadun and Bledi Taska for sharing their working-from-home job identifiers, Jesse Matheson and Paul Mizen for sharing data from the UK Survey on Working Arrangements (UK-SWA) and the CMA-LSE MPA Capstone Project team as well as the Department for Business and Trade (DBT) for sharing survey data on restrictive covenants.

3. This report uses Office for National Statistics (ONS) statistical research datasets via the Secure Research Service (SRS) . Outputs may not exactly reproduce National Statistics aggregates. We are grateful to SRS staff for their help and advice. The report also uses data accessed via the UK Data Service(UKDS).

4. The authors are also very grateful to Diane Coyle, Alan Manning, Ioana Marinescu, Maxim Massenkoff, Bernardo Mottironi, Nancy Rose, Anna Stansbury, Evan Starr, Joel Stiebale, Lucy Stokes, John Van Reenen and many CMA colleagues for their feedback on methods and results and to Frank Donnarumma for feedback on the data visualisations.

Appendix B: Glossary

5. **Elasticity**: A common way to measure the relationship between two economic variables is to measure the percentage change in one associated with a one-percent change in the other. Economists call this measure an elasticity. In the context of labour markets, common elasticities are the labour supply elasticity and the wage elasticity. The wage elasticity of concentration, for instance, measures how much a worker's wage changes with a one-percent change in concentration in the relevant labour market.

6. **Employer market power**: Employers and workers jointly create valuable output, but also need to bargain over how the surplus is shared between them. Employer market power refers to the relative power that employers have in this bargaining process. Employer market power may arise where workers have few outside employment options, lack information about alternatives or where labour market frictions make it difficult for workers to leave. Workers may also have market power, for instance if they are represented by a labour union.

7. **Gig economy**: No universal definition of the gig economy exists, but for the purposes of this report we define the gig economy as the sum total of all gig workers. A gig worker is anyone who sells their labour services via a digital platform. This definition of gig work does not include other, more traditional forms of casual or temporary work.

8. **Herfindahl Hirschman Index (HHI)**: A labour market Herfindahl Hirschman Index (HHI) is a measure of labour market concentration. The HHI falls between 0 (in the case of perfect competition) and 10,000 (in the case of monopsony. Labour markets are said to be 'concentrated' if the HHI is above 1,500 and 'highly concentrated' if the HHI is above 2,500. To compute the index, we take the employment shares of all employers in a labour market, square them to give more weight to bigger employers, and then sum them.

9. **Job-to-job transition rate**: Job-to-job transitions measure the flexibility in a labour market. In line with previous research, we define quarterly job-to-job transition rates as the proportion of individuals employed in both the current and previous quarter, who in the current quarter indicate that they have been with their employer for less than three months.

10. **Labour force participation rate**: The labour force participation rate measures how many potential workers are in fact participating in the economy. It is computed as the ratio of the labour force to the total working-age population. The labour force participation rate is a common measure of labour market tightness.

11. **Labour income share**: is a common measure of aggregate labour market power. It measures the percentage of Gross Domestic Product (GDP) that goes to labour, as opposed to capital. Labour income includes wages and other forms of labour compensation and benefits.

12. **Labour leverage ratio**: The labour leverage ratio is a measure of labour market tightness, or the relative demand and supply for jobs. It measures the number of voluntary job separations (or quits, for short) to involuntary job separations (or lay-offs), and therefore how attractive outside opportunities are for workers and firms, respectively.

13. **Labour market**: We call the set of workers that consider the same jobs at the same employers a 'labour market'. Labour markets can be defined geographically, by occupation, by industry or by the skills that the jobs use. In this report, our baseline labour market definition is Travel to Work Area (a small geographical area based on commuting patterns) by three-digit Standard Occupational Code classification (a relatively narrow categorisation of occupations).

14. **Labour market concentration**: Labour market concentration refers to the degree to which employment opportunities in a labour market are concentrated in the hands of a few employers. This is often measured using a Herfindahl Hirschman Index (HHI).

15. **Labour productivity**: Labour productivity refers to the amount of turnover or value added created by a worker. Technology, capital, other inputs and the organisation of production all matter for labour productivity.

16. **Monopsony**: Monopsony refers to a labour market consisting of a single employer, just like monopoly refers to a product market with a single seller. A small number of employers in a market is described as an oligopsony.

17. **Price markup**: The price markup is defined as the difference between the price and the cost of producing an additional unit of output. This is a measure of product market power: the larger the markup, the greater the profit margin earned by the firm.

18. **Restrictive covenants**: Restrictive covenants are clauses in employment contracts that make it more difficult for workers to leave. Examples of restrictive covenants are non-compete agreements, non-disclosure agreements and non-solicitation agreements.

19. **Wage markdown**: The wage markdown is defined as the difference between the additional contribution a worker makes to a firm's revenue and the wage

she receives. This is a measure of employer market power: the larger the markdown, the less of the surplus created together goes to the worker.

Appendix C: Data sources

The Annual Survey of Hours and Earnings (ASHE) and the Business Structure Database (BSD)

20. The ASHE dataset contains information on employee earnings, comprising a 1% random sample of employees in England, Wales, and Scotland. Responses to the survey are provided by employers, so these earnings data are considered highly accurate, but there are some well-documented measurement issues (e.g., see the Wage & Employment Dynamics project). The ASHE does not contain information on self-employed workers.

21. The BSD holds information on most businesses in the UK. It is derived from the Inter-Departmental Business Register (IDBR). The underlying data sources are from Value Added Tax (VAT) and payroll submissions, so it covers all firms above the threshold for either of these schemes.

22. We use data from the ASHE and BSD from 2002 – 2021. The ASHE data we use is at the worker level and includes various measures of pay, certain worker characteristics (full-time vs part-time, gender, occupation, Travel to Work Area) and some workplace characteristics (industry, firm size, firm identifier). We merge in a measure of productivity (turnover per worker) from the BSD, using the firm identifier to merge the two datasets.

Annual Business Survey (ABS)

23. The ABS dataset contains firm-level (i.e., reporting unit) production data such as turnover, employment, investment, and intermediate consumption that allows us to estimate production functions. The ABS is effectively a census of large firms, while smaller firms are sampled to reduce the administrative burden of the surveys. The sample is between 45,000 – 50,000 firms each year.

24. Data from 2008 and 2021 is merged at the level of the *reporting unit reference number (ruref)*. This is a unique firm identifier. In 2021, we use data at the *local unit reference number (luref)*, so we sum most variables (e.g., turnover, employment) to the ruref level. In 2021, we use the median industry and modal region across local units to label the reporting unit.

25. The ABS does not include data on firm-level capital stocks. We follow well-established research practice, computing capital stock using the Perpetual Inventory Method (PIM). This requires an estimate of firm-level capital stock in its first appearance in the ABS. We describe the methodology for this below.

After that initial year, we compute: $_{i,t+1} = (1 - \delta_{s}) \quad _{i,t} + \quad _{i,}$. The sectoral depreciation rates are from the ONS (link).

26. Firm-level investment series in the ABS may have missing values due to the sampling scheme. Missing investment observations are linearly interpolated by firm-level employment.

27. The initial capital stock for each firm is obtained by multiplying sector-level capital stock (K) with the share of aggregate investment (I) in that sector, and the firm-level sales (R) share in that sector: $K_{i,t}^{initial} = K_{s,t} \times \frac{I_{s,t}}{I_t} \times \frac{R_{i,t}}{R_{s,t}}$. We use aggregate and sectoral capital stocks and investment data from the ONS (link).

28. We deflate sales, capital, labour, and intermediate consumption using annual sectoral deflators from the ONS. For sales, we use experimental industry deflators (link). For capital, we compute an implied deflator by dividing the current price of sectoral capital by its chain-volume measure (link). For intermediate inputs, we use the Supply and Use of products data (link), computing another implied deflator. This data only goes to 2020, so we extend to 2021 by taking the average deflator growth rate from 2008 – 2020 for each sector. For labour, we deflate with the EARN03 dataset (link).

29. The data is cleaned prior to analysis. The appended ABS data has 637,121 unique firm-by-year observations. Once we drop observations without a corresponding aggregate capital stock, this falls to 636,865. Removing sectors that are inappropriate for production function estimation leads to 554,542 observations. The following sectors are dropped: Agriculture, Forestry and Fishing; Mining and Quarrying; Utilities; Finance and Insurance; Real Estate; Education, Health and Social Work. Finally, removing outliers and firms with missing data leaves 474,753 observations. We remove observations with shares of capital, labour, or intermediate consumption in revenue in the top or bottom 0.1% in each year. We also remove the top or bottom 1% of materials to employment shares in each year, which reduces outliers in markdown estimation.

Lightcast job vacancies data

30. The job vacancies dataset is collected by Lightcast (former Burning Glass) by scraping a set of known job boards. The job posting's body is then analysed to construct information like occupation, skills, geography, or standardized company name.

31. Standardized company names are assigned by stripping irrelevant information (e.g., Ltd, Inc) and comparing the raw company name to a list of known companies. For example, Amazon Logistics and Amazon UK would both be standardized and attributed to the parent company, Amazon.[4]

32. Geographic classifications like nomenclature of territorial units for statistics NUTS and Travel to Work Area (TTWA) are also imputed. Lightcast uses the 2015 NUTS geography except for in Scotland, where local government reorganisation means that some data are no longer available in the structure used in those boundaries. For this reason, in Scotland, Lightcast have a number of NUTS3 replacements which are composed of more up-to-date LAU1 areas.

33. Lightcast also attempts to identify duplicate postings across multiple websites and joins them to create a single observation for each unique post.

34. Updated vacancy data is released every fortnight. This is a great benefit of vacancy data as it allows near real-time analysis. The version of the data used in this report is the 14/10/2023 release. We use vacancies posted from January 2012 to September 2023 for our analysis.

35. Another benefit of vacancy data is the amount of information it contains. By analysing the body of the job advert many new variables can be constructed even outside those Lightcast provides directly. This allows researchers to answer many novel questions that employment data alone cannot answer. We use hybrid working measures constructed by Hansen et al. (2023) from Lightcast's vacancy data to supplement our hybrid and working from home analysis.

36. There are two important caveats of job vacancy data. Firstly, not every vacancy represents a job opening. For example, firms may use adverts to artificially create the appearance of growth; to get an idea of the pool of potential applicants; or to advertise their business.

37. Secondly, not every job opening will be posted as a separate job advert. The CMA looking to hire four new Assistant Economists might only post one job advert. Certain professions may be posting adverts in more ad-hoc ways like Facebook posts or through newspapers and offline media. Between 2012-2023 the type of businesses that post job adverts online may also have changed.

[4] For a more detailed description of Lightcast's company name taxonomy see https://kb.lightcast.io/en/articles/6957641-companies-classification-methodology.

Employment vs. vacancy Herfindahl-Hirschman Index

38. In chapter 3 we discuss concentration measures using the vacancy and employment Herfindahl-Hirschman Indices (HHI). This section analyses their correlation to give additional context to the analysis of chapter 3. We also hope that it allows the reader to better understand the relationship between the two measures.

39. The vacancy and employment HHI are positively correlated with a correlation coefficient of 0.40 for quarterly, and 0.47 for yearly vacancy HHI. The relationship does not seem to be linear. When data is binned by vacancy HHI percentile we find that employment and vacancy HHI become less correlated as their level increases, as indicated by a linear-log relationship (see Figure E.21, appendix). The same relationship holds in the disaggregated data.

40. The positive correlation is maintained when we take the average HHI in each labour market for the years where the same Travel to Work Area definition is used for both datasets (2013-2021) with a correlation coefficient of 0.40 for quarterly vacancy HHI (see Figure E.23, appendix).

41. The fact that vacancy and employment HHI are not more closely correlated is likely to come from the more volatile nature of vacancies. Additionally, while few in nature (0.13% of all employees), there are a number of markets where employment is a monopoly while many different firms post vacancies (see Figure E.22, appendix). This indicates that sampling may be adding some noise, reducing labour market level correlation. This is also evidenced by the fact that the majority (about 80%) of labour markets at the yearly level in Lightcast cannot be matched to those in the ASHE.

42. Additionally, we find that the labour markets that are common to ASHE and Lightcast are representative of all labour markets in ASHE – both in terms of the distribution of their HHI (see Figure E.28, appendix) and their size. On the other hand, the matched labour markets tend to be larger and less concentrated for Lightcast (see Figure E.28, appendix). This may be another reason for the patterns we observe.

The UK Labour Force Survey

43. The UK Quarterly Labour Force Survey(UK QLFS) is a study of the labour market status and circumstances of the UK resident population and workforce.. It is a nationally representative survey covering around 100,000 individuals every year belonging to about 20,000 households. The QLFS provides the basis for the official measure of economic activity (employment,

unemployment) in the UK, and it is consistent with the international guidelines. It is available on a quarterly basis since the early 1990s.

44. The UK QLFS contains rich information on individuals aged 16 years and above living in UK households and includes information such as qualifications, occupations, income, jobs, training, working patterns, and a range of socio-demographic characteristics.

Understanding Society (UK Household Longitudinal Study)

45. The Understanding Society Survey, also known as the UK Household Longitudinal Study, is a nationally representative survey of UK households. It started in 2009 and covers around 40,000 households. Understanding Society builds on the British Household Panel Survey (BHPS) which ran from 1991-2009 and included around 10,000 households.

46. Understanding Society provides high-quality longitudinal data on subjects such as health, work, education, income, family, and social life. The overall purpose is to help understand the long-term effects of social and economic change, as well as policy interventions designed to impact upon the general wellbeing of the UK population. Households are visited each year to collect information on changes to their household and individual circumstances. Interviews are carried out face-to-face in respondents' homes or through a self-completion online survey.

Industry-level ONS labour markets and productivity data

47. We collect statistics published by ONS at the industry level, based on sources including the National Accounts and Labour Force Survey data. We collect information on labour productivity, labour income share and labour compensation, unit labour costS,, job vacancies, and total employees at the UK SCI2007 Section-level.

UK Survey of Working Arrangements and Attitudes

48. The UK Survey of Working Arrangements and Attitudes is an ongoing worker-level survey started in 2020. It gathers information on the outcomes, plans and desires of workers related to remote working. It is run by academics Paul Mizen (KCL) and Nick Bloom (Stanford). See link for more details.

Survey sources on restrictive covenants

49. Various surveys were used to assess the prevalence of restrictive covenants in the UK.

50. The ONS Business Insights and Conditions Survey (BICS) samples approximately 39,000 businesses across the UK every two weeks. The survey is often used to enable rapid response, and inform policy decisions, about issues impacting UK businesses and the economy. In wave 87 of the BICS (July 2023), multiple one-off questions relating to restrictive covenants were included. Examples include whether the responding firm uses non-compete, confidentiality, no-poach, non-solicitation or non-recruitment of co-worker agreements, and if so, what proportion of the firms' employees have these agreements in their current contracts. Responses have been weighted by count.

51. To gain an insight into the relationship between firms using non-compete agreements and how much training they provide to employees, the BICS and Management and Expectations Survey (MES) were merged. 14% of firms in the original BICS sample responded to questions relating to average annual training days provided in the MES. The distribution of firms across industry and regions is broadly similar in the merged and original sample. A notable exception is the combined industries "Manufacturing and Mining", which accounts for 6% of firms in the BICS sample, and 29% in the merged sample. The MES does not sample firms with less than 10 employees, resulting in this group of firms not being represented, and firms in other size bands being overrepresented in the merged sample. A breakdown of the BICS distribution and BICS x MES merged sample can be found in F.19.

52. A YouGov survey jointly commissioned by the CMA and London School of Economics sampled 2,713 employees in the UK from 6th January 2023 to 13th January 2023. Respondents were aged 16-75 and could be employed either full or part time. The survey was aimed at examining the prevalence of non-compete agreements, asking respondents if they had a non-compete agreement in place with their current employer, along with other relevant questions such as whether the employee had received funded training from their employer. Responses "definitely" and "probably" have/don't have a non-compete in place with my current employer have been grouped together.

53. The Department of Business and Trade (DBT) generously shared results from three surveys: an IFF Research Employer Survey (August-September 2021), a YouGov Employee Survey (April-May 2022) and a YouGov Employer Survey (December 2021). The YouGov Employee survey (2022) has been weighted to be representative of all UK employees, and the 2021 YouGov

employer survey has been weighted by firm size, sector and industry. The IFF Research Employer Survey's responses have been weighted by the CMA on firm size. These surveys sought to assess the prevalence of non-competes amongst firms and employees and have enabled us to check the robustness of our findings as well as bringing some additional information to bear.

54. For both DBT commissioned non-compete YouGov surveys, responses "don't know" have not been dropped in the main text to maintain consistency with the methodology followed in the analysis of other surveys, as well as to observe the degree of uncertainty around the existence and implications of non-competes. In contrast, the DBT impact assessment of restricting the use of non-compete clauses (link) drops these responses. All graphs produced using data from the DBT YouGov surveys have been reproduced following the impact assessments methods in the appendix (figure E.73).

The Workplace Employment Relations Study

55. The Workplace Employment Relations Survey (WERS) is a national survey of people at work in Britain, collecting data from employers, employee representatives and employees in a representative sample of workplaces. WERS has been undertaken 6 times: 1980, 1984, 1990, 1998, 2004 and 2011. Some of the information available in this survey includes how workplaces are managed and organised, individual and collective representation at work, trade union recognition and membership, fair treatment at work, employment equality, selection and recruitment, and how learning and training activities are undertaken.

56. In this report we mainly draw from the 2004 and 2011 WERS, which contains information on receipt of merit pay at the employee-level.

Appendix D: Methodology

Trends in labour market concentration and employer market power

Defining labour markets

57. Defining any market is a challenging exercise. By defining labour markets, we approximate the scope of outside options available to an employee. If someone wants to switch out of their job, a labour market gives the set of choices they would consider. There is much economic research highlighting the important frictions when moving between jobs, especially geographical and occupational limits.

58. Our baseline definition for a labour market uses the set of jobs (or vacancies) available in a Travel to Work Area (TTWA) in the same 3-digit Standard Occupational Classification (SOC). An example of our labour market is "Directors in Logistics, Warehousing and Transport in Plymouth." One benefit of using TTWAs is that they are constructed based on observed commuting flows from census data, and hence provide a reasonable approximation to the geographic scope of labour mobility.

59. Other researchers have considered alternative definitions. For example, Azar, Marinescu and Steinbaum (2019, link) use a selection of 6-digit SOCs and commuting zone in the U.S., which produces over 8,000 labour markets. For comparison, we have just under 4,000 labour markets on average in each year, once we have removed any combinations of TTWA and 3-digit SOC with fewer than 10 employees (this step is taken for data protection reasons).

Labour market concentration measures

Once labour markets are defined, we compute employment Herfindahl-Hirschman Index (HHIs) by summing the squared employment shares of all firms in a labour market.

To aggregate labour market HHIs up to industry, occupation, or regional averages, we compute the weighted average of employment HHIs of all workers in a specific sub-group, where the weight is the Annual Survey of Hours and Earnings (ASHE)-weight which re-weights to make the ASHE sample representative of the entire working population.

Calculating vacancy concentration

60. The vacancy HHI is computed analogous to the employment HHI. It takes the sum of squared shares of vacancies posted in a labour market by each firm. We calculate quarterly and yearly vacancy HHIs.

61. Due to data limitations, we have to make some assumptions in our analysis. Firstly, not every vacancy can be assigned a hiring firm. This can be for two reasons:

    (a) Lightcast is unable to match the raw firm name to a list of known companies,

    (b) The algorithm did not find any firm name in the job advert.

62. When Lightcast is unable to match the firm name, we assume that the raw name represents the true hiring company. When Lightcast is unable to identify any firm name in the job advert we make different assumptions to provide rough bounds to vacancy concentration. Our lower bound specification takes each observation without a raw firm name to be posted by a unique firm that has only ever posted this one vacancy. On the other hand, for our upper bound, we assume that all observations without a raw firm name have been posted by the same large firm. The former assumption is much more likely to represent the truth than the latter since large firms are much more likely to be known to Lightcast and matched by their algorithms.

63. Our baseline specification instead drops all observations that do not have a raw name. The corresponding concentration measures do not necessarily have to lie between the upper and lower bound specified above, but we find that, in aggregate, they do for our dataset.

64. Additionally, some vacancies are posted through agencies rather than directly by the company itself. These vacancies may be assigned to the agency rather than the ultimate employer. This can increase concentration, but it may also decrease it when a firm hires some jobs by itself and others through an agency. Increased concentration may not be too problematic as agencies are likely to act like a single firm across their vacancies to get the best outcome for clients, so that higher HHIs accurately reflect the hiring environment. On the other hand, downwards biased HHIs could be problematic as they may understate the extent of firms' market power.

65. In this report we are using vacancy measures to get timelier evidence that complements the employment concentration view of labour markets. Since vacancy and employment measures show similar trends, this validates our analysis and reassures us that we are not just measuring noise.

66. When aggregating HHIs we weight by the number of posts in the labour market. We do not drop labour markets below a given size. Each year we have more than 3 million observations, so outliers are negligible once aggregated.

Estimating wage markdowns

67. Wage markdowns are the ratio of the additional revenue contributed by labour, divided by the wage. Markdowns equal to one indicate that employees reap the full benefit of the labour they provide. Values greater than unity imply that firms capture a fraction of the surplus created by their employees. Given increasing acceptance of imperfectly competitive labour markets, due to contracts or firm-specific amenities, we expect markdowns to often exceed one.

68. We can compute the markdown by comparing the markup estimated using labour inputs to the markup estimated using a competitively supplied input (like intermediate inputs). If the difference between price and marginal cost is larger for labour than for intermediate inputs, this suggests that in addition to some output pricing power, the firm also has some wage-setting power. In other words, the markdown is computed as the ratio between two markup estimates (the markup estimate using labour inputs and the markup estimate using intermediate inputs).

69. Therefore, we estimate two markups to estimate the markdown. Estimating markups is an active area of research. We follow the production approach, using firm-level data on sales and input expenditures to estimate the responsiveness of outputs to changes in different inputs (i.e., we estimate elasticities of output to all inputs). We can use these elasticities alongside input expenditure shares in revenue to obtain markups. Finally, we combine different markups to estimate markdowns.

70. Our approach involves regressing sales on capital, labour, and intermediate inputs. We provide results from five different approaches to this regression, which yields five alternative estimates of elasticities to compute markups.

71. We estimate these regressions by Ordinary Least Squares (OLS) for Cobb-Douglas (CD) and translog (TL) production functions. We also follow Ackerberg, Caves and Fraser (2015, link) for CD and TL production functions, using the *prodest* package in Stata (Rovigatti and Mollisi, 2018, link). This approach is known as the proxy (or “control function”) approach to estimating production functions, where a proxy variable is used to estimate the unobserved productivity of the firm, to avoid omitted variable bias. Ackerberg, Caves and Fraser (2015) assume materials is monotonic in unobserved

productivity, which follows a Markov process, and this allows for consistent estimation of elasticities. Finally, we estimate production functions following Gandhi, Navarro and Rivers (2020, link) using the *gnrprod* package in R (Jin, 2023, link). This "cost share" approach to estimating elasticities involves regressing the log of the share of materials expenditure in sales on a polynomial of all inputs. This identifies the materials elasticity, and alongside an assumption of a Markov productivity process, can be used to estimate all elasticities in the production function.

Labour market concentration and labour market outcomes

Wage-concentration regressions

72. We regress the log of wage variables (basic pay, gross pay, gross pay excluding overtime) on the log of the employer HHI, at the worker level.

73. We include an increasing number of fixed effects (year, 1-digit SIC/SOC/region and 2-digit SIC/SOC/region) followed by firm-level controls (firm size, public/private indicator).

74. Then we add worker-level controls (sex, age, squared age, permanent-contract indicator, full-time indicator), and a measure of collective bargaining agreements. Finally, we interact the HHI with the collective bargaining agreement.

Testing the monopsony model (following Azar, Huet-Vaughn, Marinescu, Taska and von Wachter (2019, link*))*

75. We combine data at level of the 2011 Travel to Work Area (TTWA) across England, Wales, and Scotland, between 2014 – 2021. We start in 2014 because of the change in the construction of UK TWAs, which makes it difficult to map to the previous iteration.

76. We have estimates of labour market concentration (HHI) across labour markets defined as the 3-digit occupation by Travel to Work Area. We also compute the share of employees paid at or below the National Minimum Wage (NMW). We call this the "NMW bite" as in Cengiz, Lube, Lindner, Zipperer (2019, link).

77. The ASHE is also used to obtain full-time employment and mean weekly gross pay of full-time employees.

78. The Annual Population Survey (APS) provides information on the number of working-age population, unemployed, and the number of employees in each 2-digit occupation (SOC 2010).

79. If we had data for each TWA in England, Wales, and Scotland from 2014 – 2021, that would yield 1,744 observations. However, we drop some labour markets for data disclosure reasons. There are also some missing values for employment, unemployment, and average wages, where low samples are suppressed in publicly available data.

80. The cleaned dataset has 1,258 observations, which is 72% of the potential dataset. The missing data covers mostly very small TWAs, so is unlikely to affect the overall findings.

81. The 1,258 observations we use for analysis have an average working-age population of just over 220,000. The 28% of the data that is not analysed has an average working-age population of below 13,500.

Defining standardised pay and its correlates

For Figures 43 and 44, each worker in each year is identified as a union member based on the WERS variable “eqd4r” (identification of union presence at a workplace), and as receiving merit-based pay from the WERS variable “nmerit” (identification of merit pay setting at a workplace).
Worker wages in the WERS are provided by the variable “e15” and qe11” in 2004 and 2011 respectively. These variables are wage ranges, with 14 bands. We compute the mid-point of each range to allocate a specific wage value to each worker.
Wage per hour is computed by dividing our imputed wage with hours per worker from the variable “ehours” (usual employee weekly hours worked).

Labour market power and the changing nature of work

Lightcast hybrid vacancies – Herfindahl-Hirschman Index (HHI) scatterplots (Figure 26 & Figure E.47, appendix)

82. To generate Figure 26, we order labour markets according to their HHI. Then, for each labour market, we calculate its percentile in the HHI distribution of all

labour markets. If a labour market falls into two different percentiles[5] we assign it to the higher one.

83. We calculate the line of best fit using a regression of the log percentage of hybrid vacancies per labour market on the log HHI of that labour market.

84. As the log-log relationship is a good fit we would like to use an equivalent regression at the post level (Figure E.47, appendix). From 2014Q1-2023Q3, 67% of labour markets do not have any hybrid job posts, but these only make up 13.3% of all vacancies. If we restrict the period to 2023Q1-2023Q3, 37% of labour markets still face this issue, but only make up 5% of total vacancies.

85. To circumvent this problem, we are using the inverse hyperbolic sine (arcsinh) transformation. Bellemare and Wichman (2019, link) show that this transformation approximates elasticities for large enough values of the transformed variable. Since we are using percentages rather than decimals to measure hybrid work, and HHIs are measured between 0 and 10,000, we believe that the inverse hyperbolic sine formulation gives a good approximation. We also check this by adding 1 percentage point to the hybrid prevalence in every labour market to avoid zeros before applying the logarithm. Results are similar.

86. Bellemare and Wichman also point out that of the presence of many observations with zero values can bias the elasticity estimate when using arcsinh. We weigh each labour market by its share of total vacancies, which reduces the effective number of zero value observations in the dataset, easing our concerns.

Lightcast hybrid work regressions

87. The regressions are done in R using the *feols* command from the *fixest* package (Berge, 2018, link) to estimate a linear probability model, $y_i = {}_i + \sum_{j \in J} \alpha\alpha_{j(i)}$ indicator for a vacancy i is denoted y_i J is the set of fixed effects, and j(i) is the category of observation i for fixed effect j. For example, in regression (4) in Table F.10, the set of fixed effects, J, are the year-quarter and Travel to Work Area (TTWA), and j(i) may be London or 2016Q1..

88. A common problem of linear probability models is that predicted values do not have to lie between 0 and 1. When we predict vacancies using our data, we find that only 21 observations are assigned values above 1; however, 16% of

[5] For example, if there were 200 vacancies in the dataset and the lowest HHI labour market had 3 observations it would fall into the 2nd percentile, not the 1st.

our data have a predicted negative probability of being hybrid. Nearly half of these predictions are above -0.05 (or a -5% chance of a hybrid vacancy being posted), and only 7.2% of them (i.e., less than 1% of all prediction) are worse than -0.1.

89. To further validate our findings, we use a logit model. The results are in Table F.15 and agree with the other specifications. While HHI has a statistically significant positive effect on the probability of hybrid vacancies – even after controlling for company size – the effect is economically insignificant. We use the model to predict the hybrid work probability at HHI of 0 (perfect competition) and 10,000 (monopsony) using our baseline specification (columns (1) in Table F.15, appendix) across all labour markets. The highest increase from going from perfect competition to monopoly is 3.6 percentage points.

90. We have found that, at the job market level and once binned, percentage changes in mean HHI are linearly correlated with percentage changes in the percent of vacancies in a labour market that offer hybrid working (i.e., a log-log relationship, see Figure 26. Therefore, we want to test an equivalent relationship in our post level regressions (Table F.10). We do this by estimating a logit model with log(HHI), see specification (4) in Table F.15.

91. We repeat the prediction exercise. Since this regression uses log(HHI), the effect of an increase in HHI is no longer linear (see Figure E.48 for an example labour market). The largest total effect of going from near perfect competition (HHI of 1 due to logarithm) to monopoly is an 8.6% increase in the likelihood of hybrid vacancies. This effect is concentrated at the lowest levels of HHI and going from 13, the lowest HHI in the data, to 10,000 gives a total maximum increase of 6.2 percentage points. Going from 13 to 100 gives a 1.9 percentage point increase, while going from 100 to 200 only increases the chance by 0.7 percentage points. Going from 200 to 300 further slows the increase to 0.4 percentage points. This is in line with the rest of the analysis that HHI is not an economically significant correlate of hybrid vacancies.

92. Across all the regressions we cluster at the level of the labour market by constructing a labour market indicator. To create this indicator, we combine the Travel to Work Area, 3-digit Standard Occupational Classification, and time (i.e., year-quarter) variables. We cluster at this level as we believe it to be the relevant level for idiosyncratic shocks.

Estimating the relative change in the number of individuals working in a geographic area due to remote working between 2019 and 2022

93. To construct the expected change in the number of individuals working in a geographic area in England and Wales from 2019 to 2022 due to remote working, we followed the methodology outlined in "Remote Working and the New Geography of Local Service Spending", by De Fraja et al. (2022, link). We used data from the UK Survey of Working Arrangements and Attitudes (link) to obtain information on the proportion of time individuals worked remotely in 2019 and intended on working remotely from 2022 onwards. The 2011 ONS Census (link) was used to get estimates of population counts.

94. To enable meaningful comparisons across geographies, we then divided this number by the total number of individuals whose workplace was located in each geographic area in 2019.

95. Using ONS lookups, we aggregated each Middle Super Output Area (2011) to a Local Authority District (2018, link) and then to a Nomenclature of Territorial Units for Statistics 3 (NUTS 3, 2018) region (link). This enabled us to compare changing working patterns to earnings data which is reported on a NUTS 3 basis. We took the earnings data from the ONS Earnings and employment from the Pay As You Earn Real Time Information dataset (link).

96. We assume the expected remote working time of an individual in each occupation in a given year to be constant across local authorities (LA) within each of the four LA groups considered. These are: LAs outside of Greater London and not located in one of the most populated 15 cities, LAs in the top 15 cities by population size, LAs in central London and LAs in outer London.

97. Due to data limitations, we assume the following: First, when working remotely, workers are assumed to work in the geographic area of their residence. Second, since resident and worker populations are based on the 2011 census, we assume the number of people residing and working in each neighbourhood is the same in 2019 as in 2022. Finally, we treat all employment as full time.

Restrictive covenants

Estimating restrictive covenant prevalence amongst workers using the Business Insights and Conditions Survey

98. In wave 87 of the Business Insights and Conditions Survey, firms who report using restrictive covenants are also asked what proportion of their workers

have these agreements in their contracts. Where firms use multiple restrictive covenants, no distinction is made between agreements.

99. Respondents choose between multiple categories, such as “between 10% and 24% of employees” have these agreements in their contract. We use these responses to obtain lower and upper bounds for the proportion of each firms employees with each restrictive covenant in their contract (e.g. lower bound of 10%, upper bound of 24%). Using these estimates and counts of the number of workers each firm employs, we then calculate lower and upper bounds for the number of employees in each firm with these agreements in their contract. These figures are then used to calculate lower and upper bound estimates for the total number of employees with these agreements in their contract. Finally, we divide these figures by the total number of employees employed across all firms to get lower and upper bound estimates for the proportion of all UK employees with each restrictive covenant in their contract.

100. It should be noted that when a firm indicates using multiple restrictive covenants, we make the assumption that the proportion of employees with each of these agreements in their contracts is the same. For example, if a firm uses both non-competes and confidentiality agreements, and indicates 100% of employees have these agreements in their contracts, we assume 100% of the firms employees have both a non-compete and confidentiality agreement in their contract.

Estimating job-to-job transition rates

101. We define quarterly job-to-job transition rates as the proportion of individuals employed in both the current and previous quarter, who in the latter quarter indicated that they had been with their current employer less than three months. This is based on a variable which indicates the number of months a respondent has worked continuously with their current employer. For industry breakdowns, we calculate these rates amongst individuals employed in each industry in the previous quarter. We use data from the Longitudinal Labour Force Survey to calculate the job-to-job transition rates in each quarter from July 2022 to June 2023, and then take a raw-average of the four quarters to get a more precise estimate over the year.

102. There are certain limitations with our method that should be noted. First of all, individuals who had unobserved spells not in employment (i.e., inactive or unemployed) between moving from one job to another will be classed as a job-to-job transition. In addition, we are unable to measure transitions within

the same organisation. We also only have data on both job-to-job transitions and non-compete prevalence across 13 industry sectors.

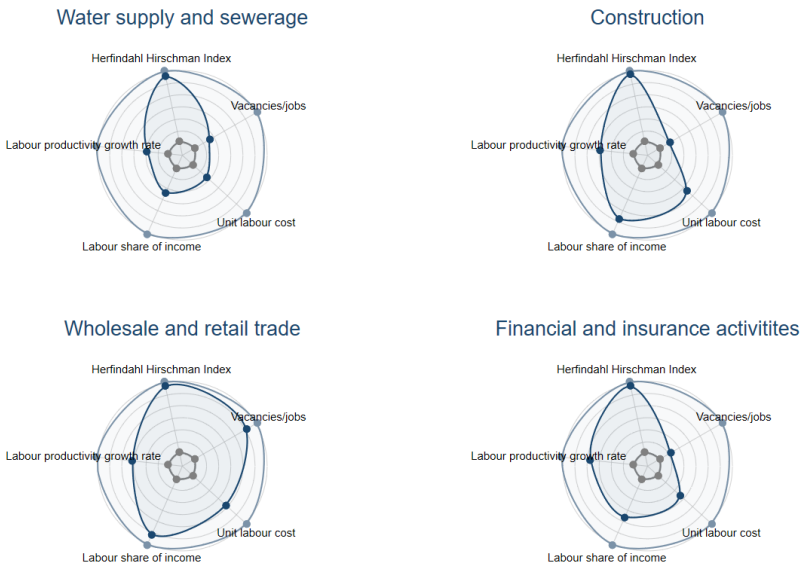
103. To cross-check our results, we repeat our calculations using an alternative self-reported measure to define a job-to-job transition. In this alternative approach, we define a job-to-job transition as individuals who were employed in both the current and previous quarter, who also self-reported leaving a paid job in the last three months. We found that a similar picture emerges when using either method.

Appendix E: Additional figures

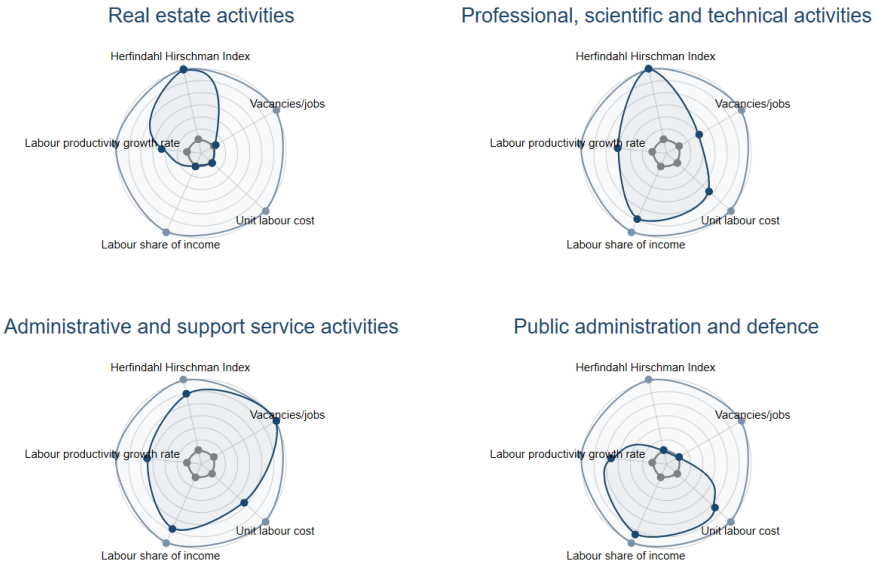
Structural trends in UK labour markets

1. *Industries vary significantly in the structure of their labour markets*

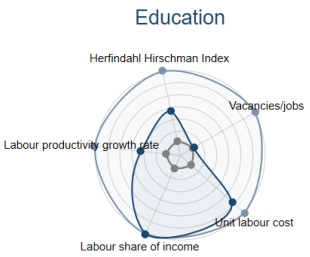
One-digit Standard Industrial Classification plots of five labour market indicators across industries, from published ONS data, UK, 2002-2021

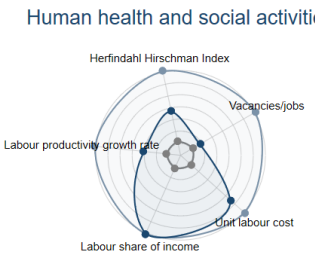


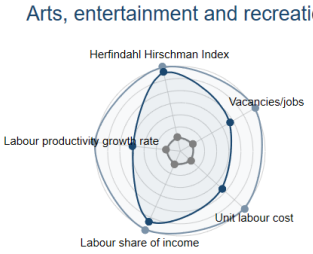
Note: Values are normalised between 0 and 1; the dark line indicates industry values, & the outer grey line indicates maximum values across industries and the inner grey line indicates minimum values across industries; Data corresponds to average values for the period 2002-2021

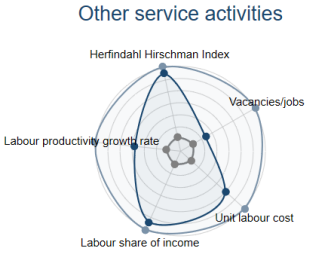


Note: Values are normalised between 0 and 1; the dark line indicates industry values, & the outer grey line indicates maximum values across industries and the inner grey line indicates minimum values across industries; Data corresponds to average values for the period 2002-2021





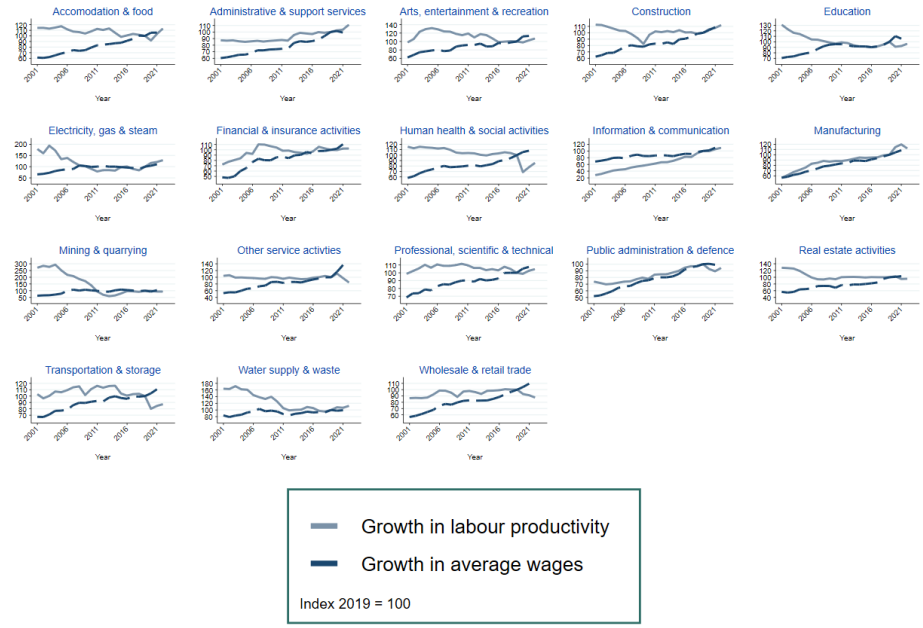




Note: Values are normalised between 0 and 1; the dark line indicates industry values, & the outer grey line indicates maximum values across industries and the inner grey line indicates minimum values across industries; Data corresponds to average values for the period 2002-2021

2. *Growth in wages have outstripped that of labour productivity in the majority of UK industries*

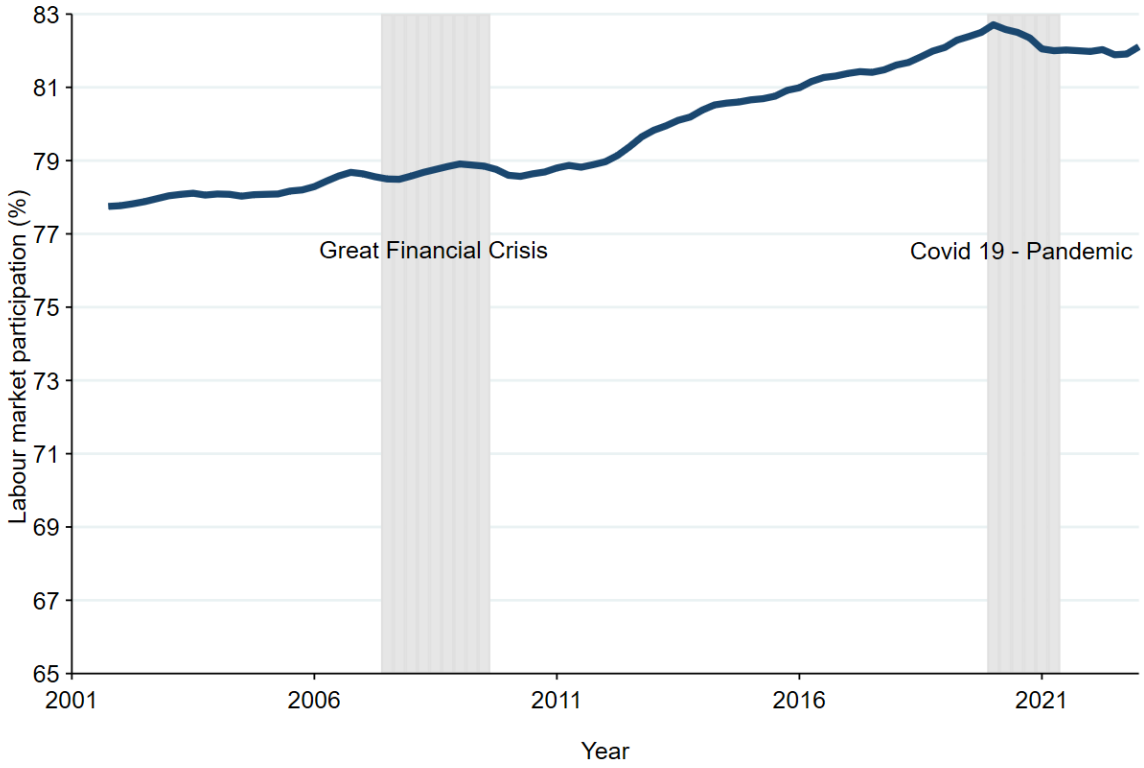
Figure shows an index of labour productivity (output per hour worked) and an index of average wages (labour compensation per hour worked), where the year 2019 takes the value of 100, for the period 2001-2022 for Section-level (SIC 2007) industries, UK



Source : ONS Data

3. ***UK labour market participation has risen steadily since the beginning of the 2000s, but started a decline in the aftermath of the Covid-19 pandemic***

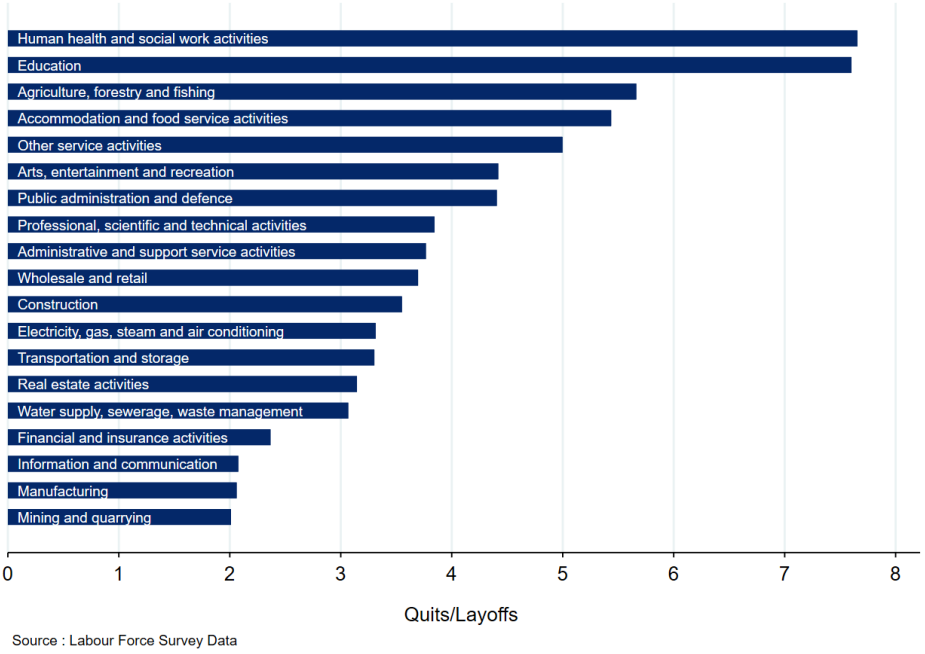
Labour participation rate measured as percentage of the working population that is active in the labour market, shown as a quarterly moving average from 2001 to 2023, UK



Labour market participation rate measures the percentage of the working-age population actively engaged in employment or actively seeking employment.
Source : Labour Force Survey

4. *There is significant variation across UK industries in the labour leverage ratio*

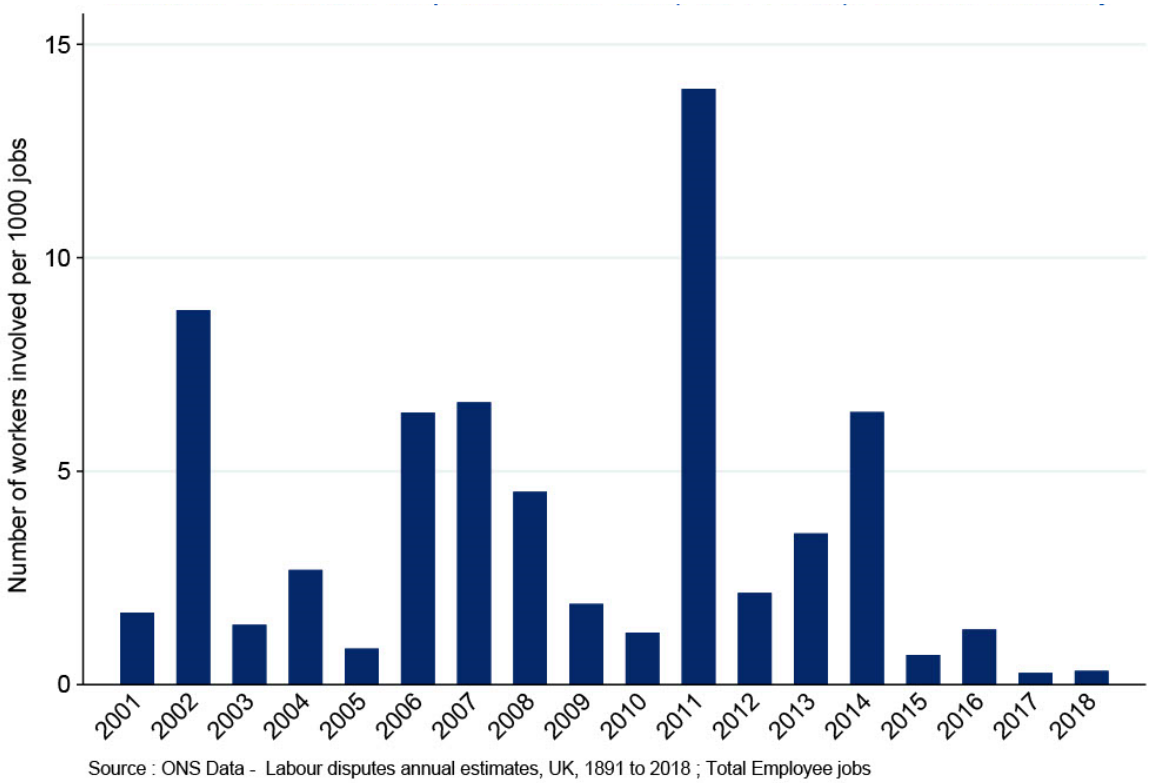
Annual industry level averages for the period 2009-2023 in the ratio of voluntary quits to lay-offs (labour leverage ratio), from the UK Labour Force Survey, UK



Source : Labour Force Survey Data

5. *The number of labour disputes has been highly variable over time*

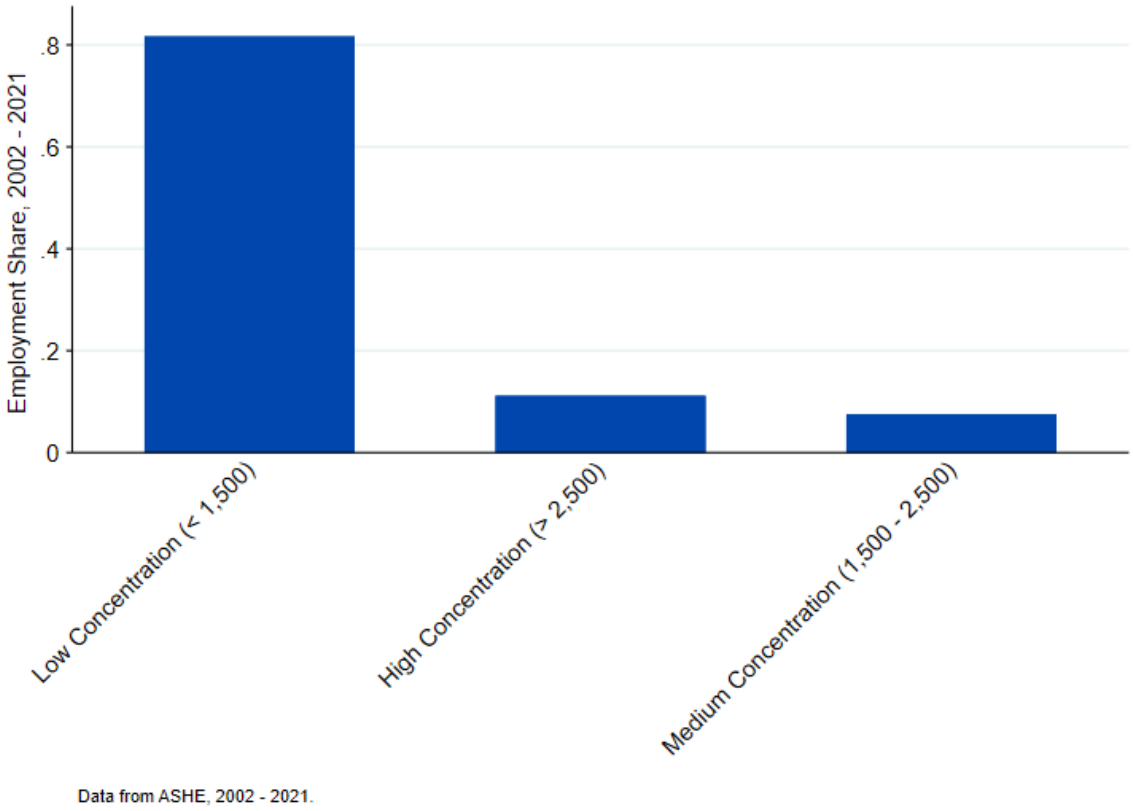
Number of labour disputes relative to total number of jobs for the period 2001-2018, from published ONS data, UK



Concentration figures

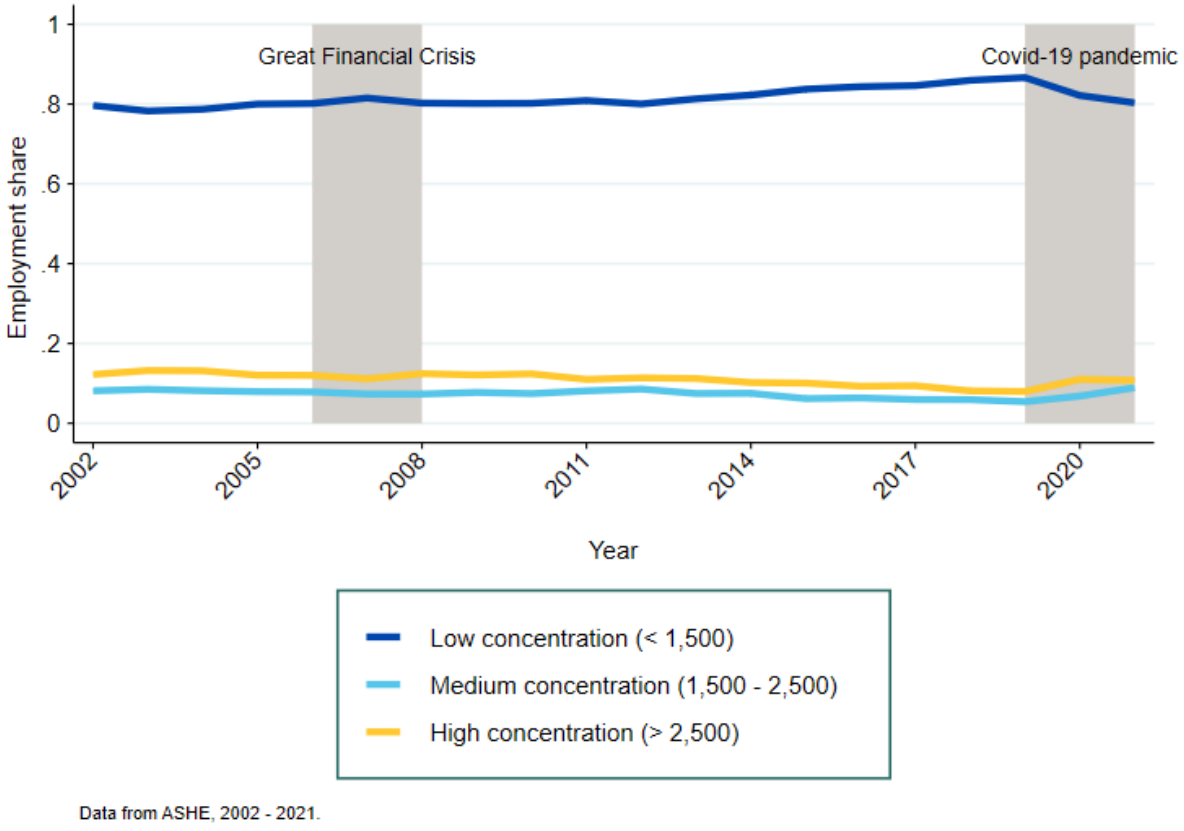
6. *Over 80% of employees work in "low concentration" labour markets*

Share of workers operating in low-, medium-, and high-concentration labour markets. Concentration is the labour market Herfindahl Hirschman Index (HHI), with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



7. ***The share of workers in low-concentration labour markets rose steadily from 80% to 87% between 2002 and 2019, before returning to 80% during the pandemic***

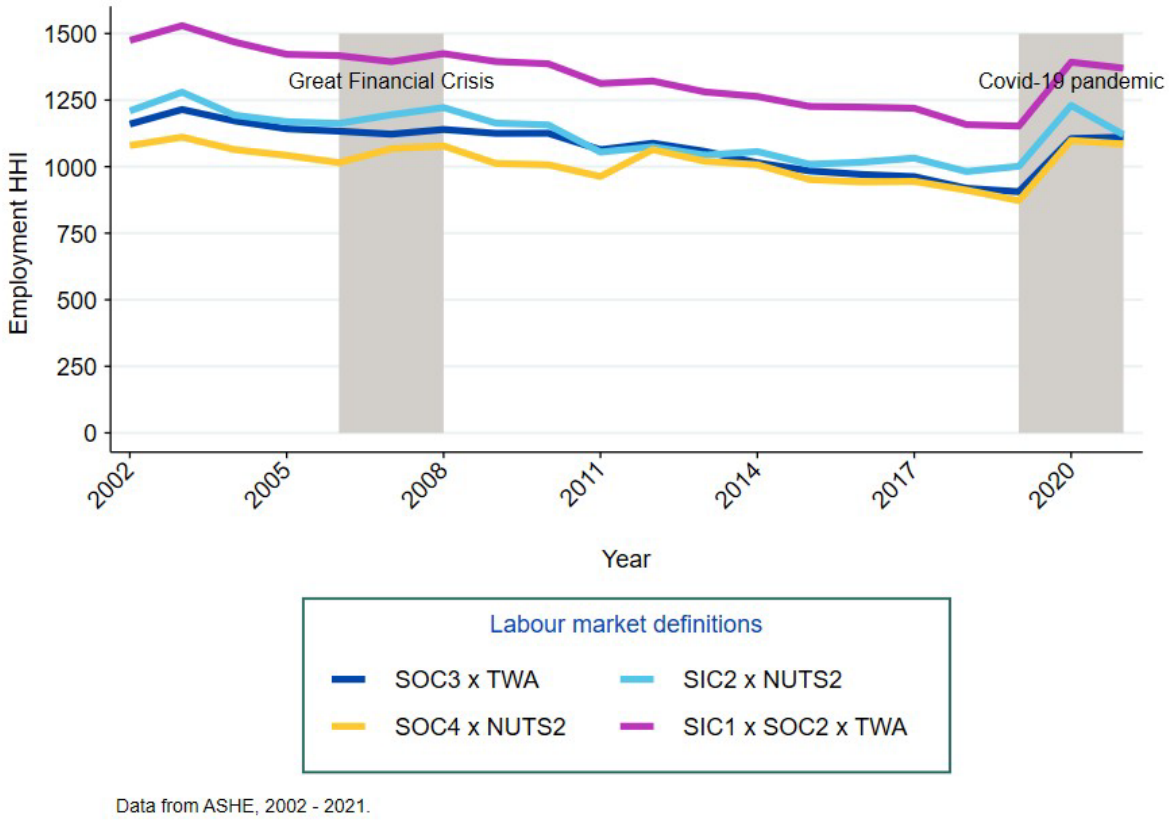
Share of workers operating in low-, medium-, and high-concentration labour markets over time. Concentration is the labour market Herfindahl Hirschman Index (HHI), with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



Data from ASHE, 2002 - 2021.

8. *Labour market concentration has been steady or declining over the past twenty years, across various definitions of labour markets*

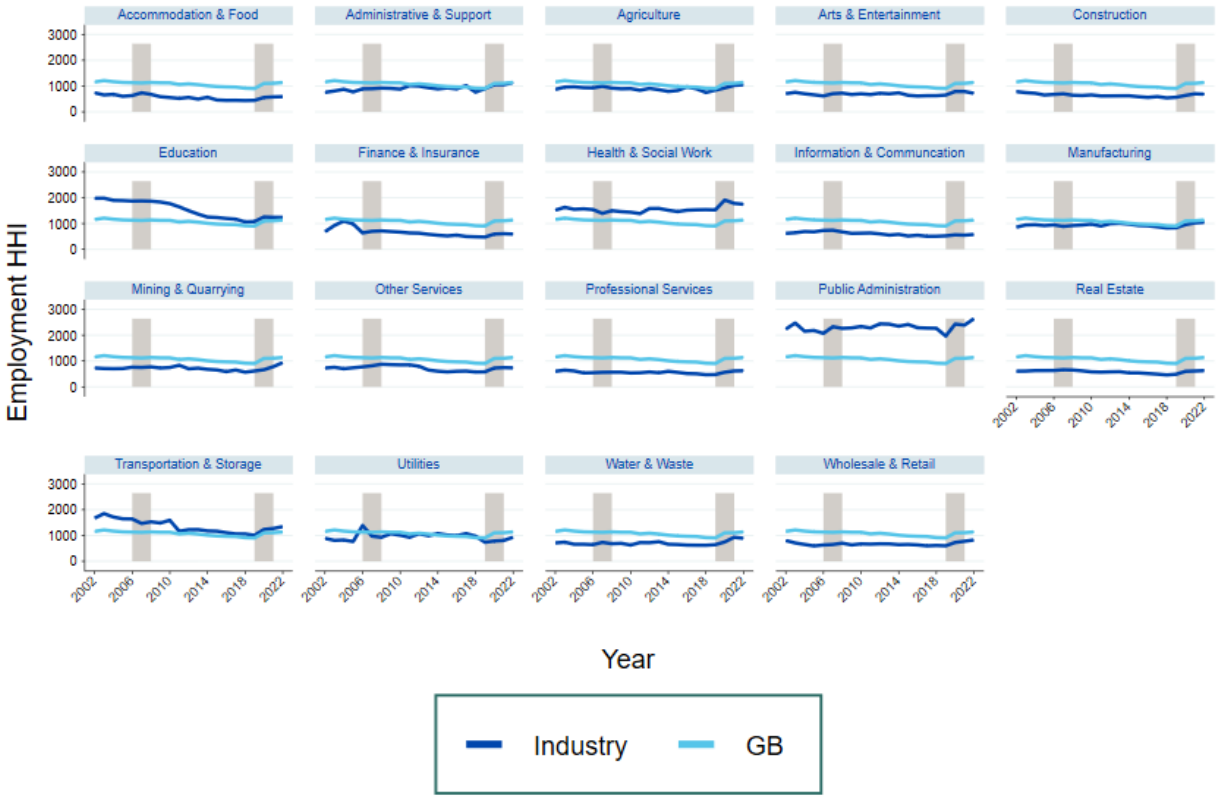
Whole-economy mean labour market Herfindahl Hirschman Index (HHI) for Great Britain across four labour market definitions, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



Data from ASHE, 2002 - 2021.

9. *Great Britain employer market concentration by industry has either stayed flat or steadily declined*

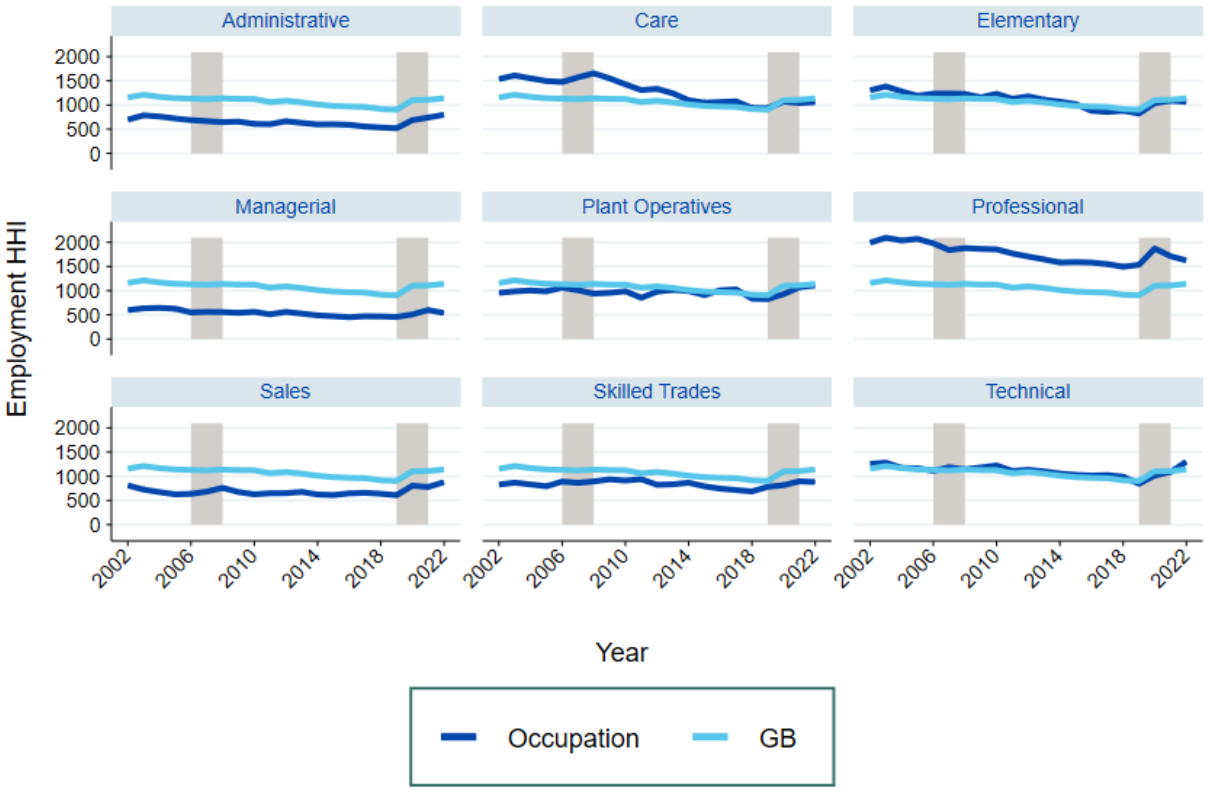
Regional mean labour market Herfindahl Hirschman Index (HHI) with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



Data from ASHE, 2002 - 2022.
Shaded regions: Great Financial Crisis and Covid-19 pandemic.

10. Great Britain employer market concentration has fallen in Professional and Care occupations, but is relatively steady in other occupations

Occupational mean labour market Herfindahl Hirschman Index (HHI) with labour markets defined as 3-digit Standard Occupation Classification byTravel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



Data from ASHE, 2002 - 2022.
Shaded regions: Great Financial Crisis and Covid-19 pandemic.

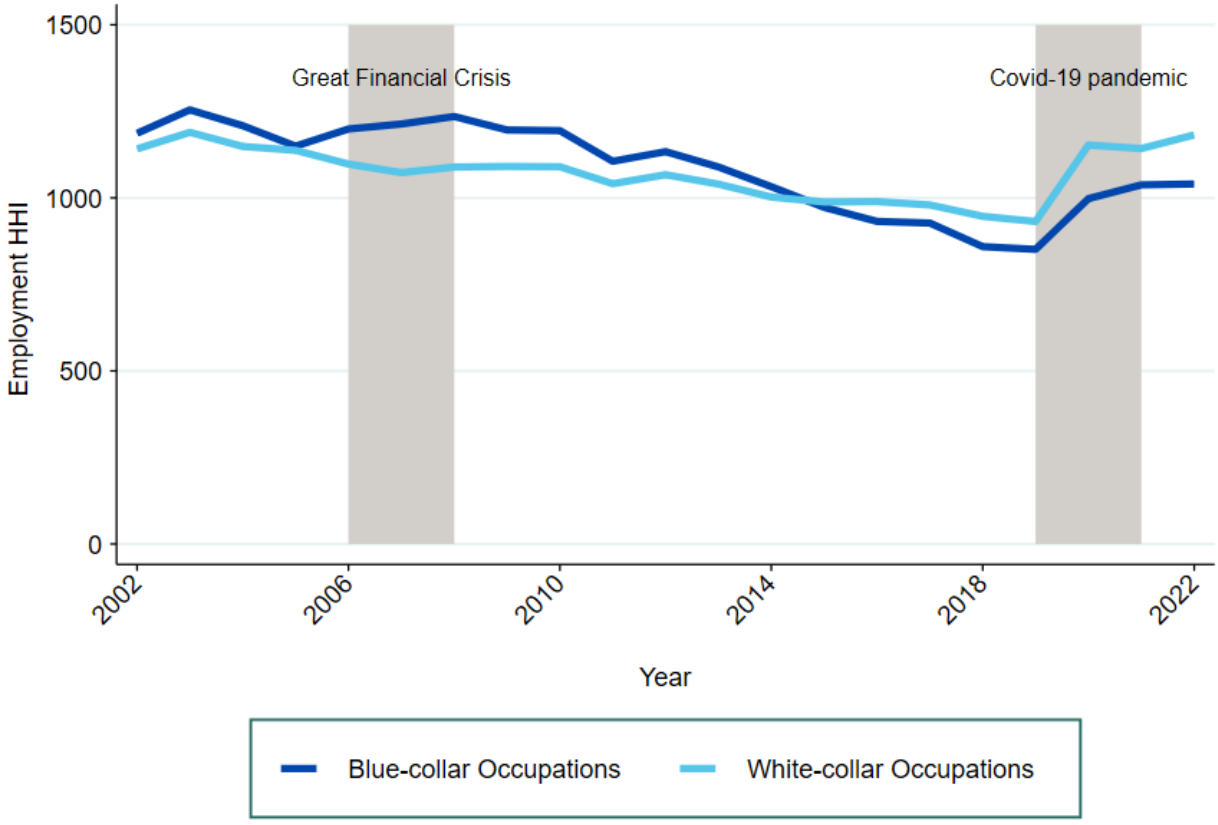
11. Great Britain employer market concentration is above the economy-wide average in Scotland and Wales, and lower in London

Regional mean labour market Herfindahl Hirschman Index (HHI) with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022

Data from ASHE, 2002 - 2022.
Shaded regions: Great Financial Crisis and Covid-19 pandemic.

12. Great Britain employer market concentration declined in both blue-collar and white-collar occupations, but faster in blue-collar jobs

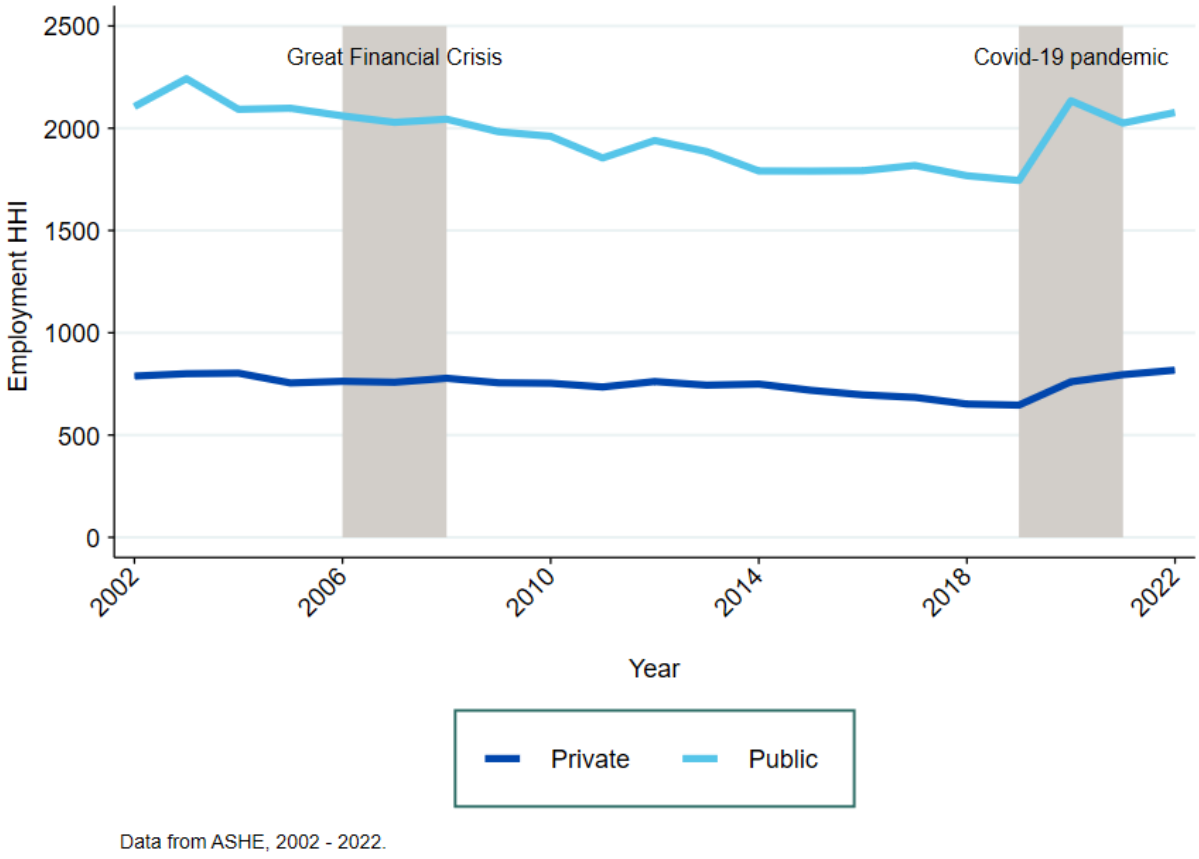
Mean labour market Herfindahl Hirschman Index (HHI) for blue-collar and white-collar occupations, with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



Data from ASHE, 2002 - 2022.

13. Great Britain employer market concentration is higher in the Public sector, but declined more over the period than in the Private sector

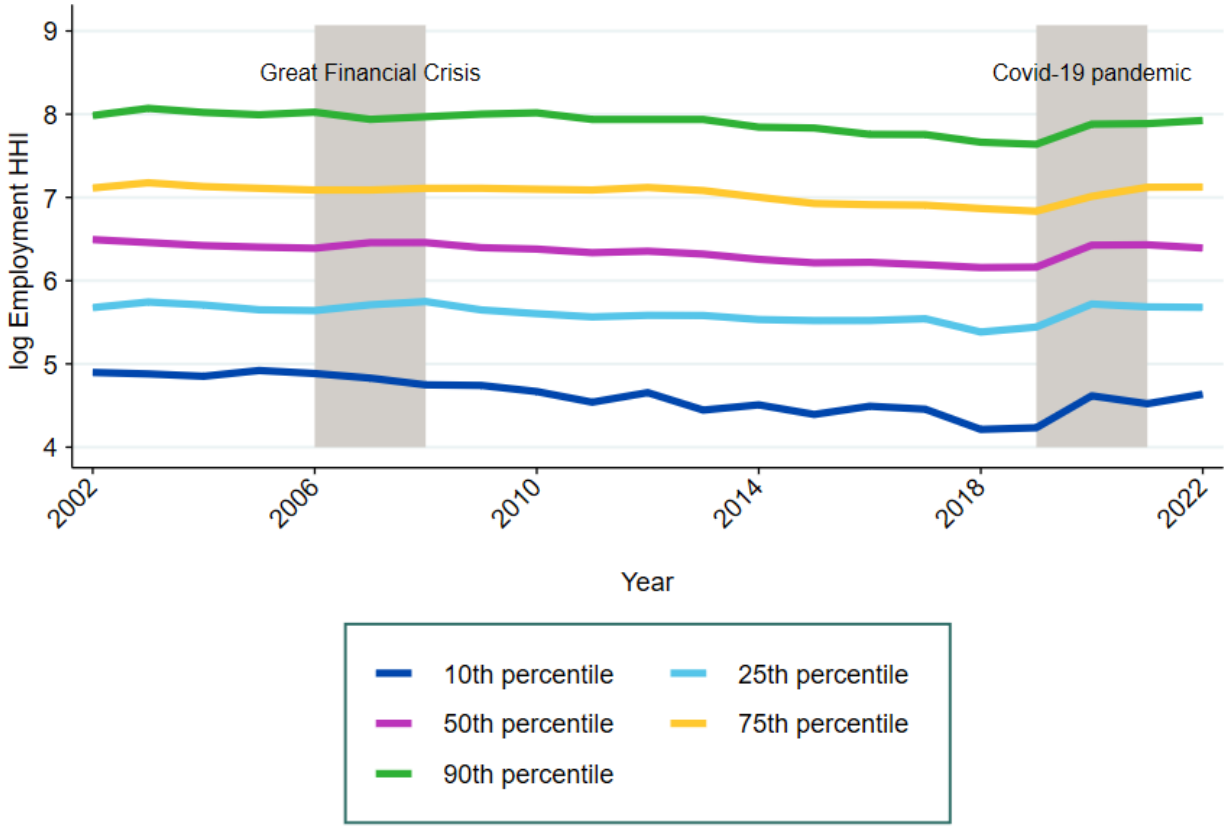
Mean labour market Herfindahl Hirschman Index (HHI) for the Public and Private sectors, with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



Data from ASHE, 2002 - 2022.

14. Great Britain employer market concentration has been flat for the most-concentrated labour markets but has fallen for the least-concentrated labour markets

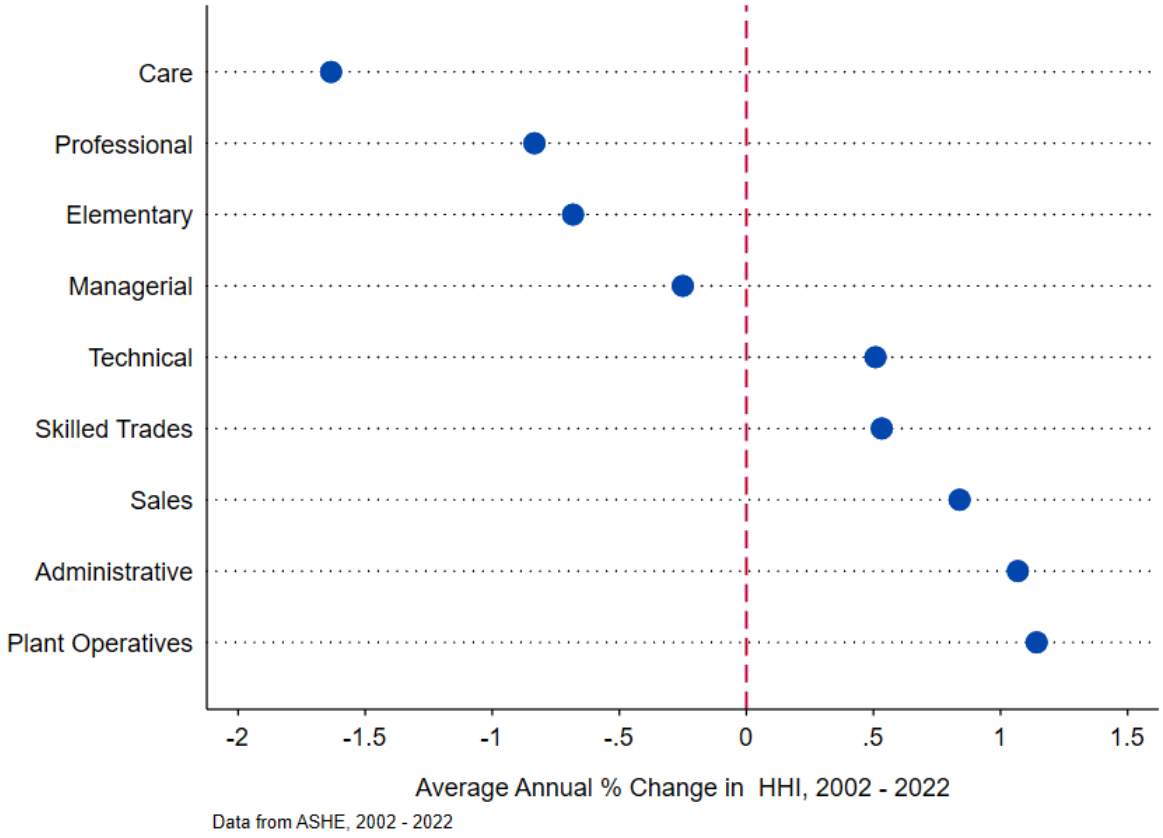
Percentiles of whole-economy labour market Herfindahl Hirschman Index (HHI), with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



Data from ASHE, 2002 - 2021.

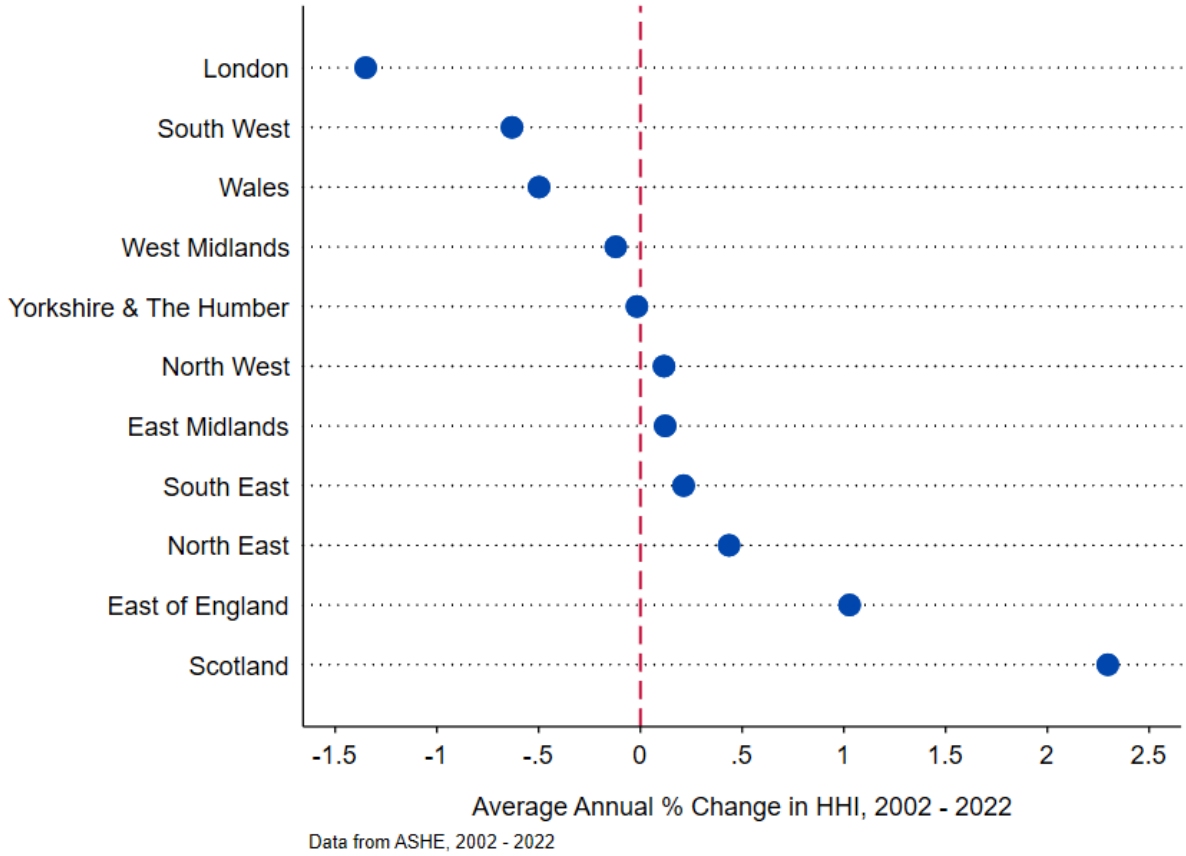
15. Great Britain employer market concentration has increased most for those working in Administrative and Plant Operative occupations, and has fallen the most for Care employees

Average growth in labour market Herfindahl Hirschman Index (HHI) by occupation, with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



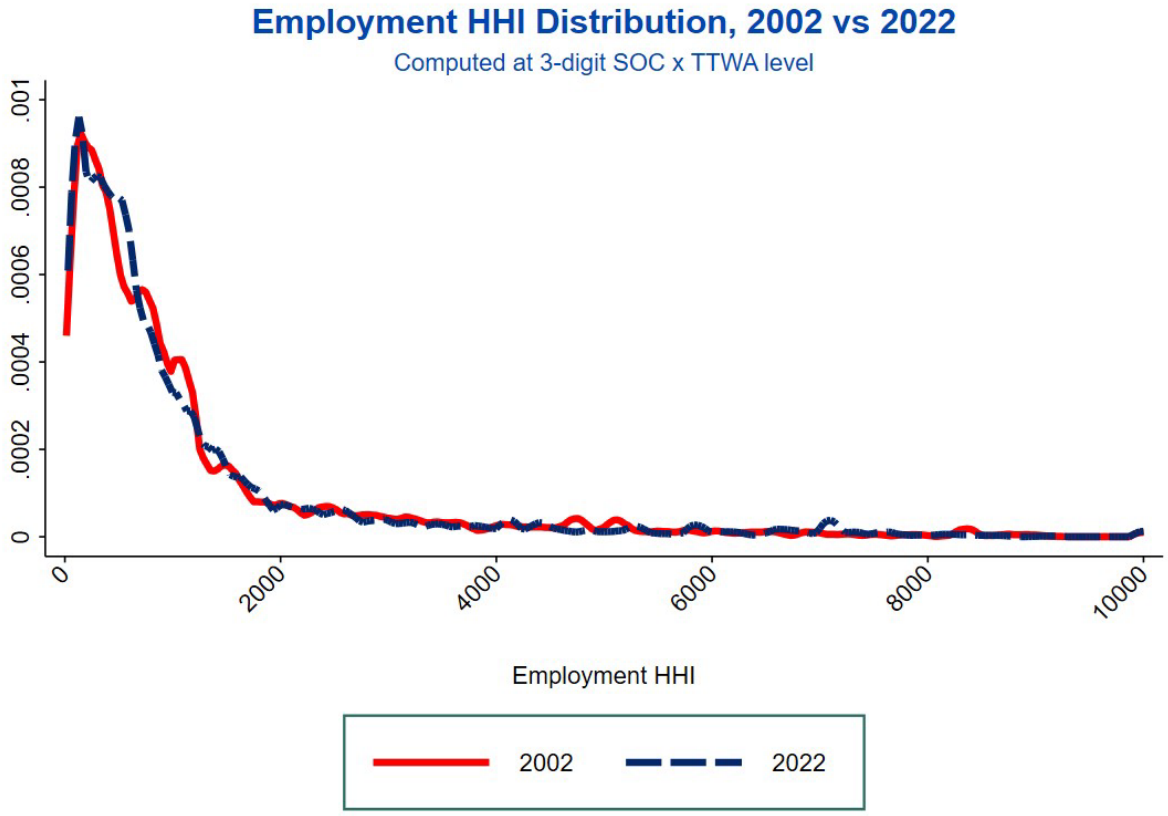
16. Great Britain employer market concentration has increased most for those working in Scotland, and has fallen the most for London workers

Average growth in labour market Herfindahl Hirschman Index (HHI) by region, with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



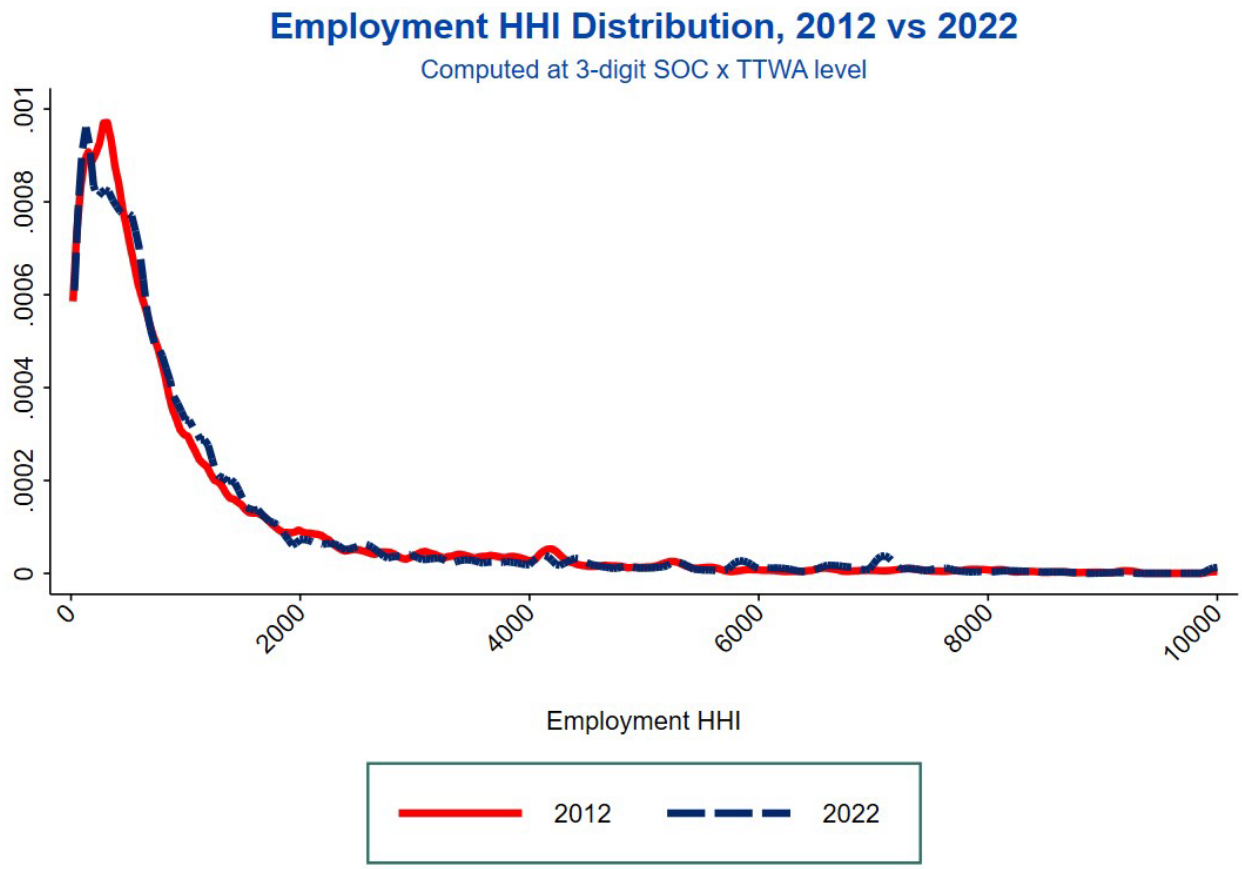
17. The distribution of British employer market concentration has been quite stable from 2002 to 2022

Kernel-smoothed histogram of labour market Herfindahl Hirschman Index (HHI), with labour markets defined as 3-digit Standard Occupation Classification xby Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 20022022



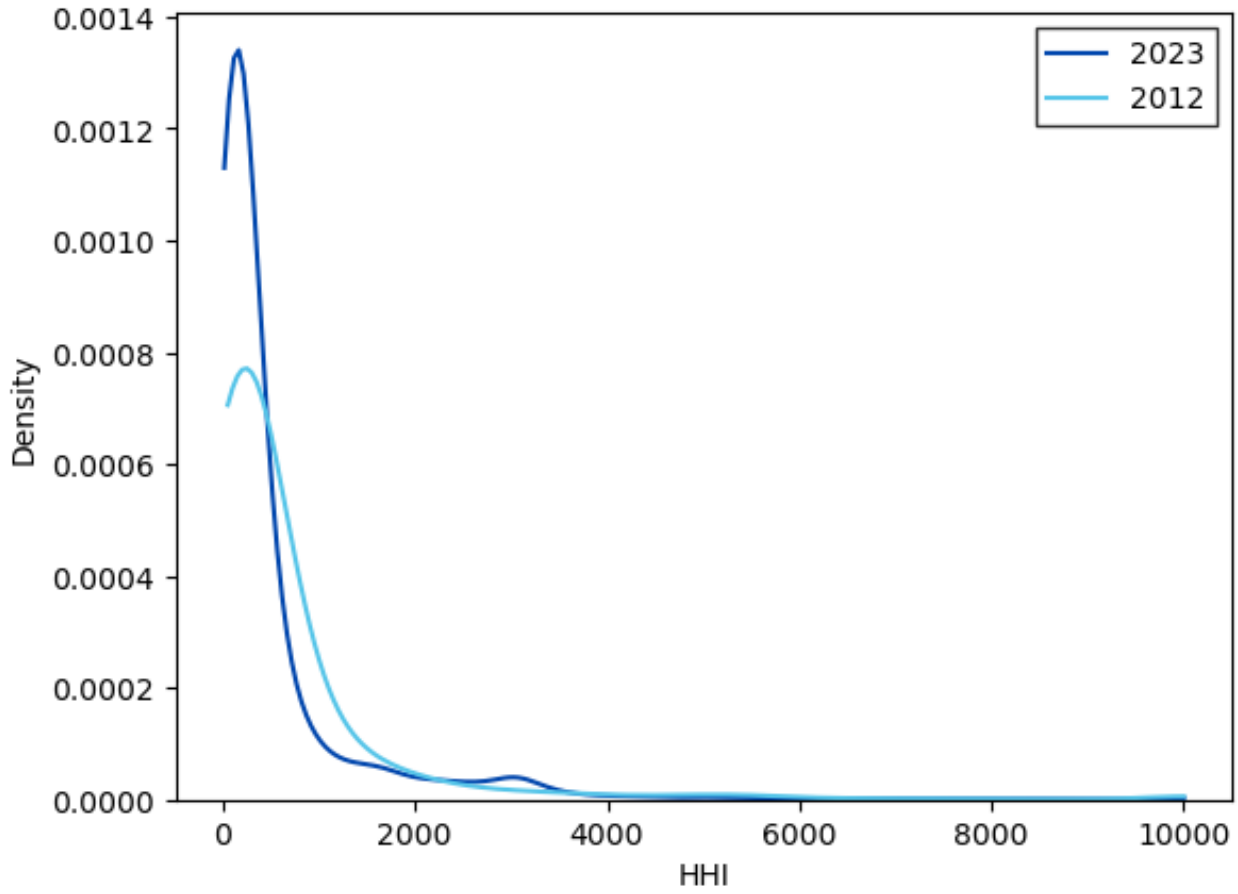
18. The distribution of British employer market concentration has been quite stable from 2012 to 2022

Kernel-smoothed histogram of labour market Herfindahl Hirschman Index (HHI), with labour markets defined as 3-digit Standard Occupation Classification by Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), GB, 2002-2022



19. Vacancies have become less concentrated over time

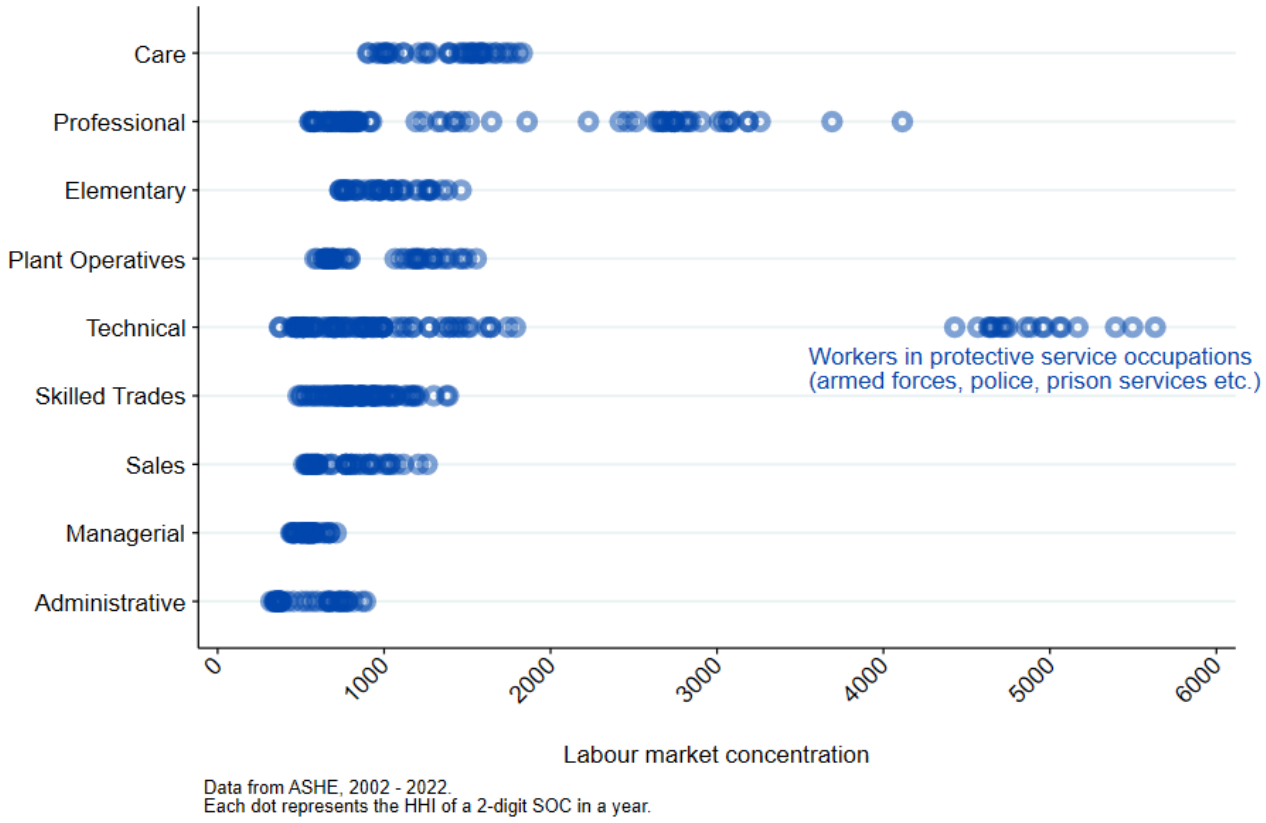
Distribution of vacancy Herfindahl-Hirschman Index (HHI), calculated at Travel to Work Area x 3-digit Standard Occupational Classification level using Lightcast vacancy data, 2012Q1 and 2023Q1, UK



Data from Lightcast, 2012Q1 and 2023Q1. HHI calculated at the Travel to Work Area x 3-digit Standard Occupational Classification level for each quarter.

20. Great Britain labour market concentration by 2-digit occupations within 1-digit occupations

Mean two-digit Standard Occupation Classification (SOC) labour market Herfindahl Hirschman Index (HHI), sorted by average 1-digit SOC HHI, from the Annual Survey of Hours and Earnings (ASHE), Great Britain, 2002-2022



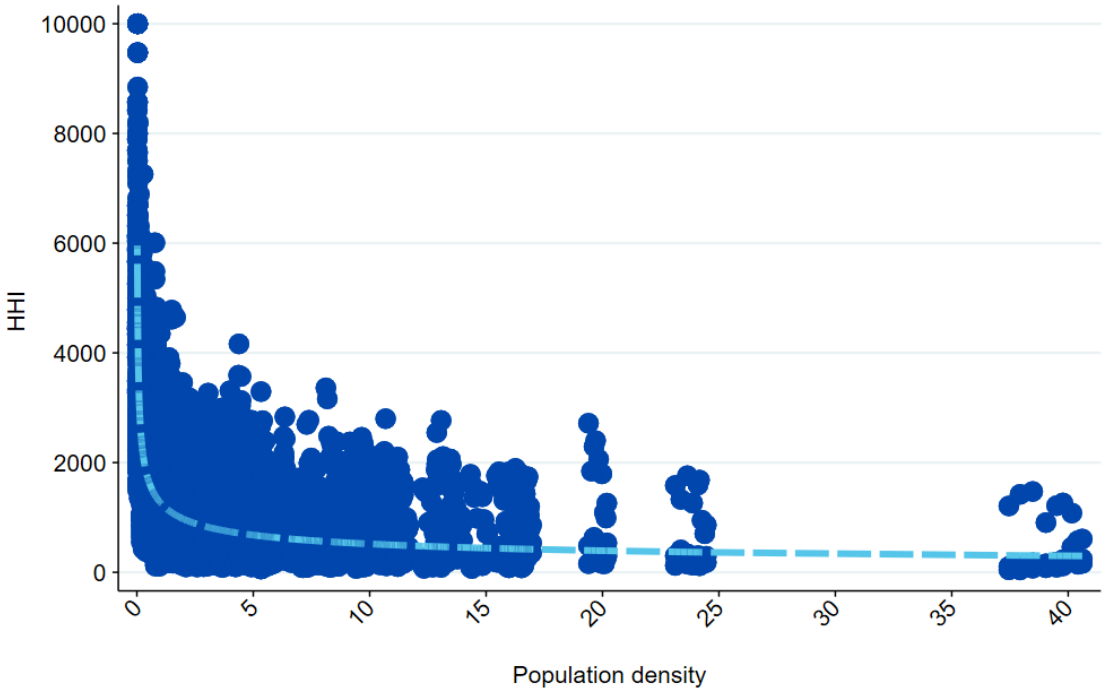
Data from ASHE, 2002 - 2022.
Each dot represents the HHI of a 2-digit SOC in a year.

21. Great Britain labour market concentration by 2-digit regions within 1-digit regions

Mean two-digit Nomenclature of Territorial Units for Statistics (NUTS) labour market Herfindahl Hirschman Index (HHI), sorted by average 1-digit NUTS HHI, from the Annual Survey of Hours and Earnings (ASHE), Great Britain, 2002-2022

22. Less densely populated areas face higher labour market concentration

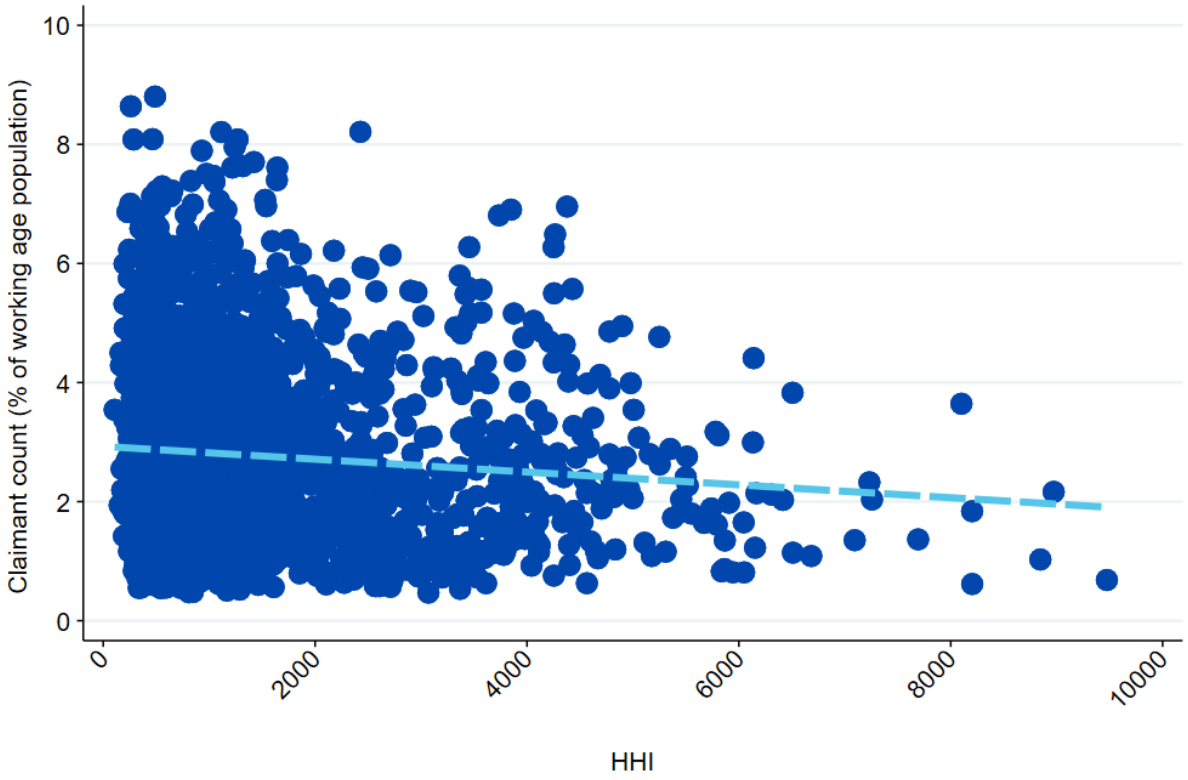
Scatterplot of population density against mean yearly labour market concentration, at the Travel to Work Area level, from Lightcast job vacancy data and published NISRA, NRS and, ONS data, UK, 2012-2020



HHI data from Lightcast, 2012-2020. HHI calculated at the Travel to Work Area (TTWA) x 3-digit Standard Occupational Classification level for each year and aggregated at TTWA level using number of job posts in the labour market as weight. Population density calculated by aggregating area size and mid year population estimates to TTWA level. Data from published NISRA, NRS, and ONS statistics. Line of best fit calculated using a log-log regression.

23. Vacancy concentration does not have an economically significant correlation with claimant counts

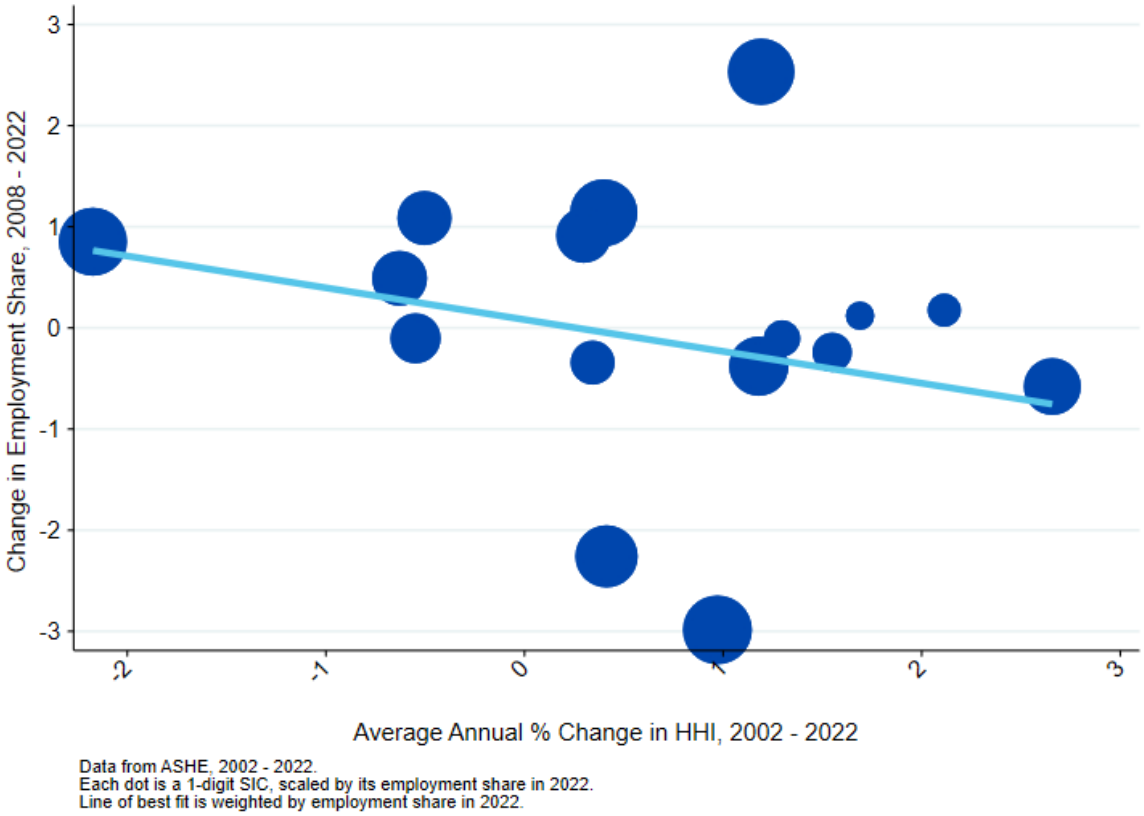
Scatterplot of mean HHI in a Travel to Work Area against claimant count, from Lightcast vacancy data 2012-2022 and published ONS data, UK



HHI data from Lightcast, 2012-2022. HHI calculated at the Travel to Work Area (TTWA) x 3-digit Standard Occupational Classification level for each year and aggregated at TTWA level using number of job posts in the labour market as weight. Claimant count and working age population data from published ONS statistics.

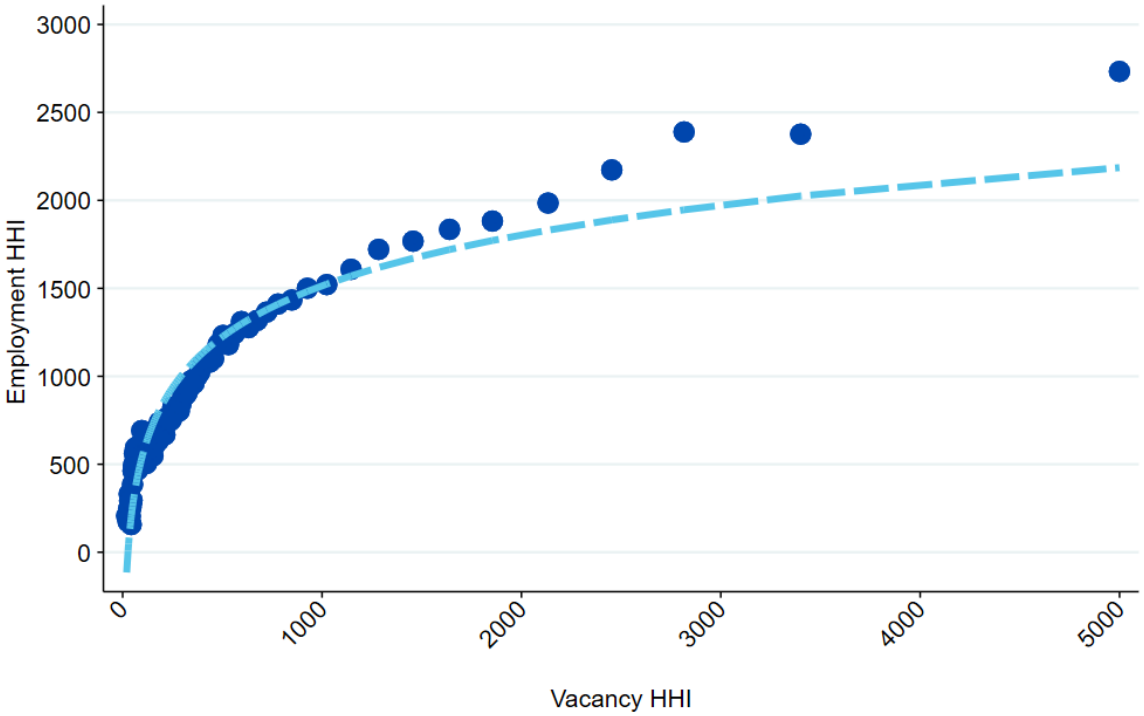
24. Many industries that exhibited a rise in the average annual change in HHI also shrunk as a share of total British employment

Scatterplot of the average annual % change in HHI at the 1-digit Standard Industry Classification between 2002 – 2022, against the change in employment share between 2008 – 2022. Line of best fit is weighted by the industry-level employment share in 2022. Data from the Annual Survey of Hours and Earnings (ASHE), GB, 2002022.



25. The relationship between employment and vacancy Herfindahl-Hirschman Indices (HHI) appears to be log-linear

Correlation between binned vacancy and employment HHI, using ASHE and Lightcast, GB, 2013-2021



HHI calculated at Travel to Work Area x 3-digit Standard Occupational Classification Level. Employment HHIs calculated yearly using data from ASHE, 2013-2021. Vacancy HHIs calculated quarterly using data from Lightcast, 2013Q1-2021Q4. Line of best fit calculated using linear-log regression. Vacancy HHIs have been binned in percentiles. Within the bins vacancy HHIs have been averaged using the number of vacancies as weight, and employment HHIs have been averaged using the number of employees as weight.

26. *Employment and vacancy Herfindahl-Hirschman Indices (HHI) are positively correlated, but there is a lot of noise.*

Scatterplot of yearly employment HHIs and quarterly vacancy HHIs, from ASHE and Lightcast, GB, 2012-2022

HHI calculated at Travel to Work Area x 3-digit Standard Occupational Classification Level. Employment HHIs calculated yearly using data from ASHE, 2013-2021. Vacancy HHIs calculated quarterly using data from Lightcast, 2013Q1-2021Q4. Each dot represents a labour market. Line of best fit calculated using linear-log regression.

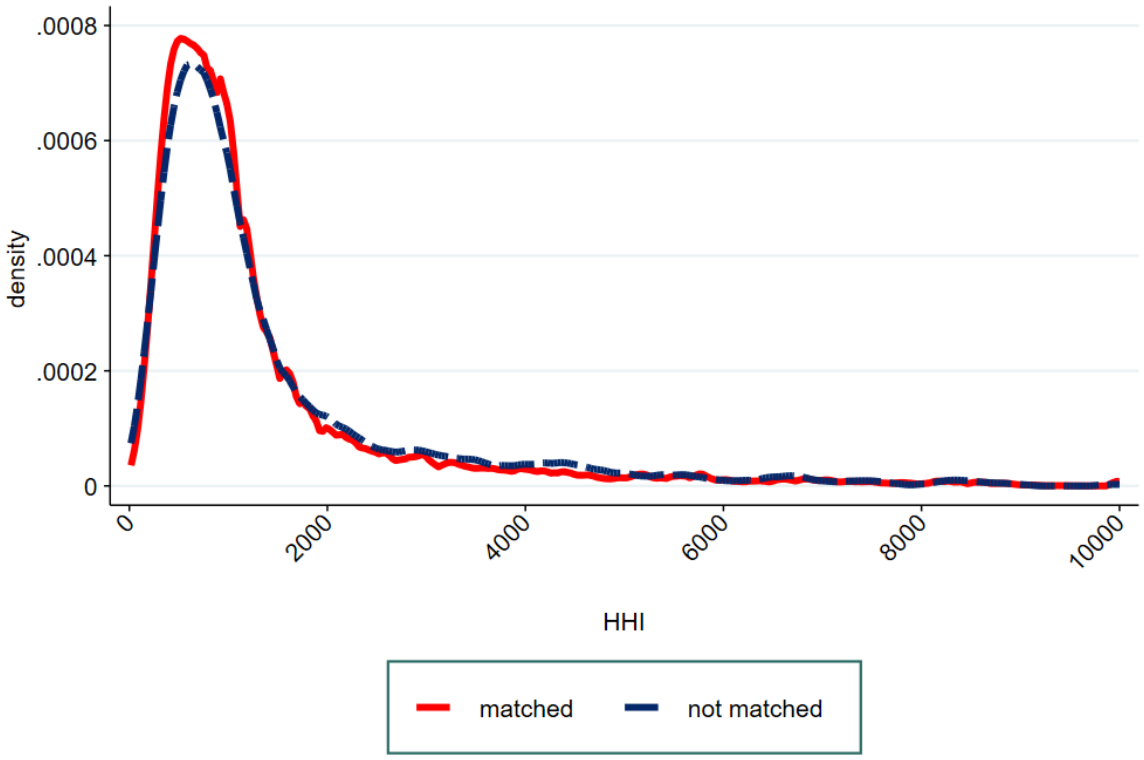
27. Average Herfindahl-Hirschman Indices (HHI) at the labour market level, averaged across time, are also positively correlated and noisy. Herfindahl-Hirschman

Scatterplot of employment and vacancy HHIs averaged over time, using ASHE and Lightcast, GB, 2013-2021

HHI calculated at Travel to Work Area x 3-digit Standard Occupational Classification Level. Employment HHIs calculated yearly using data from ASHE, 2013-2021. Vacancy HHIs calculated quarterly using data from Lightcast, 2013Q1-2021Q4. HHIs are averaged across time at the labour market level.

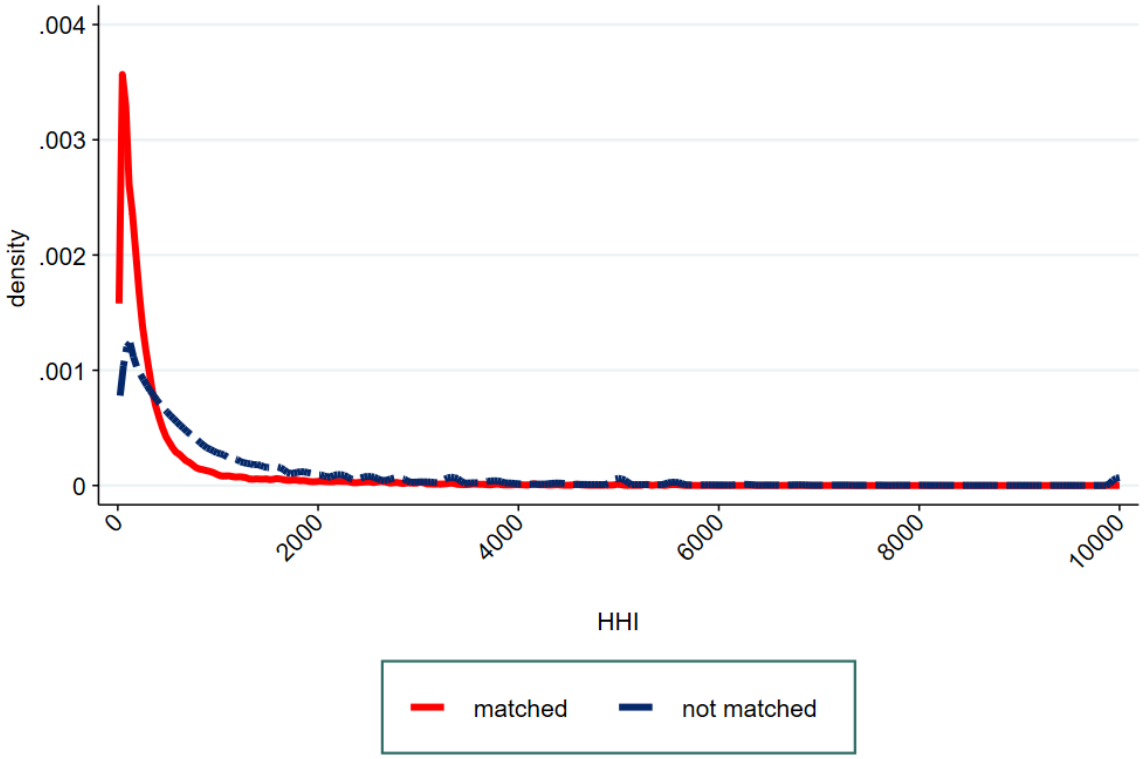
28. The labour markets that are common across the ASHE and Lightcast vacancy data from 2013-2021 are representative of all labour markets in ASHE, but tend to be less concentrated labour markets from Lightcast

Panel 1: Estimated distribution of the Herfindahl-Hirschman Index (HHI) across labour markets in ASHE, GB, 2013-2021



HHI calculated at Travel to Work Area x 3-digit Standard Occupational Classification Level. Employment HHIs calculated yearly using data from ASHE, 2013-2021. Each labour market is weighted by its share of employment.

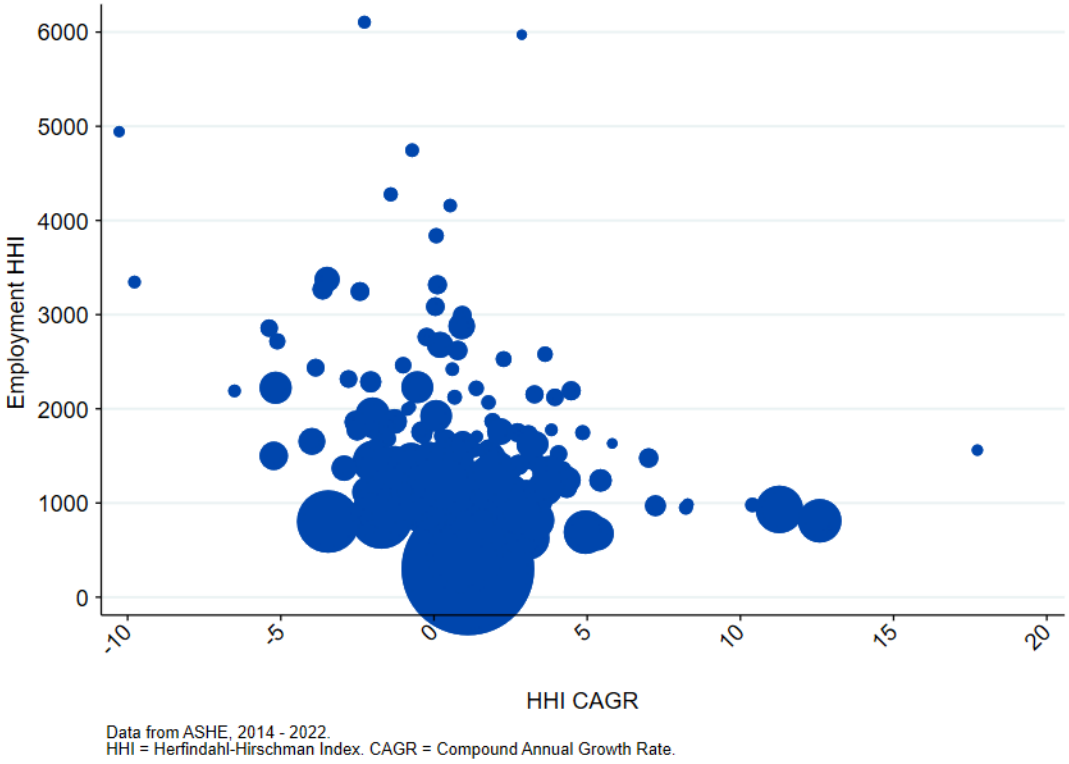
Panel 2: Estimated distribution of the quarterly Herfindahl-Hirschman Index (HHI) across labour markets in Lightcast, UK, 2013Q1-2021Q4



HHI calculated at Travel to Work Area x 3-digit Standard Occupational Classification Level. Vacancy HHIs calculated quarterly using data from Lightcast, 2013Q1-2021Q4. Each labour market is weighted by its share of vacancies.

29. *Slight negative correlation between baseline Herfindahl-Hirschman Indices (HHI) at the Travel to Work Area (TTWA) level, and growth of the HHI*

Scatterplot of employment HHI at the TTWA level in 2014, compared to the Compound Annual Growth Rate (CAGR) in employment HHI from 2014 – 2022, using data from Annual Survey of Hours and Earnings (ASHE), GB, 2014 – 2022.

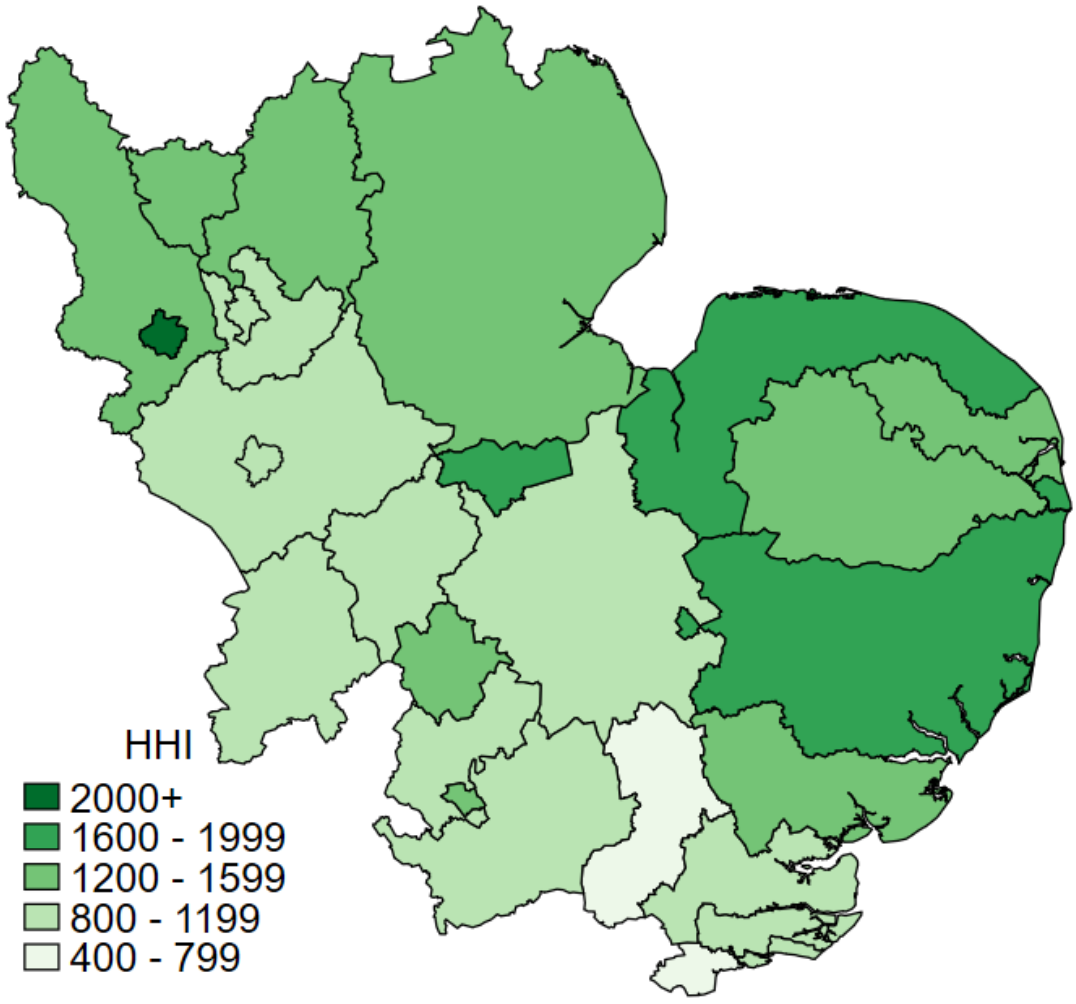


Data from ASHE, 2014 - 2022.
HHI = Herfindahl-Hirschman Index. CAGR = Compound Annual Growth Rate.

Concentration maps

30. East Midlands and East of England labour market concentration averaged over 2002 – 2022

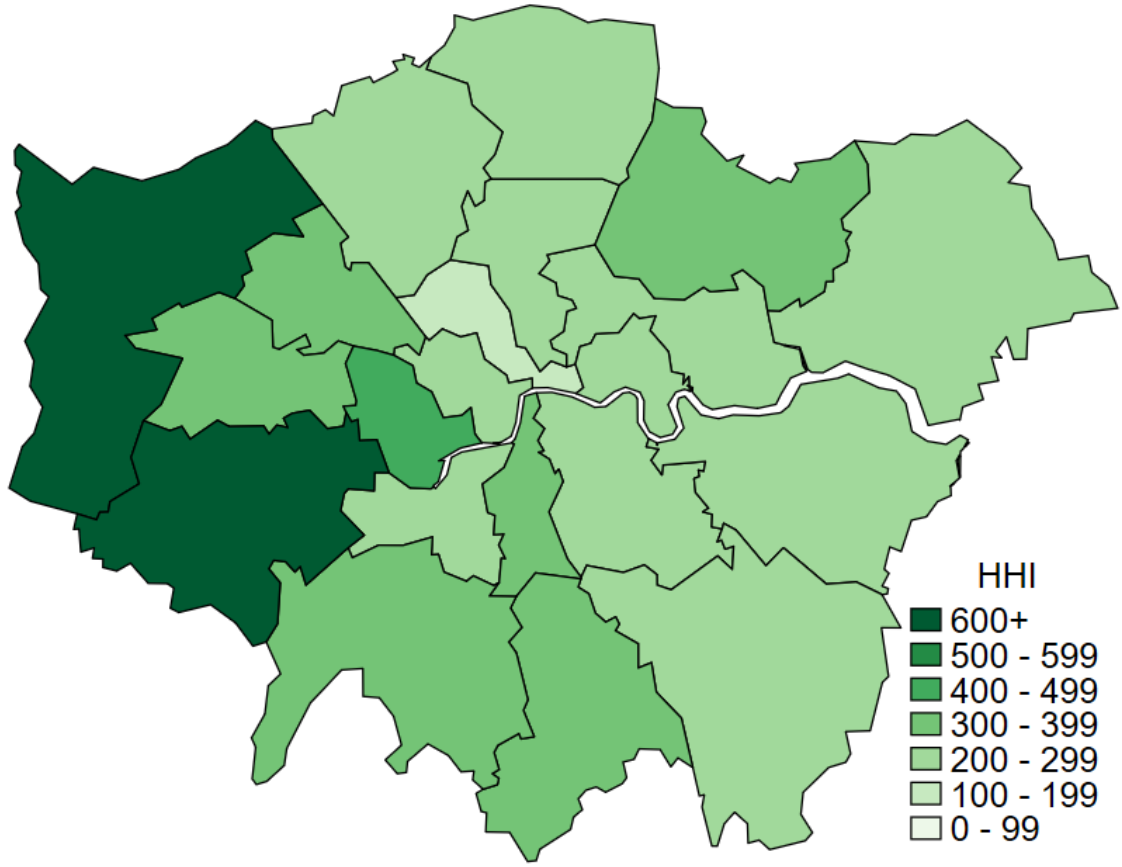
Mean labour market Herfindahl Hirschman Index (HHI) for East Midlands and East of England at NUTS3 level, with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), 2002-2022



Data from ASHE, 2002 - 2022.

31. London labour market concentration averaged over 2002 – 2022

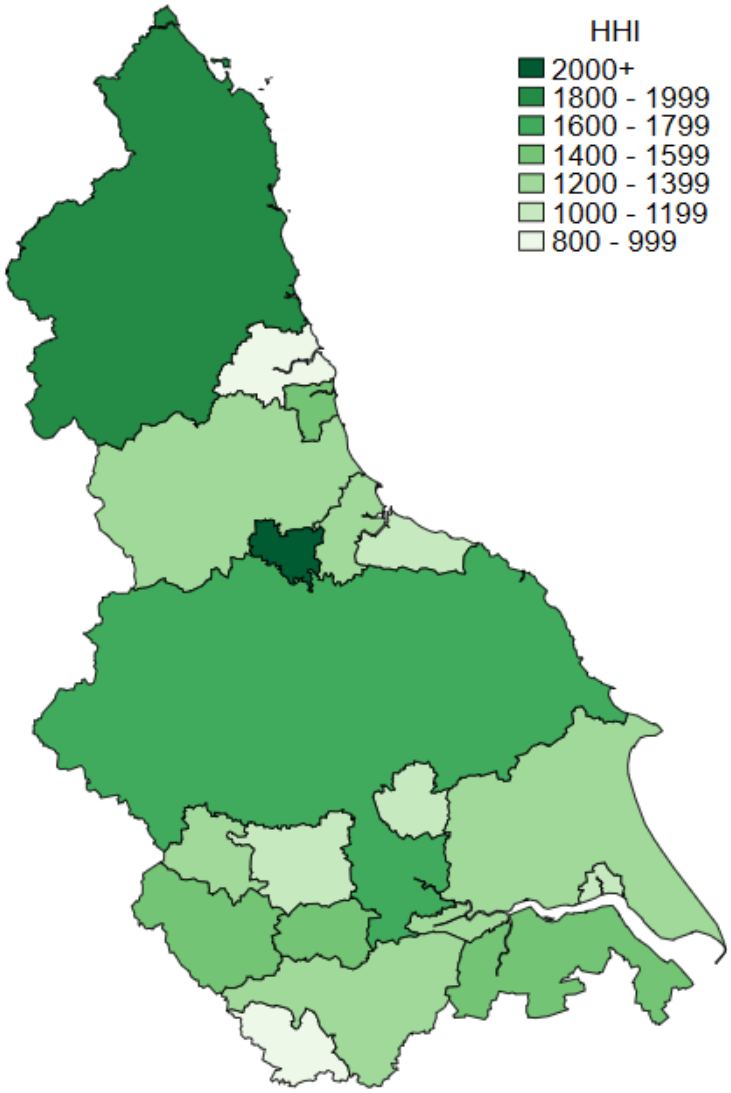
Mean labour market Herfindahl Hirschman Index (HHI) for London at NUTS3 level, with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), 2002-2022



Data from ASHE, 2002 - 2022.

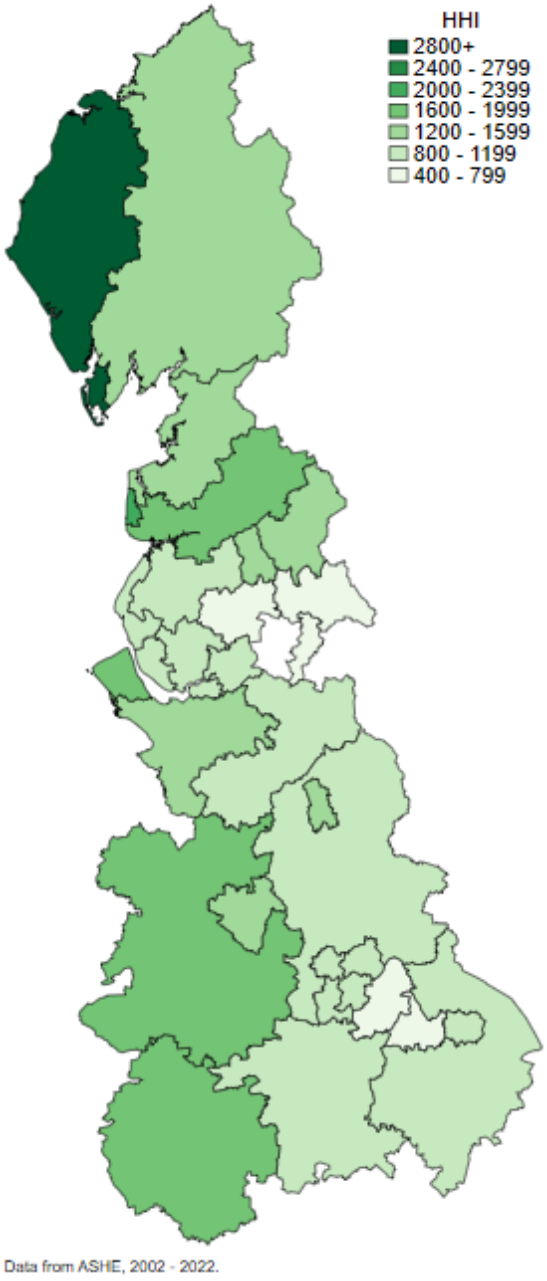
32. North East and Yorkshire labour market concentration averaged over 2002 – 2022

Mean labour market Herfindahl Hirschman Index (HHI) for the North East and Yorkshire at NUTS3 level, with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), 2002-2022



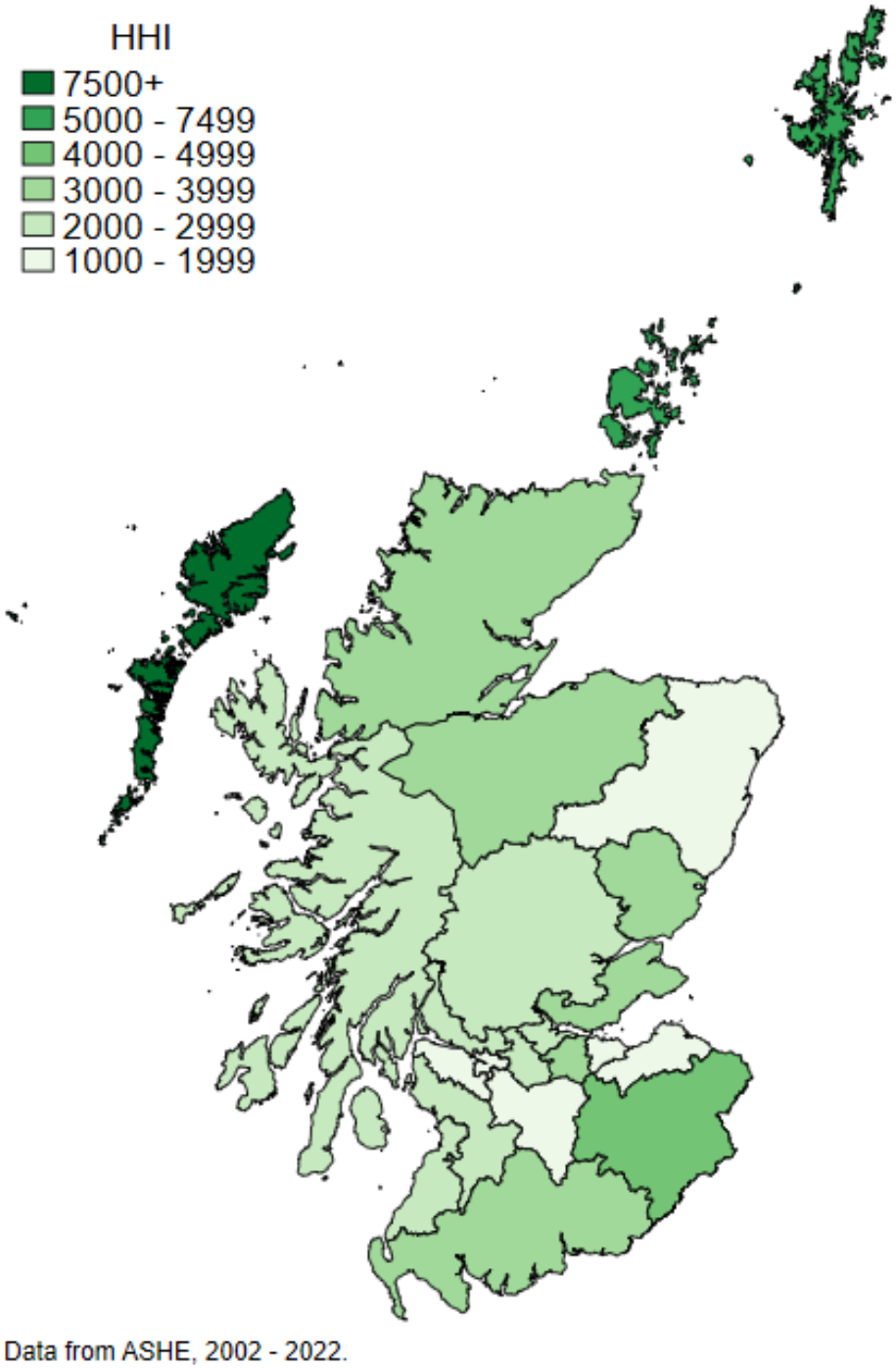
33. North West and West Midlands labour market concentration averaged over 2002 – 2022

Mean labour market Herfindahl Hirschman Index (HHI) for the North West and West Midlands at NUTS3 level, with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), 2002-2022



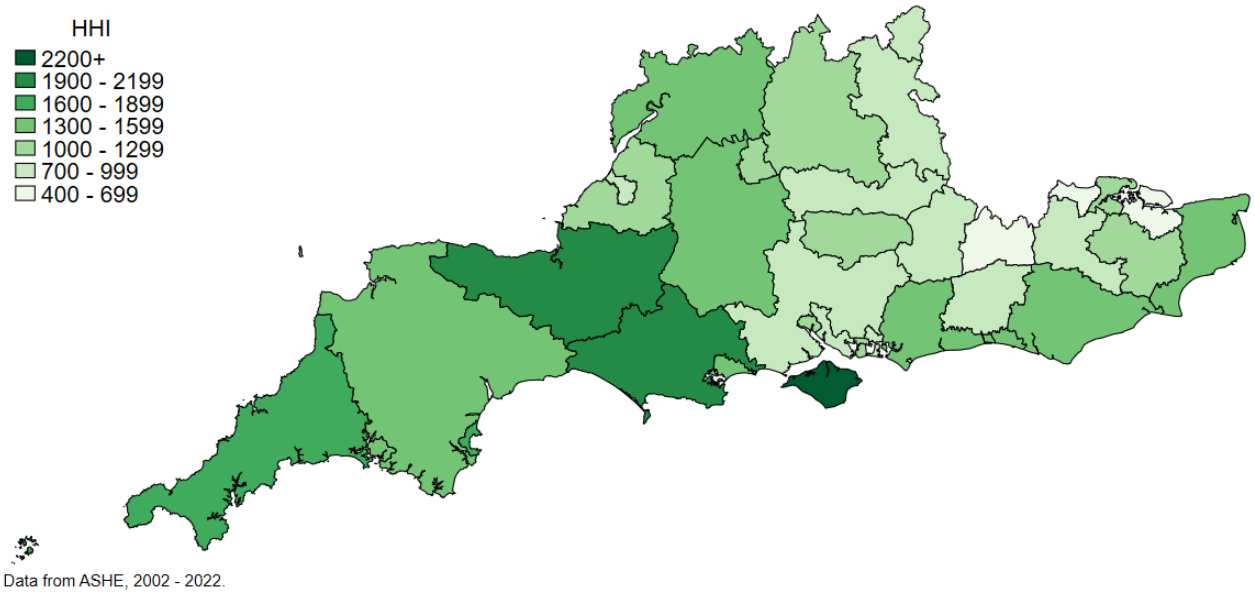
34. Scotland labour market concentration averaged over 2002 – 2022

Mean labour market Herfindahl Hirschman Index (HHI) for Scotland at NUTS3 level, with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), 2002-2022



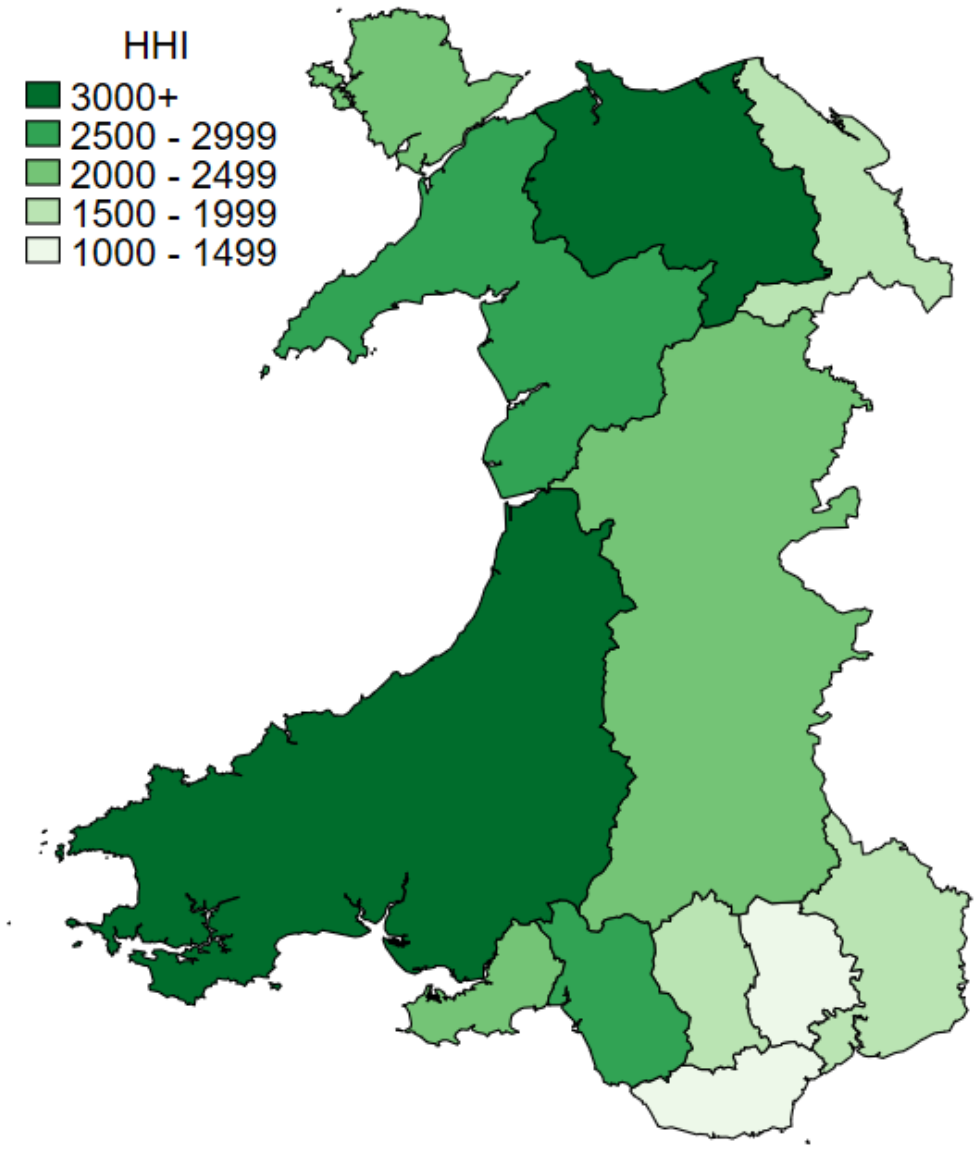
35. South England labour market concentration averaged over 2002 – 2022

Mean labour market Herfindahl Hirschman Index (HHI) for South England at NUTS3 level, with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), 2002-2022



36. Wales labour market concentration averaged over 2002 – 2022

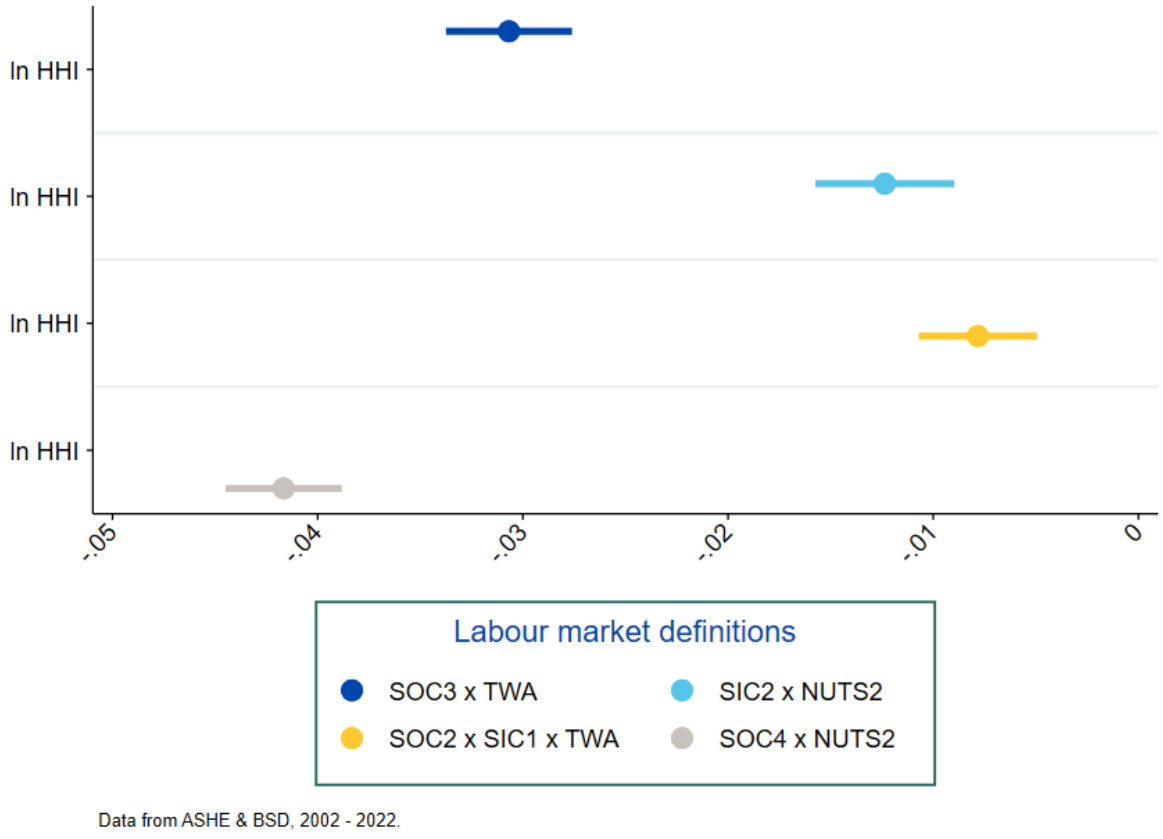
Mean labour market Herfindahl Hirschman Index (HHI) for Wales at NUTS3 level, with labour markets defined as 3-digit Standard Occupation Classification x Travel to Work Area, from the Annual Survey of Hours and Earnings (ASHE), 2002-2022



Labour market institutions & concentration figures

37. Negative elasticity of wage to labour market concentration in Great Britain averaged over 2002 – 2022, for four definitions of labour markets

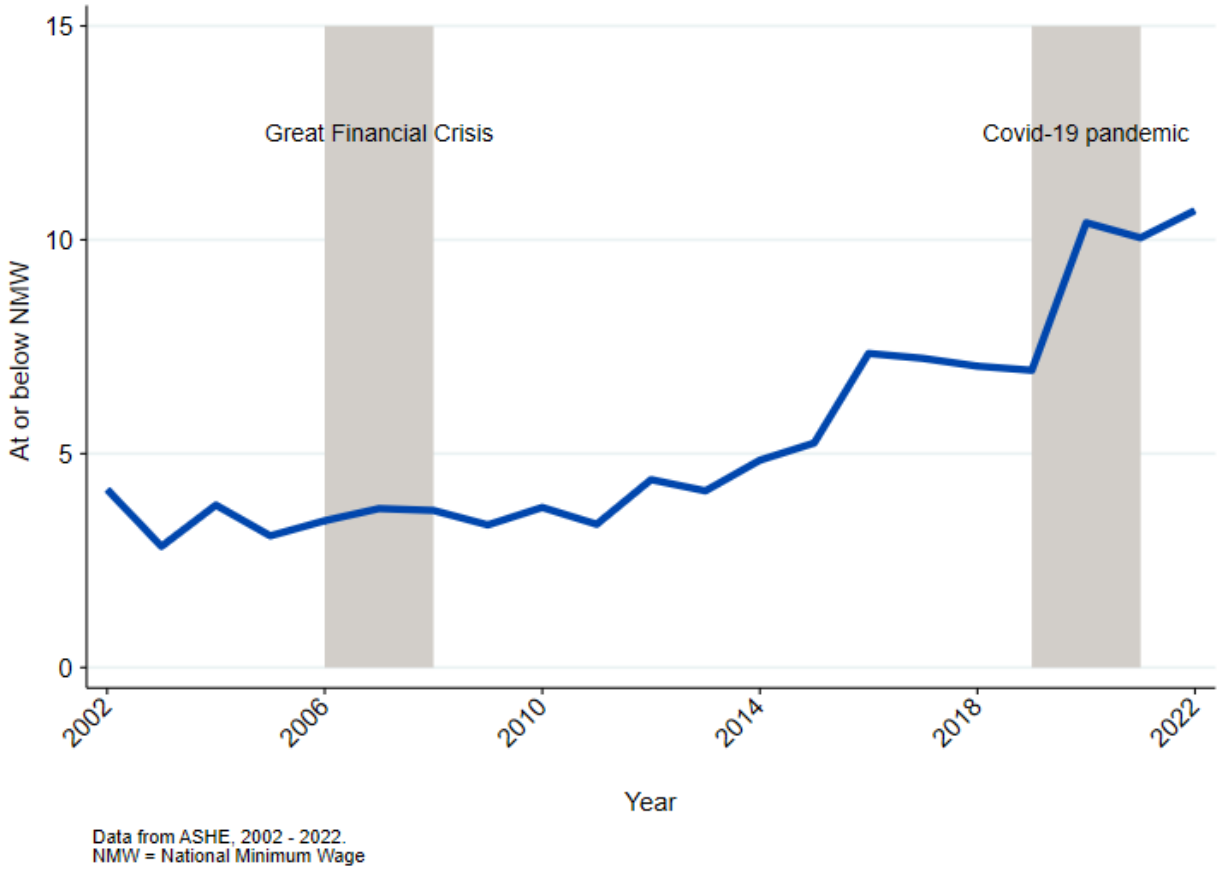
Estimated coefficients from regression of gross pay on employer Herfindahl Hirschman Index (HHI), controlling for worker and firm characteristics, and fixed effects for industry/occupation/region/year. Labour markets are defined at the Standard Occupation Classification (SOC) and/or Standard Industry Classification (SIC) and/or Travel to Work Area (TTWA) and/or Nomenclature of Territorial Units for Statistics (NUTS) levels. Data from the Annual Survey of Hours and Earnings (ASHE) and the Business Structure Database (BSD), GB, 2002 – 2022.



Data from ASHE & BSD, 2002 - 2022.

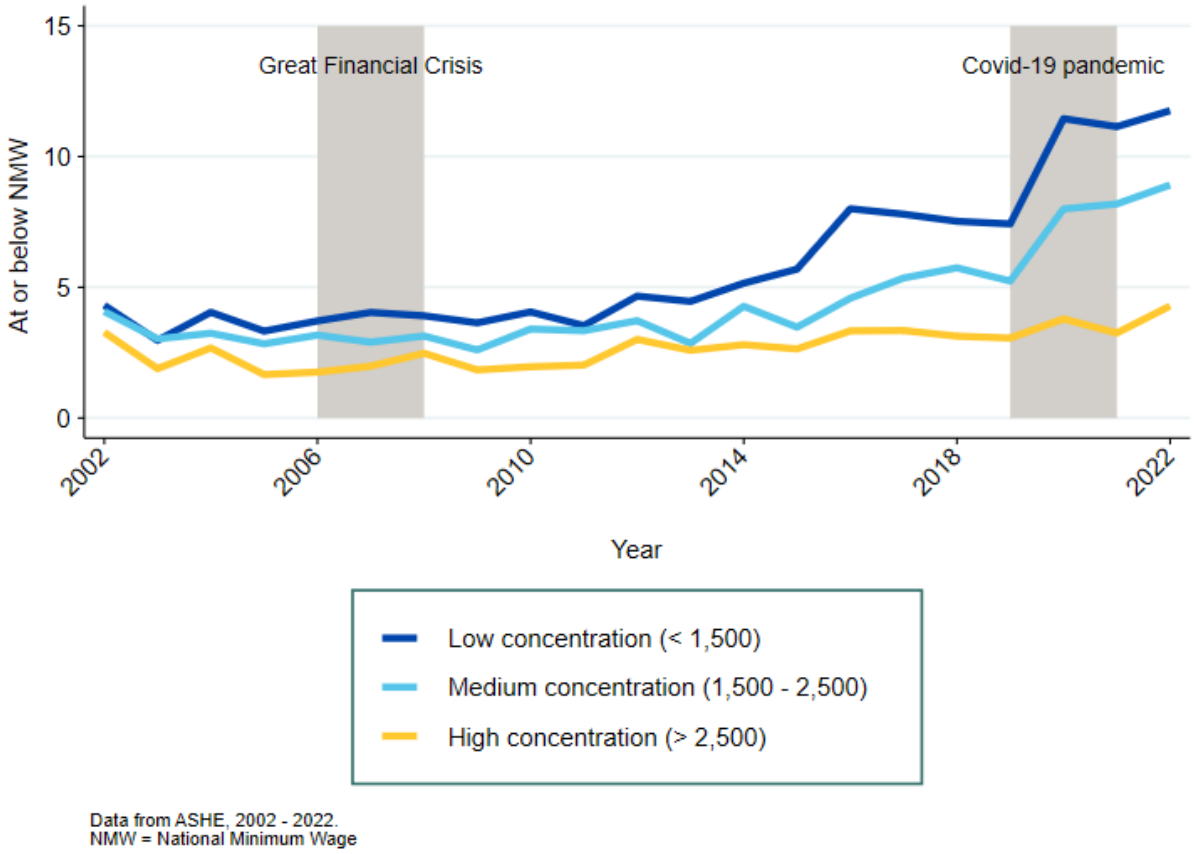
38. The share of workers at the National Minimum Wage (NMW) in Great Britain has steadily risen

Share of UK workers earning at or below the NMW from 2002 – 2022, computed using the Annual Survey of Hours and Earnings (ASHE), matching both year- and age-specific wage floors, GB



39. The share of workers at the National Minimum Wage (NMW) in Great Britain has risen most quickly in low-concentration labour markets

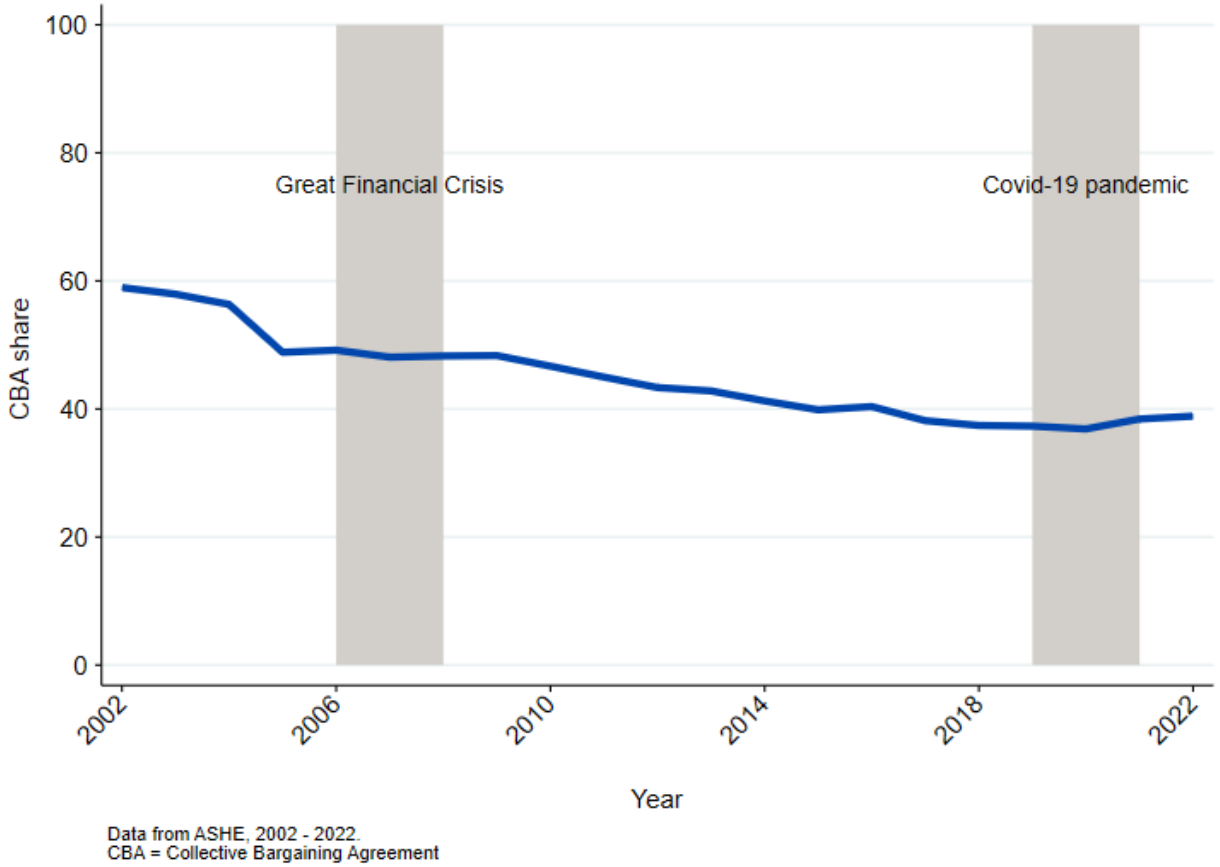
Share of UK workers earning at or below the NMW from 2002 – 2022 by employer Herfindahl Hirschman Index (HHI), computed using the Annual Survey of Hours and Earnings (ASHE), matching both year- and age-specific wage floors. Labour markets defined as 3-digit Standard Occupation Classification (SOC) x Travel to Work Area (TTWA), GB



Data from ASHE, 2002 - 2022.
NMW = National Minimum Wage

40. Declining coverage of Collective Bargaining Agreements (CBAs) in Great Britain

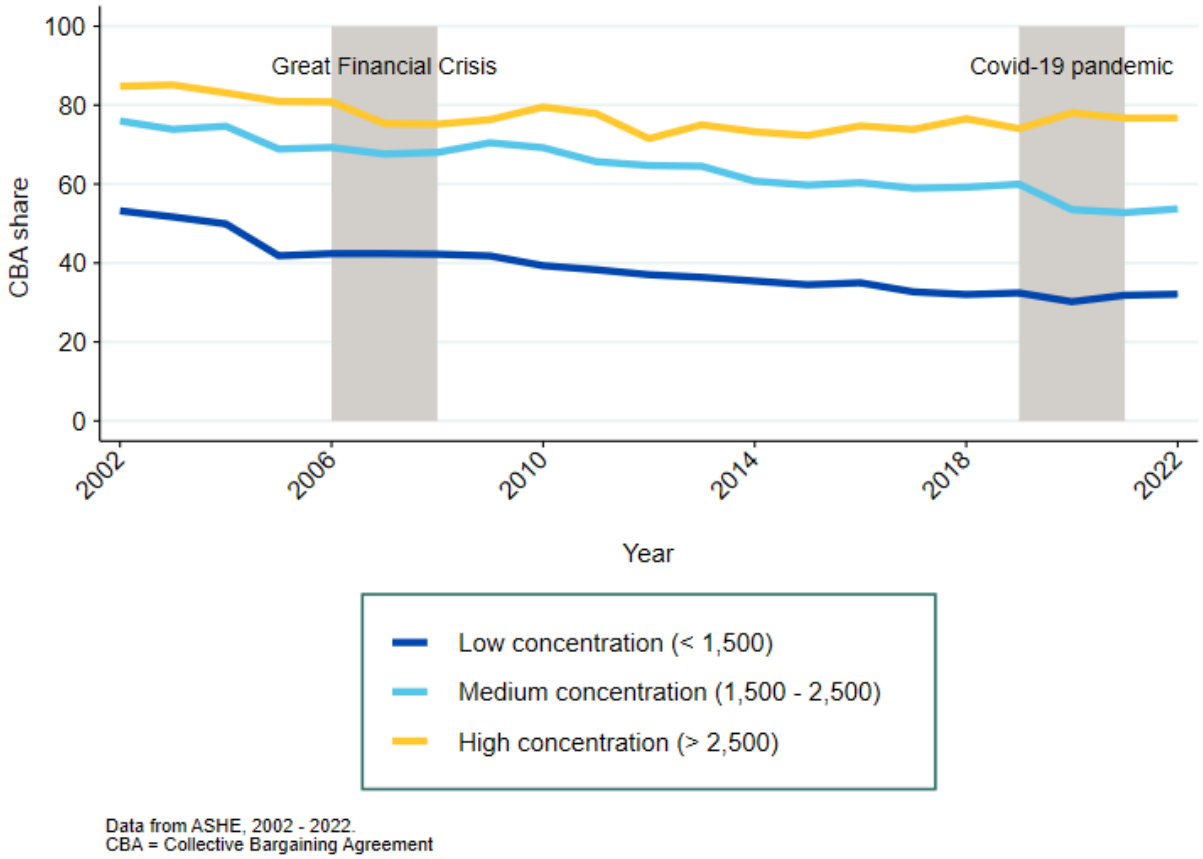
Share of employment covered by CBA in Great Britain, computed from the Annual Survey of Hours and Earnings (ASHE), GB, 2002 - 2022



Data from ASHE, 2002 - 2022.
CBA = Collective Bargaining Agreement

41. Declining coverage of Collective Bargaining Agreements (CBAs) in Great Britain, in medium- and low-concentration labour markets

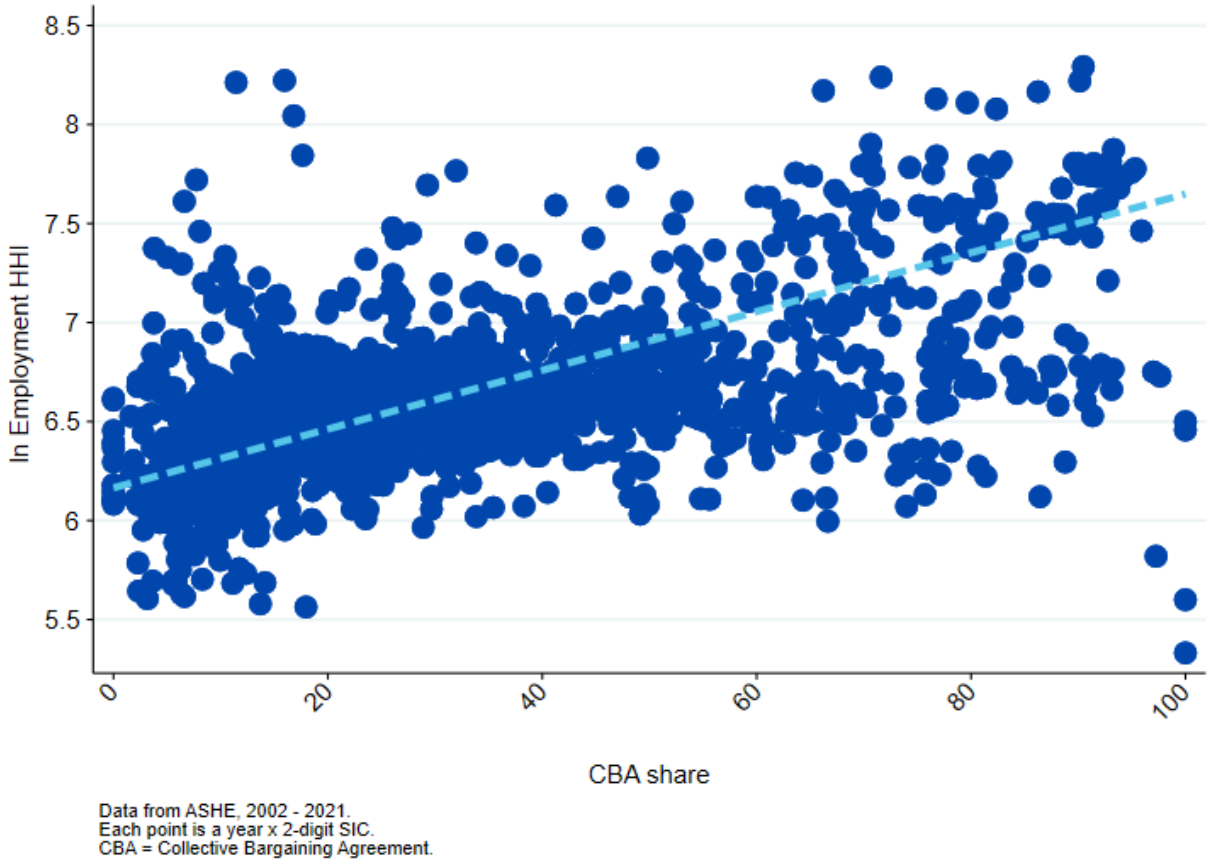
Share of employment covered by CBA in Great Britain, computed from the Annual Survey of Hours and Earnings (ASHE), 2002 – 2022. Calculated for different levels of employer Herfindahl Hirschman Index (HHI), with labour markets defined as 3-digit Standard Occupation Classification (SOC) x Travel to Work Area (TTWA), GB



Data from ASHE, 2002 - 2022.
CBA = Collective Bargaining Agreement

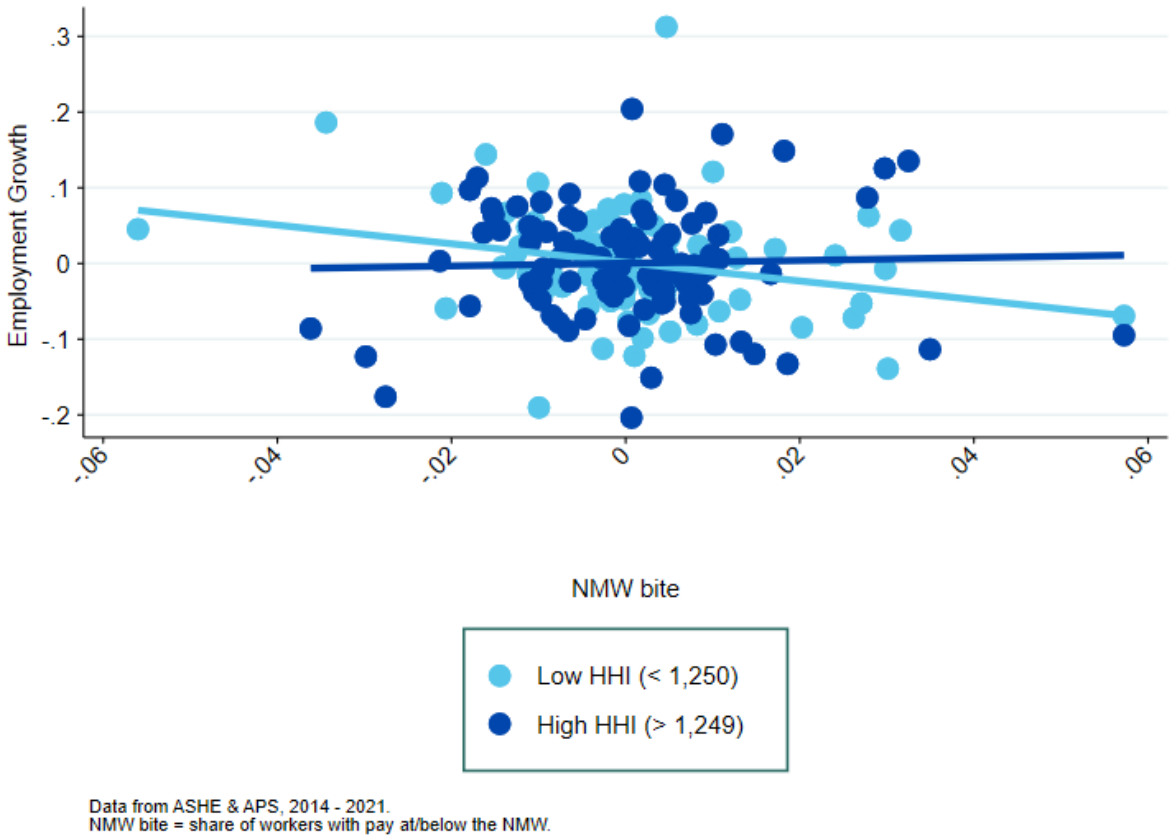
42. *Positive relationship between labour market concentration and Collective Bargaining Agreement (CBA) coverage*

Scatter of 2-digit Standard Industry Classification (SIC) by year relationship between the employer Herfindahl Hirschman Index (HHI) and the share of workers covered by CBAs. Labour markets defined as 3-digit Standard Occupation Classification (SOC) x Travel to Work Area (TTWA), from the Annual Survey of Hours and Earnings (ASHE), GB, 2002 – 2021



43. *Employment growth is negatively correlated with National Minimum Wage (NMW) bite in low-concentration labour markets, but not in concentrated labour markets*

Binned scatterplot of residuals of employment growth and NMW bite at the TWA level after controlling for the average wage, unemployment rate, working-age population, and labour market concentration, alongside TWA and year fixed effects, from the Annual Survey of Hours and Earnings (ASHE) and Annual Population Survey (APS), GB, 2014-2021



Data from ASHE & APS, 2014 - 2021.
NMW bite = share of workers with pay at/below the NMW.

Wage markdown figures

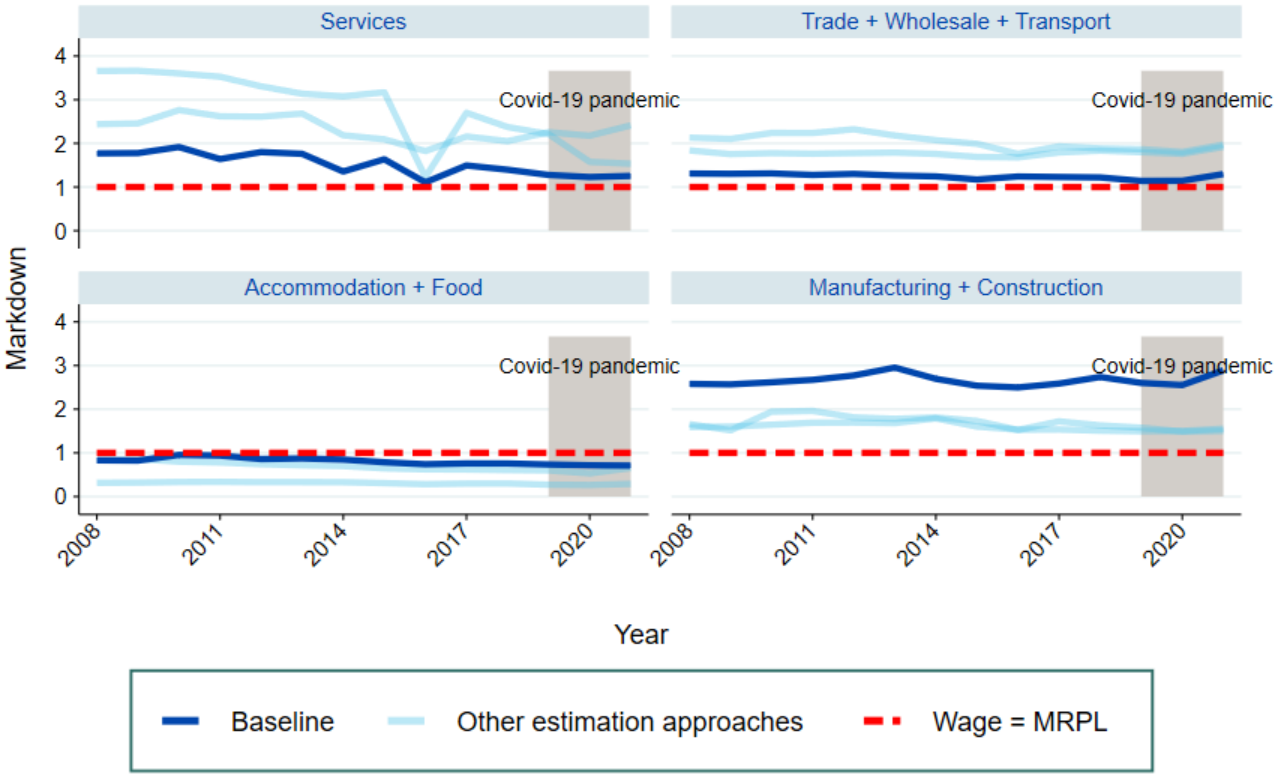
44. Markdowns have declined in the UK since 2008

Whole-economy mean markdown series from a variety of production function estimation approaches, from the Annual Business Survey, Great Britain, 2008-2021. Markdowns measure the ratio of additional revenue provided by a worker, to their wage. Declining markdowns mean that workers are taking home a greater share of the value they provide to their employer

Baseline estimation method is Ordinary Least Squares (OLS) with a translog (TL) production function.
Alternative methods are different production functions, with/without control function approaches. Details in the appendix.
For readability, we remove OLS & ACF Cobb-Douglas estimates which take values between 3 and 5.
Data from Annual Business Survey, 2008 - 2021.

45. Markdowns are highest in manufacturing and construction, and have fallen steadily in services

Sectoral mean markdown series from a variety of production function estimation approaches, from the Annual Business Survey, Great Britain, 2008-2021. Markdowns measure the ratio of additional revenue provided by a worker, to their wage. Declining markdowns mean that workers are taking home a greater share of the value they provide to their employer.

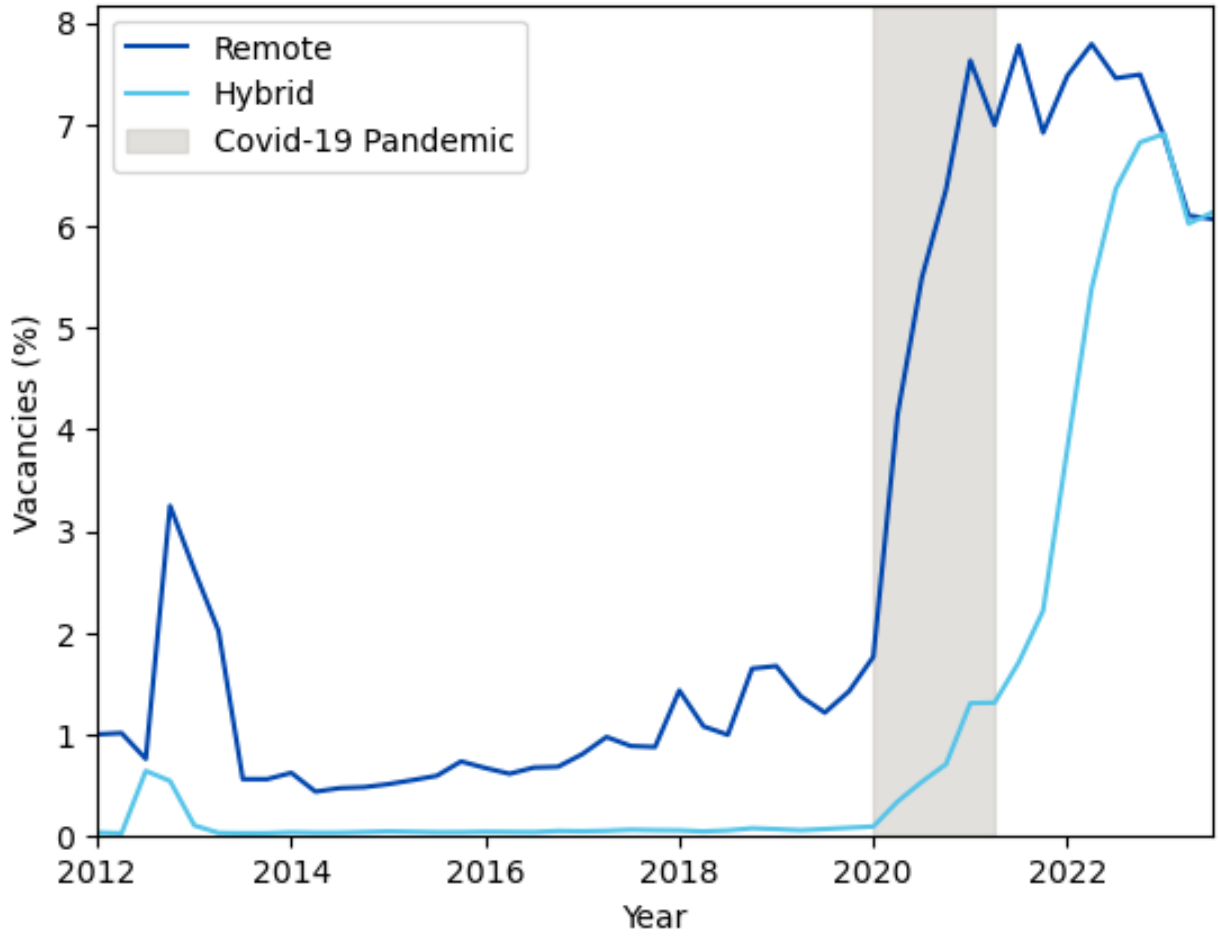


Baseline estimation method is Ordinary Least Squares (OLS) with a translog (TL) production function.
Alternative methods are different production functions, with/without control function approaches. Details in the appendix.
For readability, we remove OLS & ACF Cobb-Douglas estimates which take values above 4.
Data from Annual Business Survey, 2008 - 2021.

Remote working figures

46. Remote working arrangements have exploded since the pandemic

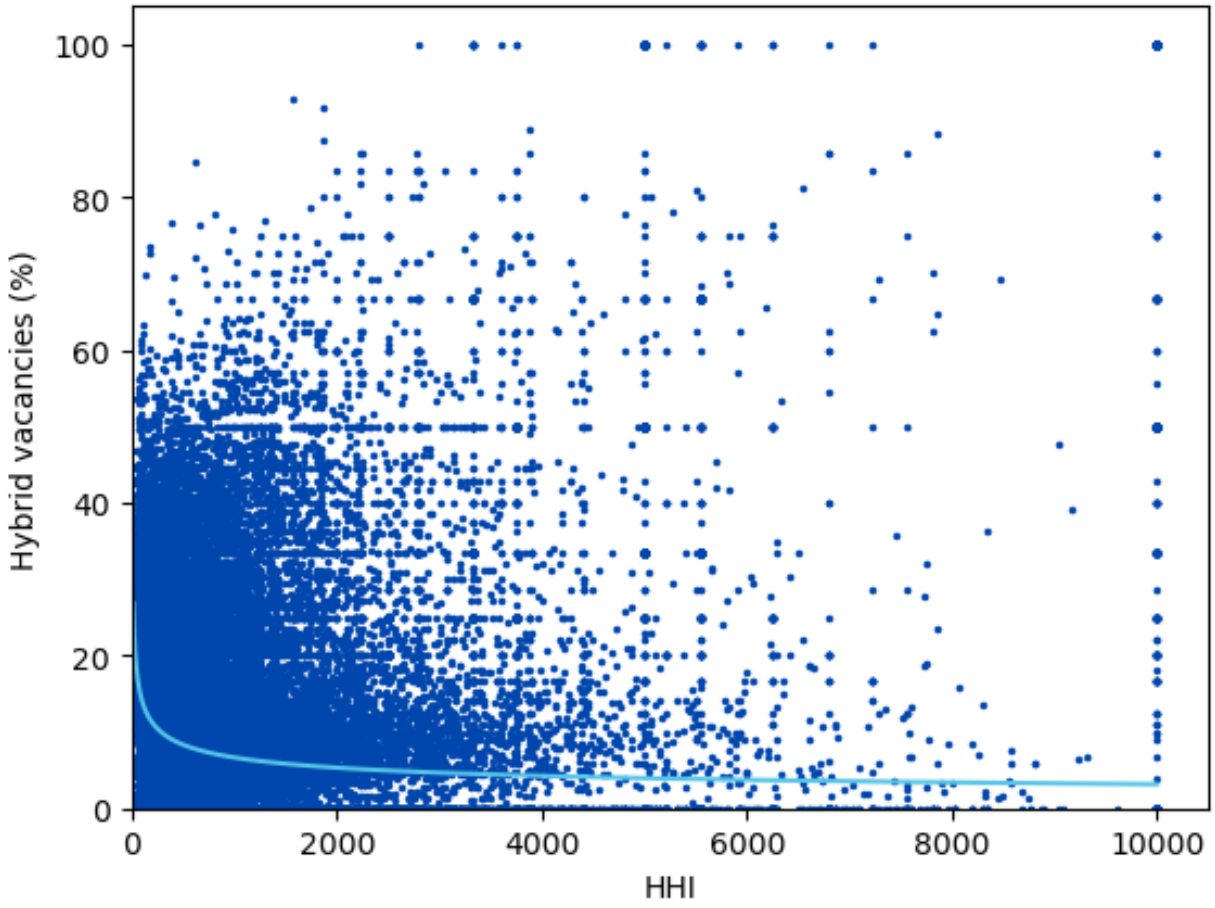
Percent of vacancies that Lightcast classifies as remote or hybrid, UK, 2012Q1-2023Q3



Data from Lightcast, January 2012 - September 2023.

47. The Herfindahl-Hirschman Index (HHI) is uncorrelated with the number of hybrid vacancies for HHIs over 1000

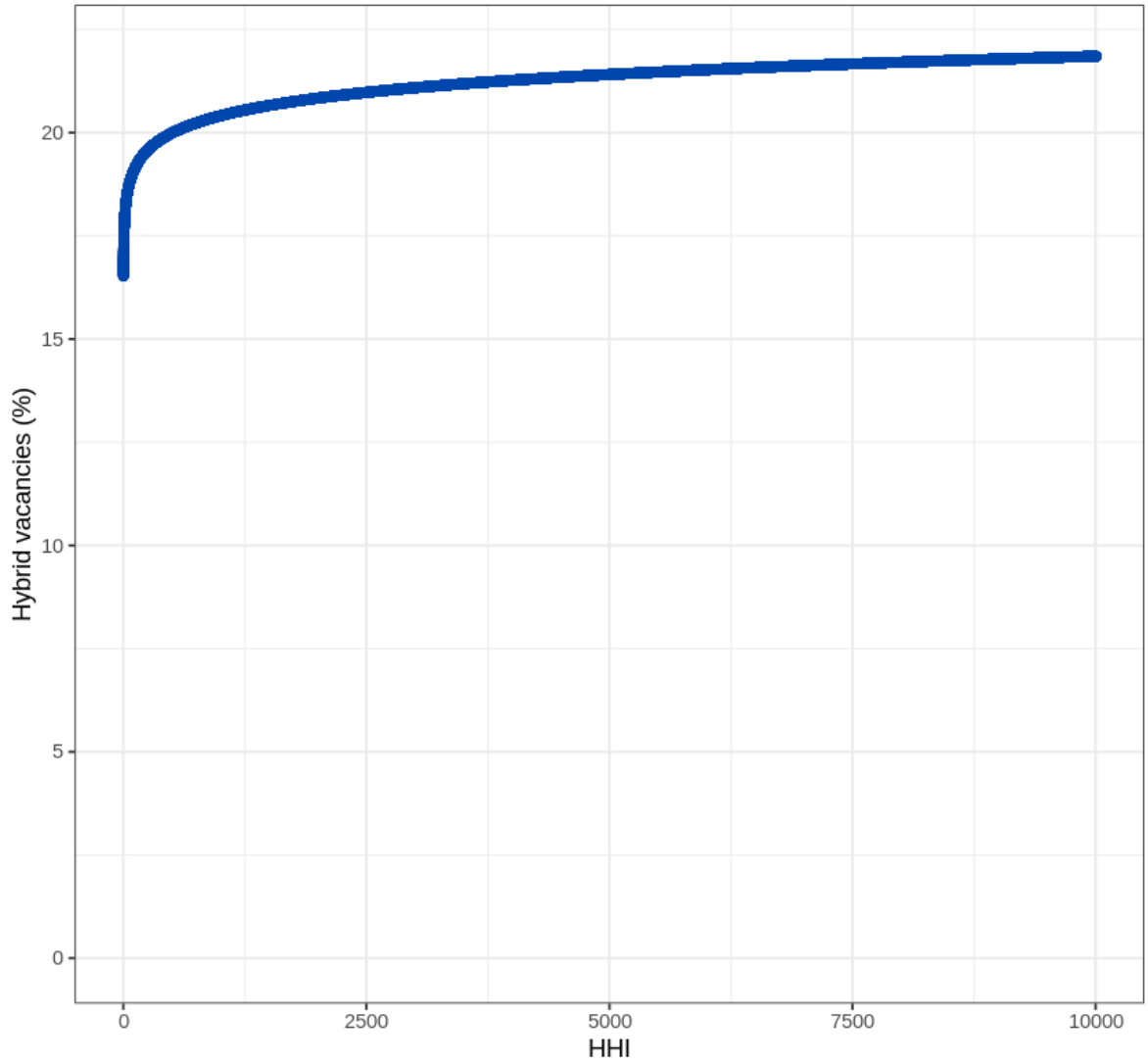
Scatterplot of the percentage of vacancies in a labour market that are classified as hybrid by Hansen et al. (2023) against the HHI of that labour market, from Lightcast vacancy data, UK, 2023Q1-2023Q3



HHI calculated at the Travel to Work Area x 3-digit Standard Occupational Classification level for each quarter. Line of best fit calculated using weighted log-log regression after adding 1% point to hybrid vacancies percentage to deal with zeroes. Weight is number of job posts in the labour market. Data from Lightcast, January 2023-September 2023.

48. The Herfindahl-Hirschman Index (HHI) is uncorrelated with the prevalence of hybrid vacancies except at the lowest levels

Predicted percentage of vacancies posted in a labour market with the given HHI, predictions from Logit regression, Table F.15, regression (4)

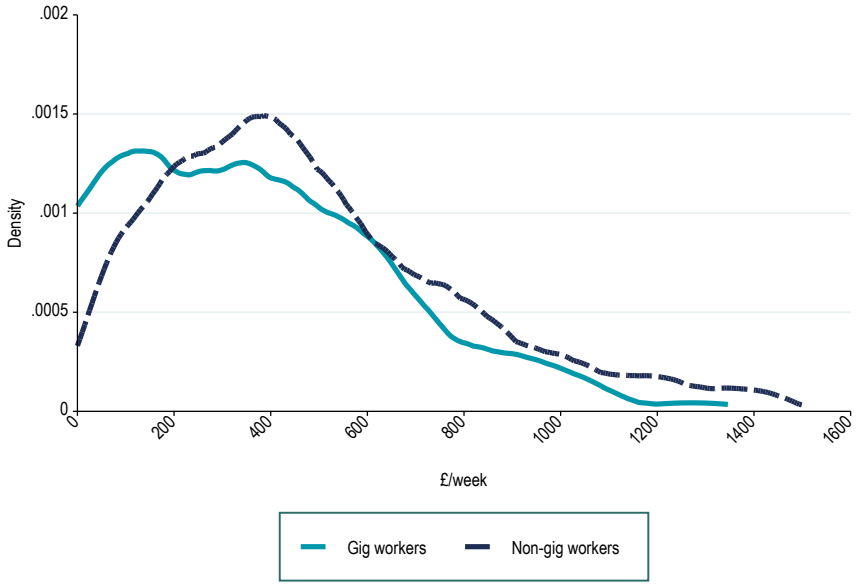


Predicted data for TTWA:E30000004, Administrative Occupations: Finance, 2023Q1 labour market. Predictions from logit regression of hybrid indicator on log(HHI) with Year-Quarter and TTWA x 3-digit Standard Occupational Classification fixed effects. Regression data from Lightcast, January 2014 - September 2023.

Gig work figures

49. Data on gross weekly earnings indicates that there is a higher incidence of low pay amongst gig workers

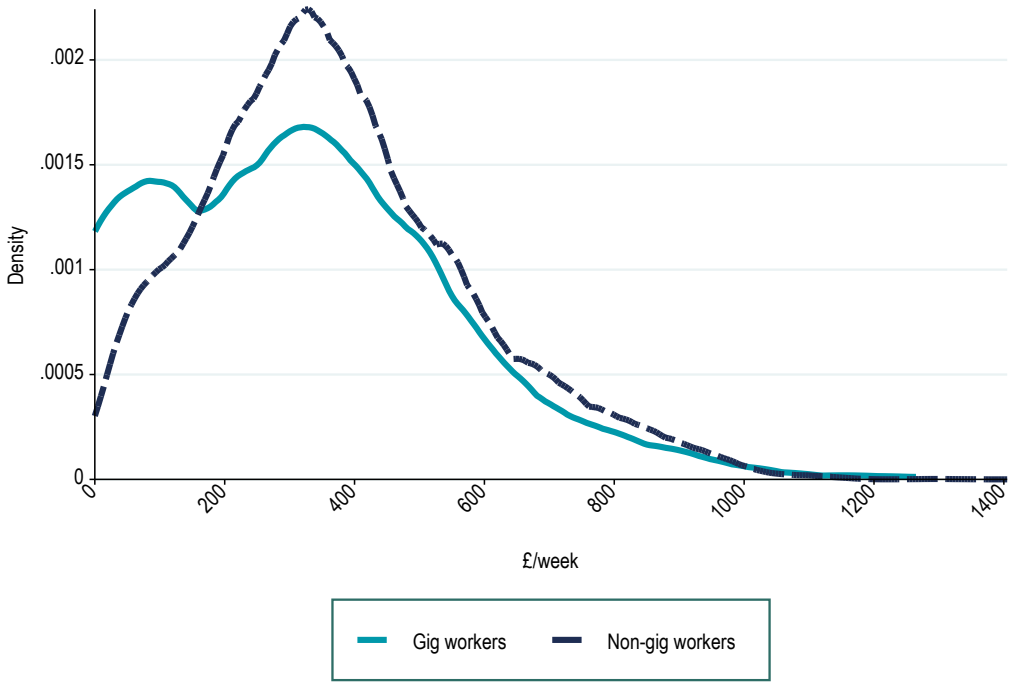
Distribution of weekly (gross) earnings in £ of gig workers compared to those of non-gig workers, from the UK Longitudinal Household Survey, UK, 2020-2022. Gross income includes tax, *pension and social contributions*



Source: UK Household Longitudinal Study, Wave 12 (2020-2022), weighted estimates; Gross earnings include taxes, pension and social security contributions.

50. The higher incidence of low pay amongst gig workers is also evident in net terms

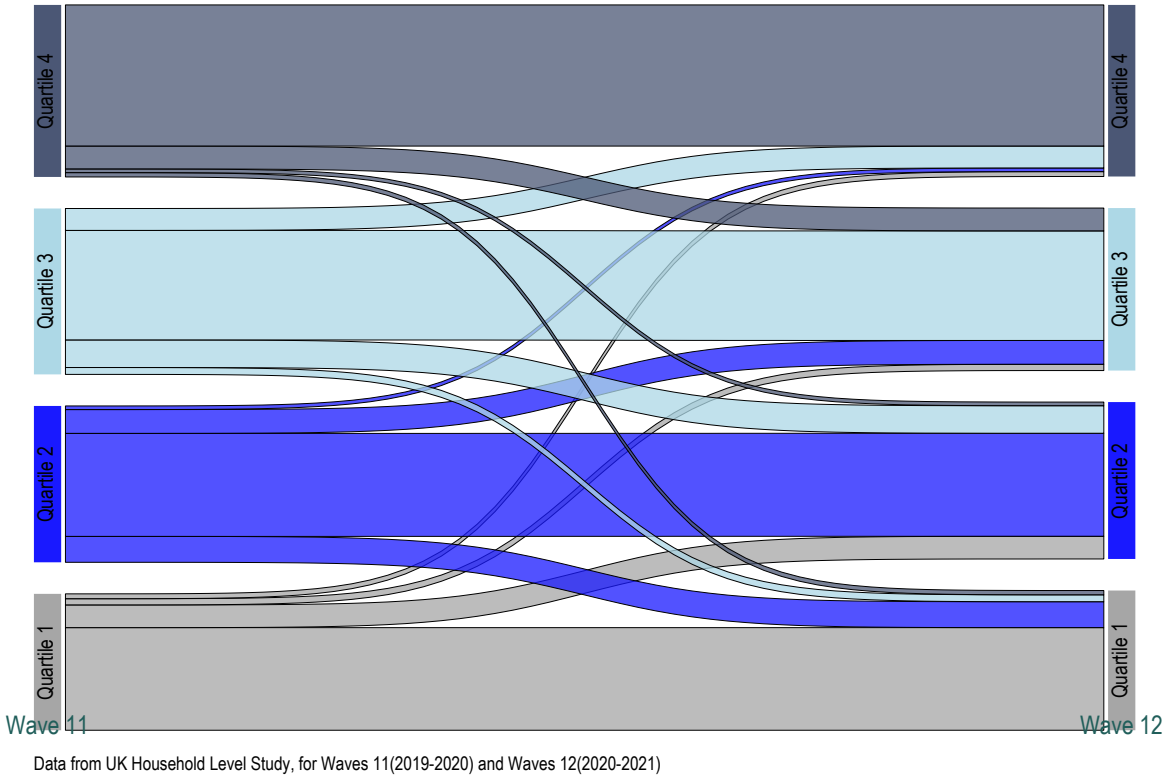
Distribution of weekly (net) earnings in £ of gig workers compared to those of non-gig workers, *from the UK Longitudinal Household Survey, UK, 2020-2022*



Source: UK Household Longitudinal Study, Wave 12 (2020-2022), weighted estimates.

51. Traditional workers appear less mobile across the income distribution compared to gig workers, but a smaller share is on low pay

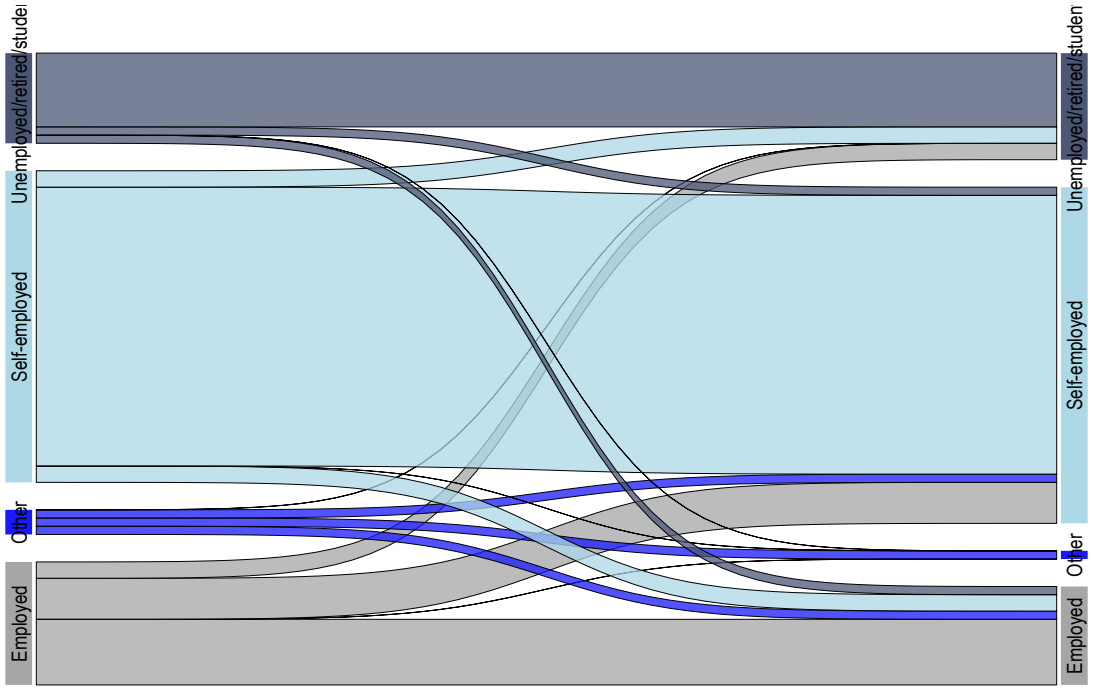
Sankey diagram of income quartile to income quartile flows for non- gig workers, from the UK Household Longitudinal Study, UK, 2020-2022



Data from UK Household Level Study, for Waves 11(2019-2020) and Waves 12(2020-2021)

52. The majority of those that gig work on a more continuous basis do so as self-employed

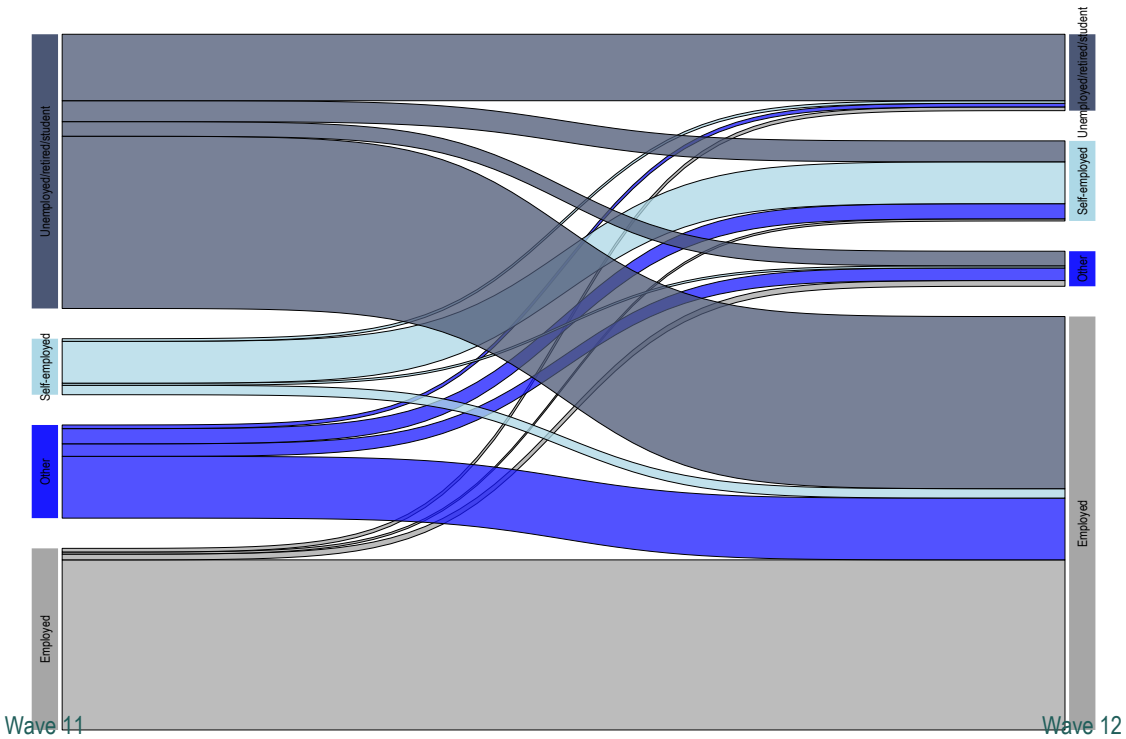
Sankey diagram of gig workers across labour market status, from the UK Household Longitudinal Study, UK, 2020-2022



Data from UK Household Level Study, for Waves 11(2019-2020) and Waves 12(2020-2021)

53. However, those that decide to start gig work do so after spells of unemployment or economic inactivity

Sankey diagram of lows across labour market status of those who start gig-work, from the UK Household Longitudinal Study, UK 2020-2022

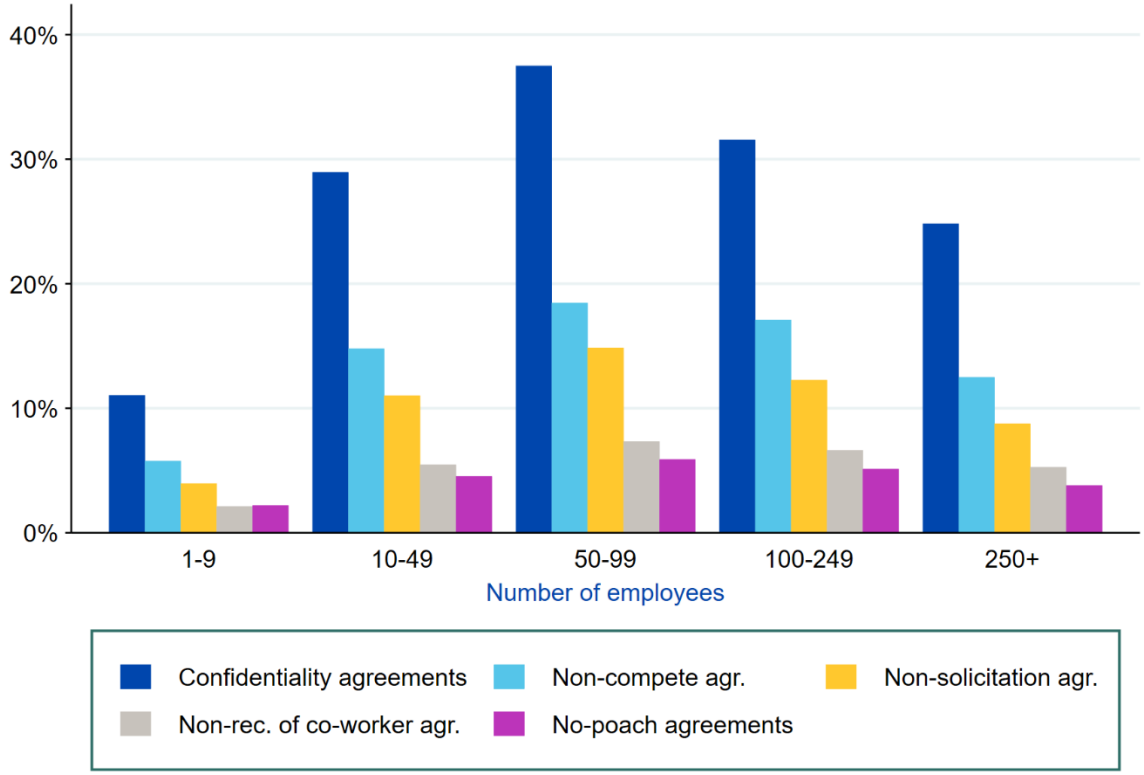


Data from UK Household Level Study, for Waves 11(2019-2020) and Waves 12(2020-2021)

Restrictive covenant figures

54. Restrictive covenants are prevalent across firm sizes

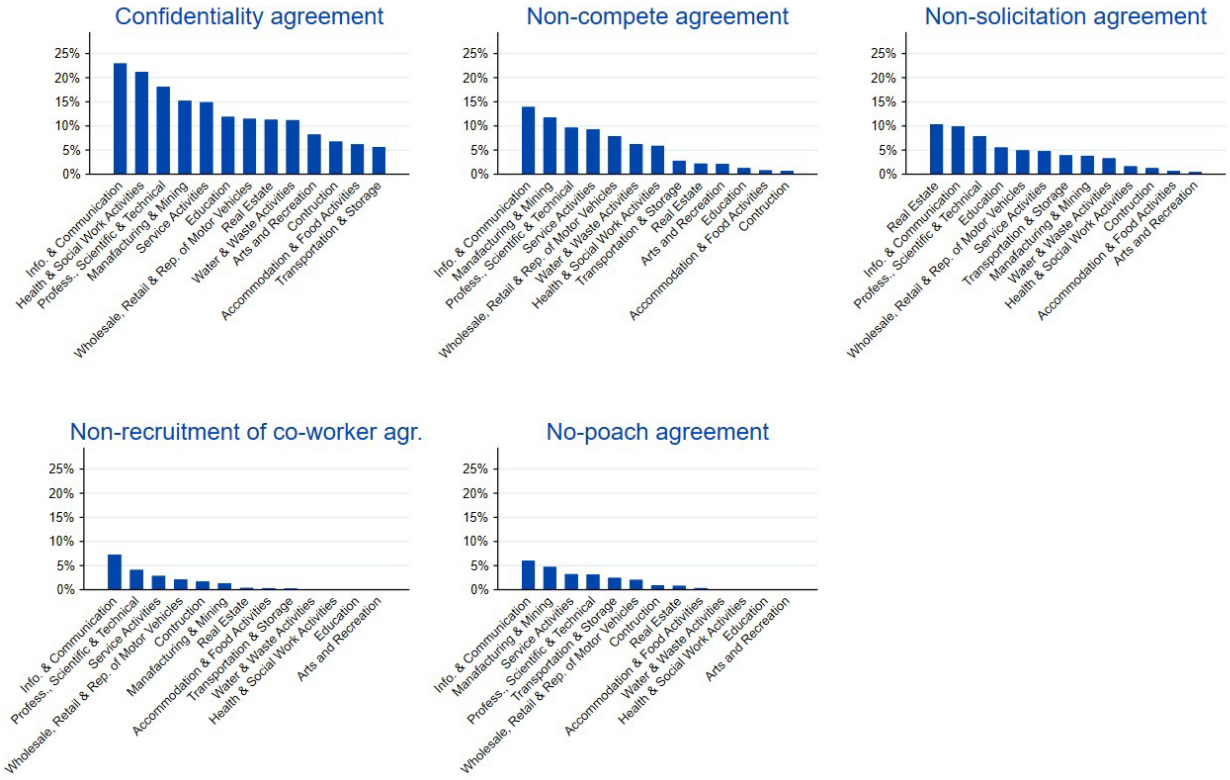
Proportion of firms using each restrictive covenant by firm size, from the Business Insights and Conditions Survey, UK, 2023



Source: Business Insights and Conditions Survey

55. Four out of five restrictive covenants are most prevalent in the information and communications industry

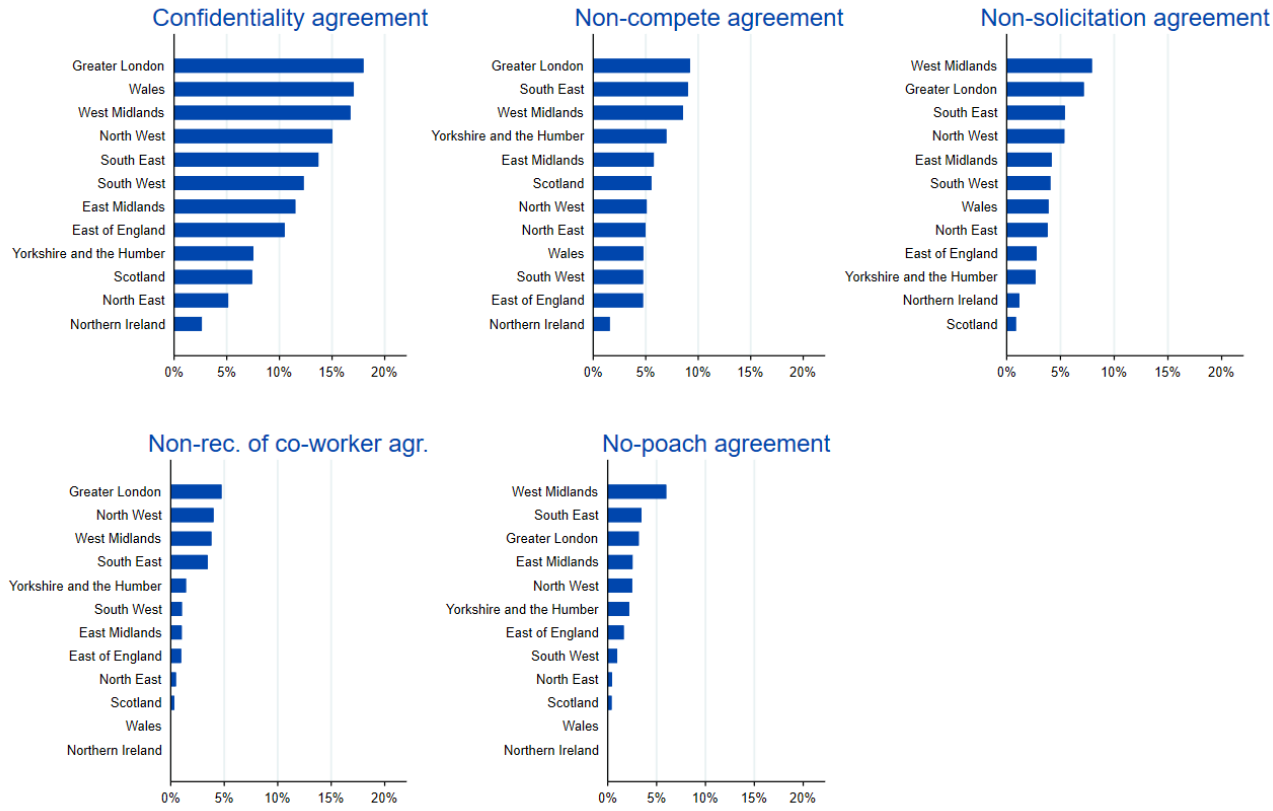
Proportion of firms using each restrictive covenant by industry, from the Business Insights and Conditions Survey, UK, 2023



Blank columns have been suppresed due to low counts
Source: Business Insights and Conditions Survey

56. Three out of five restrictive covenants are most prevalent in Greater London

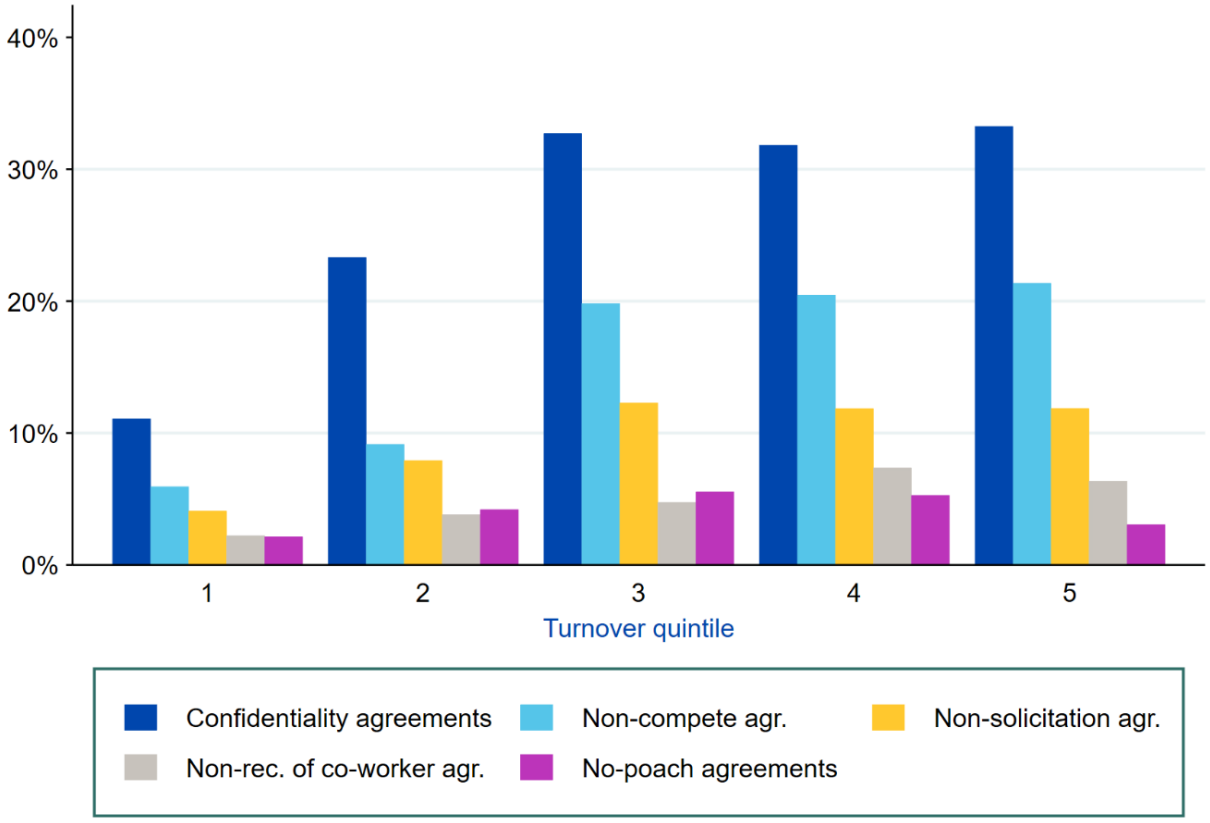
Proportion of firms using restrictive covenants in current employee contracts by region, from the Business Insights and Conditions Survey, UK, 2023



Blank columns have been suppresed due to low counts
Source: Business Insights and Conditions Survey

57. Restrictive covenants are prevalent across firm turnover quintiles

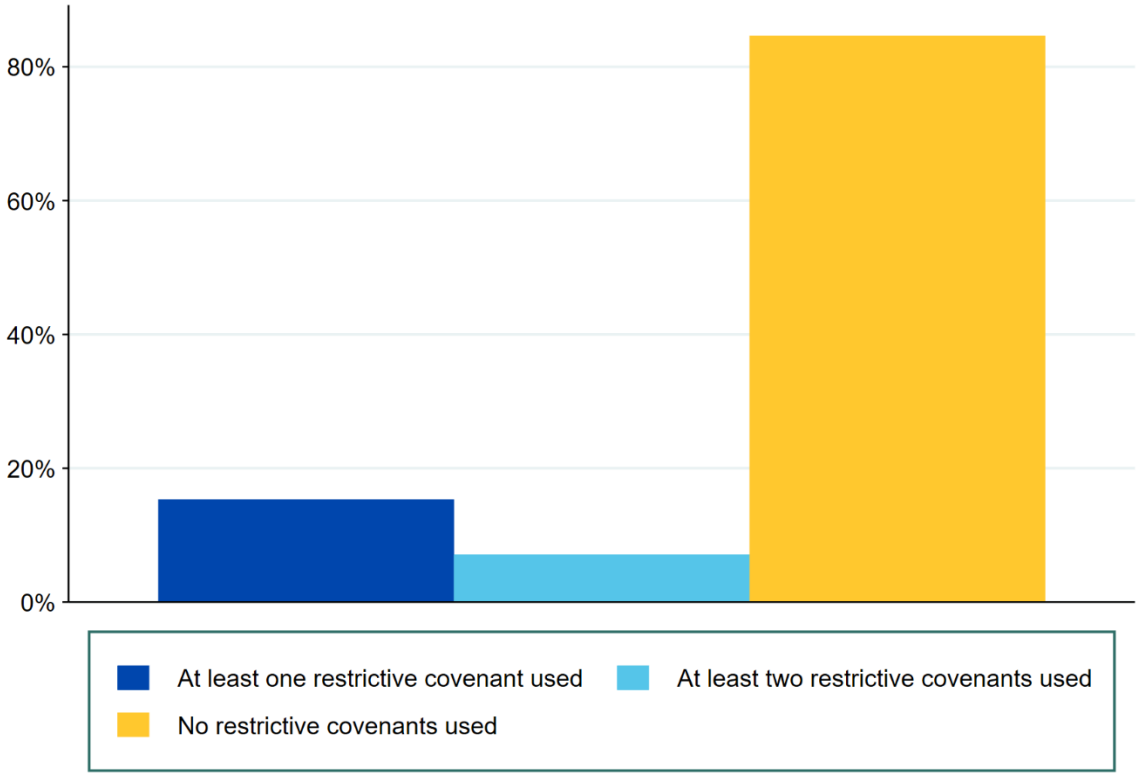
Proportion of firms using each restrictive covenant by turnover quintile, from the Business Insights and Conditions Survey, UK, 2023



Source: Business Insights and Conditions Survey

58. Approximately half of all firms using restrictive covenants in employee contracts use multiple clauses

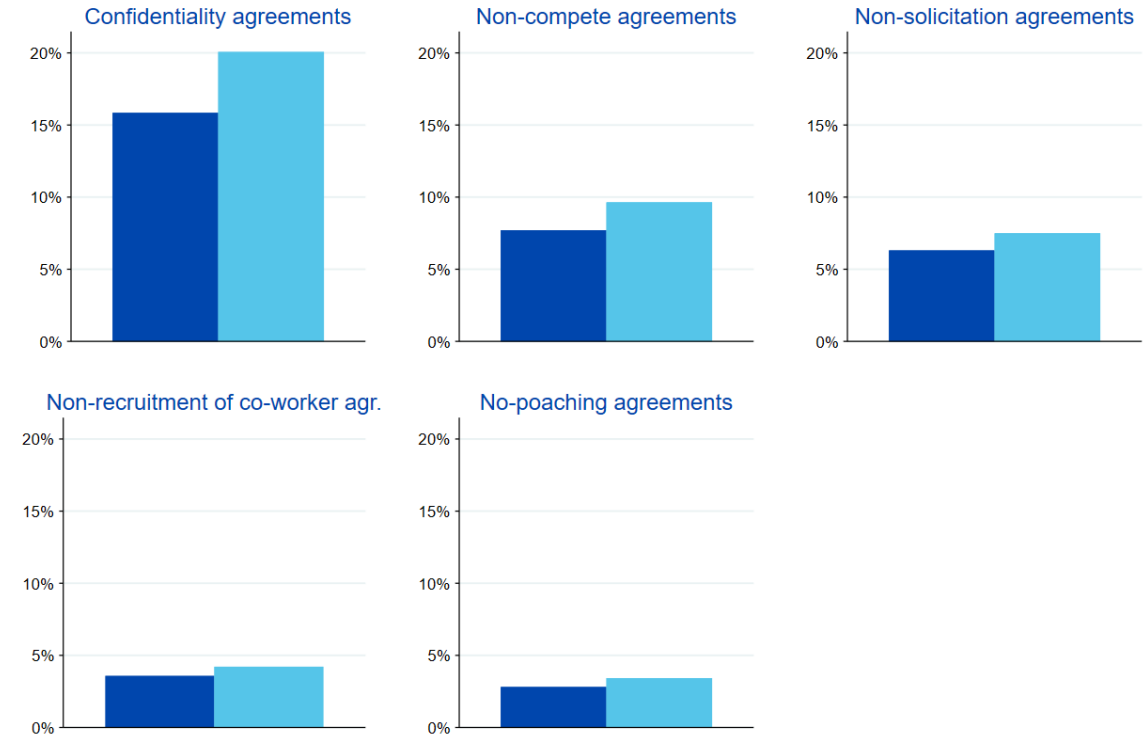
Proportion of firms using restrictive covenants in current employee contracts, from the Business Insights and Conditions Survey, UK, 2023



Source: Business Insights and Conditions Survey

59. Restrictive covenants are prevalent in the UK

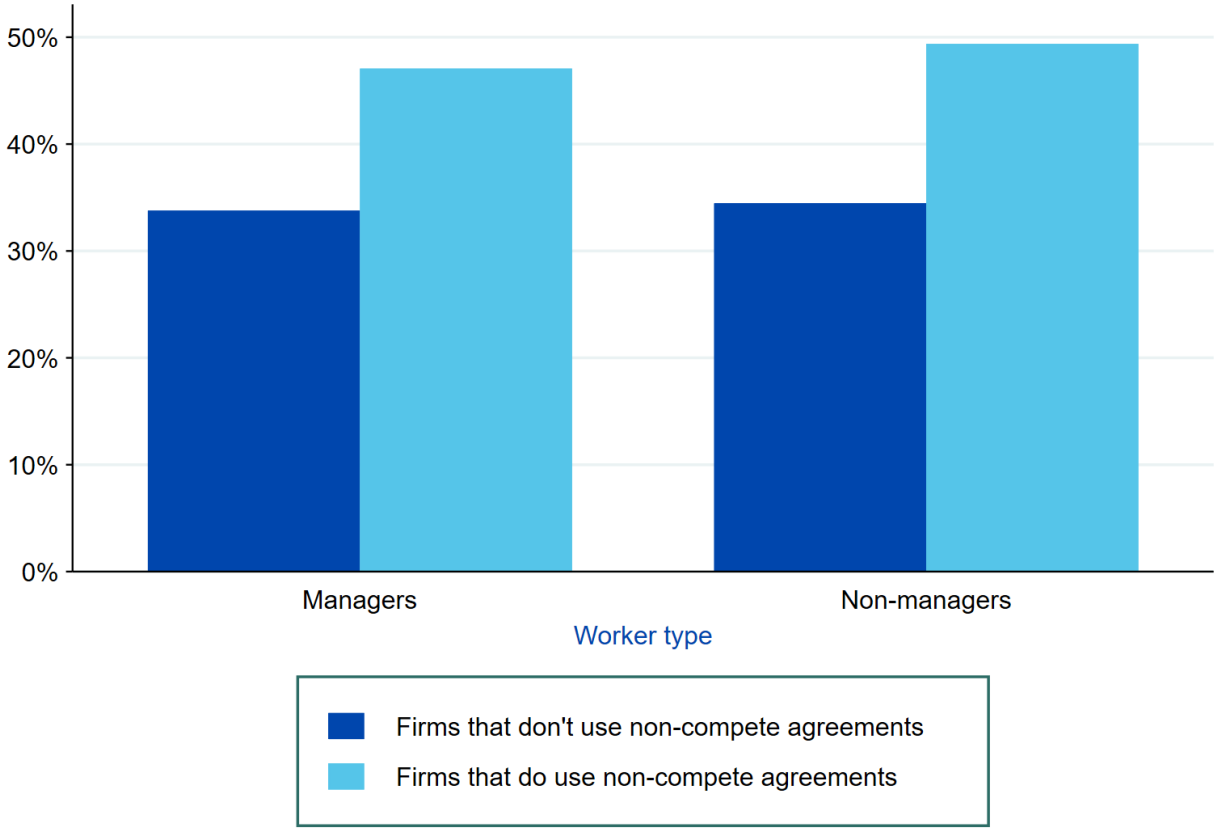
Proportion of all employees with restrictive covenants in their contracts, from the Business Insights and Conditions Survey, UK, 2023



Blue bar= lower bound estimate
Red bar= upper bound estimate
Source: Business Insights and Conditions Survey, with CMA analysis

60. A firm using non-compete agreements in employee contracts is positively associated with the amount of training days provided to workers

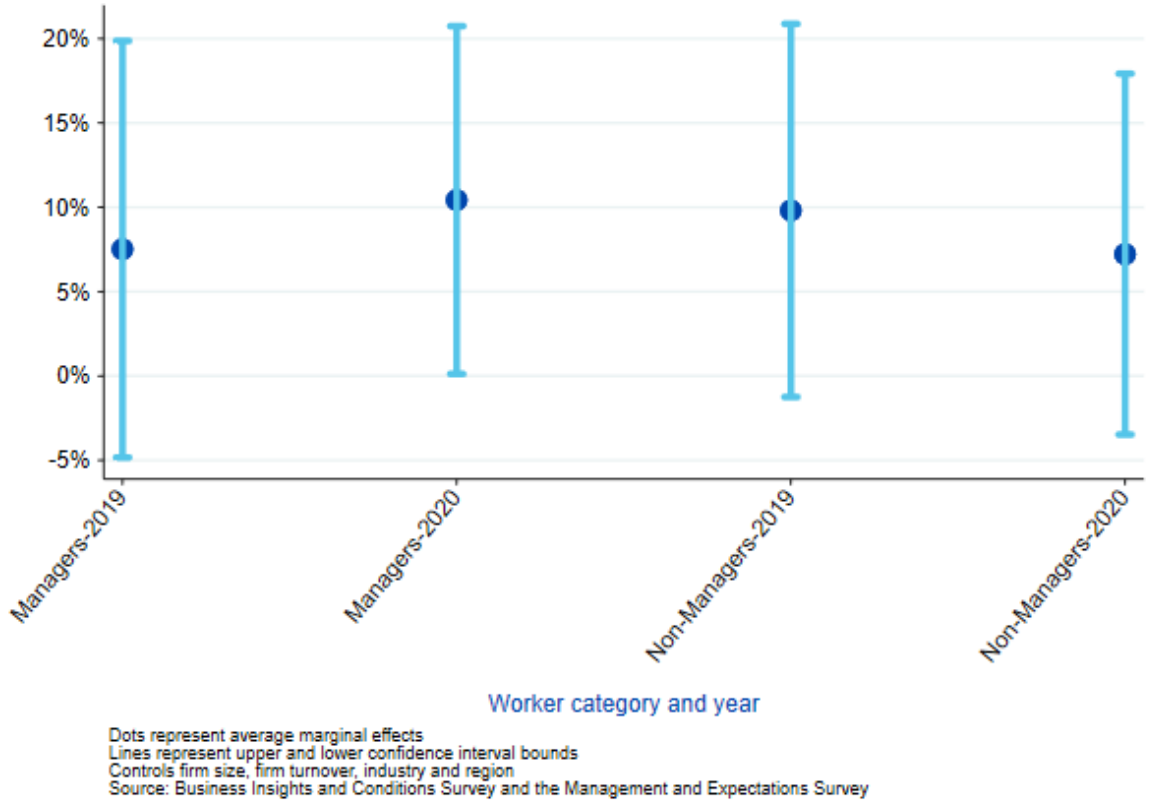
Proportion of firms that use, and don't use, non-compete agreements providing 5+ average annual training days to employees, from the Business Insights and Conditions Survey (2023) and the Management and Expectations Survey (2020), Great Britain



Source: Business Insights and Conditions Survey and Management and Expectations Survey

61. The positive association between firms using non-competes and average training days provided to workers holds when controlling for various firm characteristics

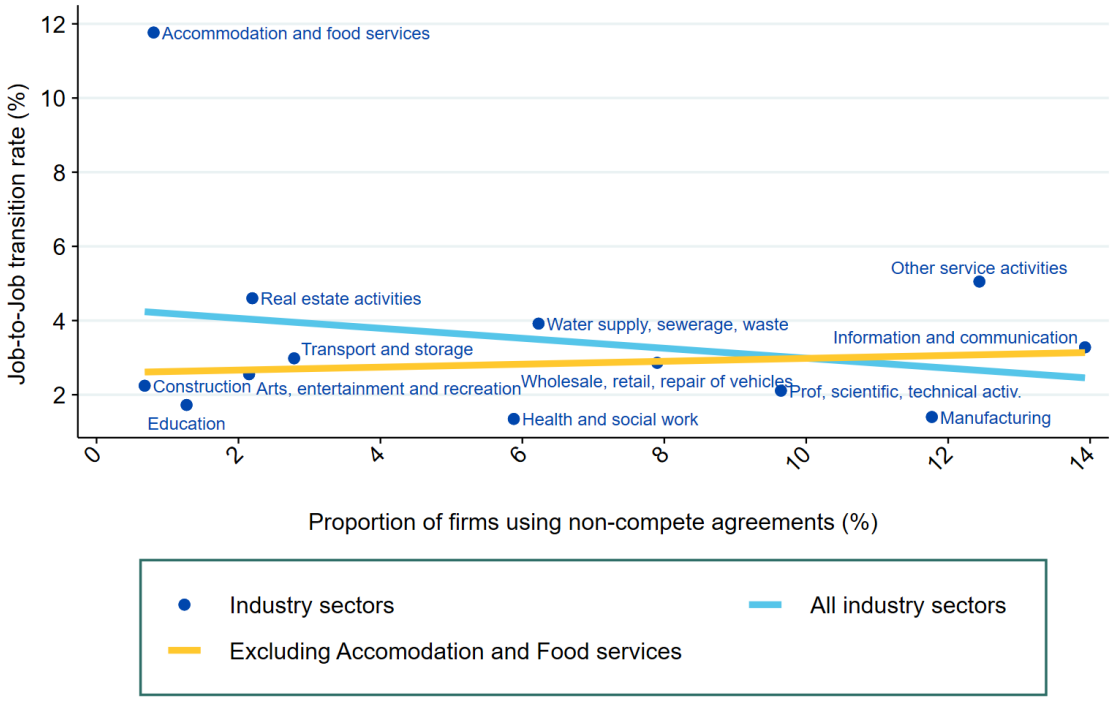
Average marginal effects of a firm using non-competes on the likelihood of providing 5+ average annual training days to workers, from the Business Insights and Conditions Survey (2023) and the Management and Expectations Survey (2020), Great Britain



Dots represent average marginal effects
Lines represent upper and lower confidence interval bounds
Controls firm size, firm turnover, industry and region
Source: Business Insights and Conditions Survey and the Management and Expectations Survey

62. *Non-compete prevalence is negatively associated with worker movements between jobs, but this relationship disappears when excluding Accommodation and Food services*

Scatterplot of Job-to-Job transition rates against the proportion of firms using non-compete agreements in employee contracts by industry sector, data from the Longitudinal Labour Force Survey and (April 2022- June 2023) the Business Insights and Conditions Survey (2023), UK

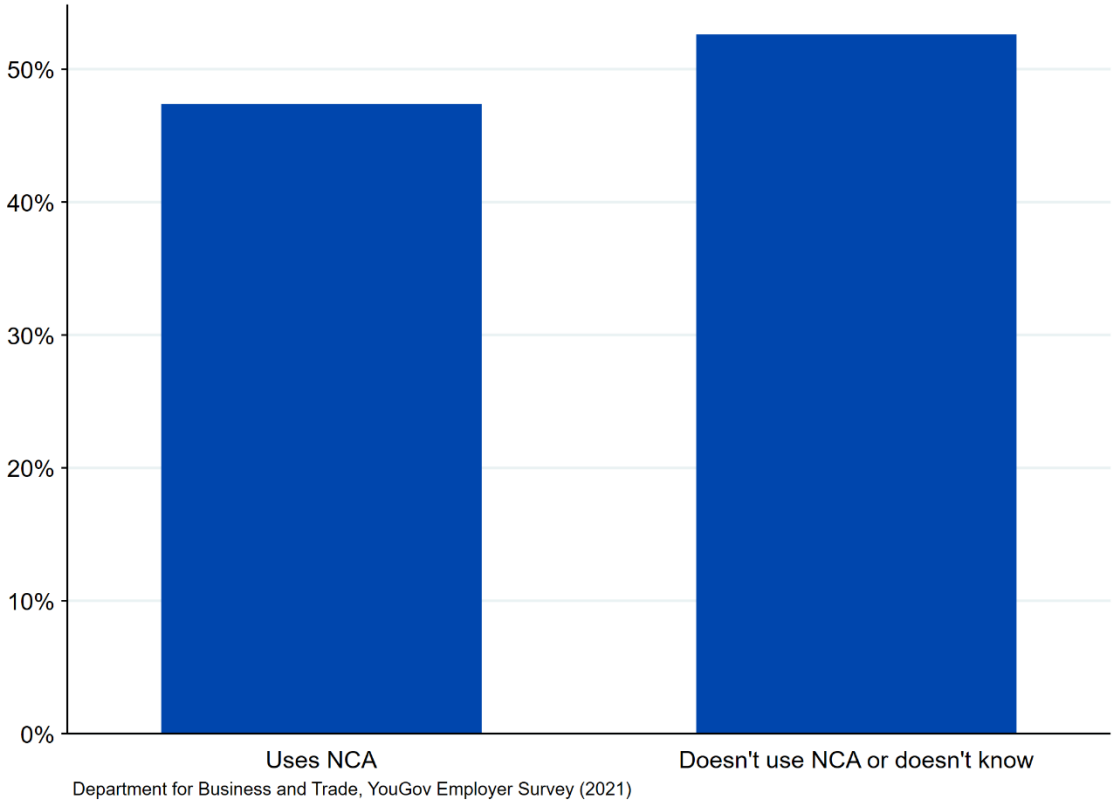


Job-to-Job transition rate is 4 a quarter average over the period July 2022 to June 2023
Non-compete data refers to June 2023

Sources: Longitudinal Labour Force Survey and the Business Insights and Conditions Survey

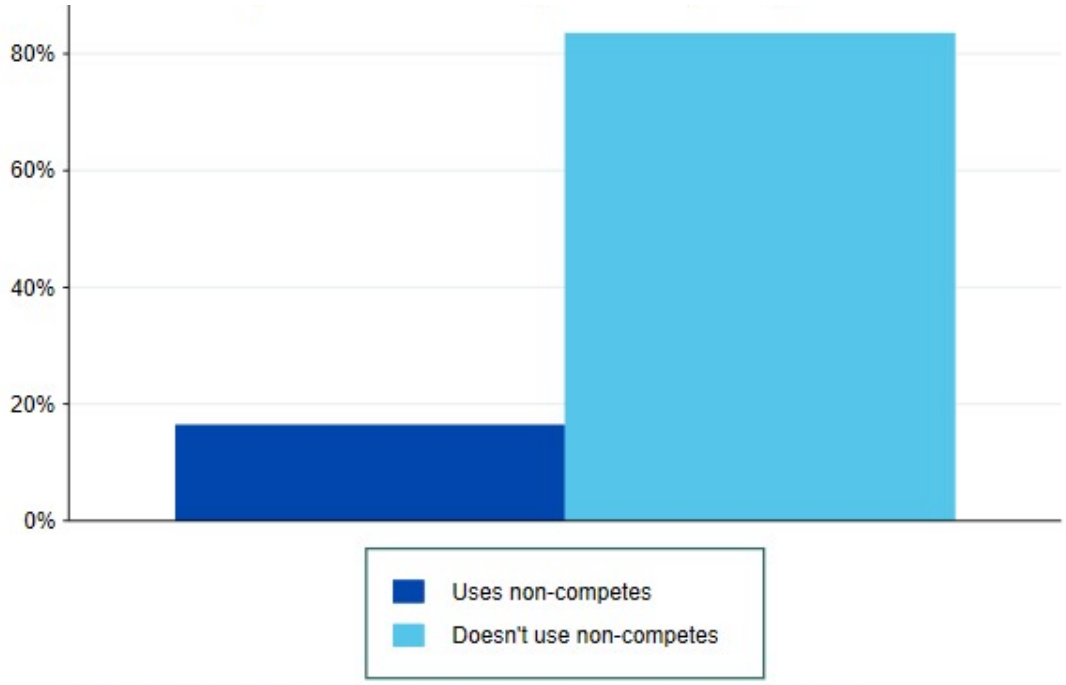
63. Approximately half of firms use non-competes in employee contracts

Proportion of firms using non-compete agreements (NCA) in employee contracts, from the 2021 DBT YouGov Survey, UK



64. 16% of firms use non-competes in employee contracts

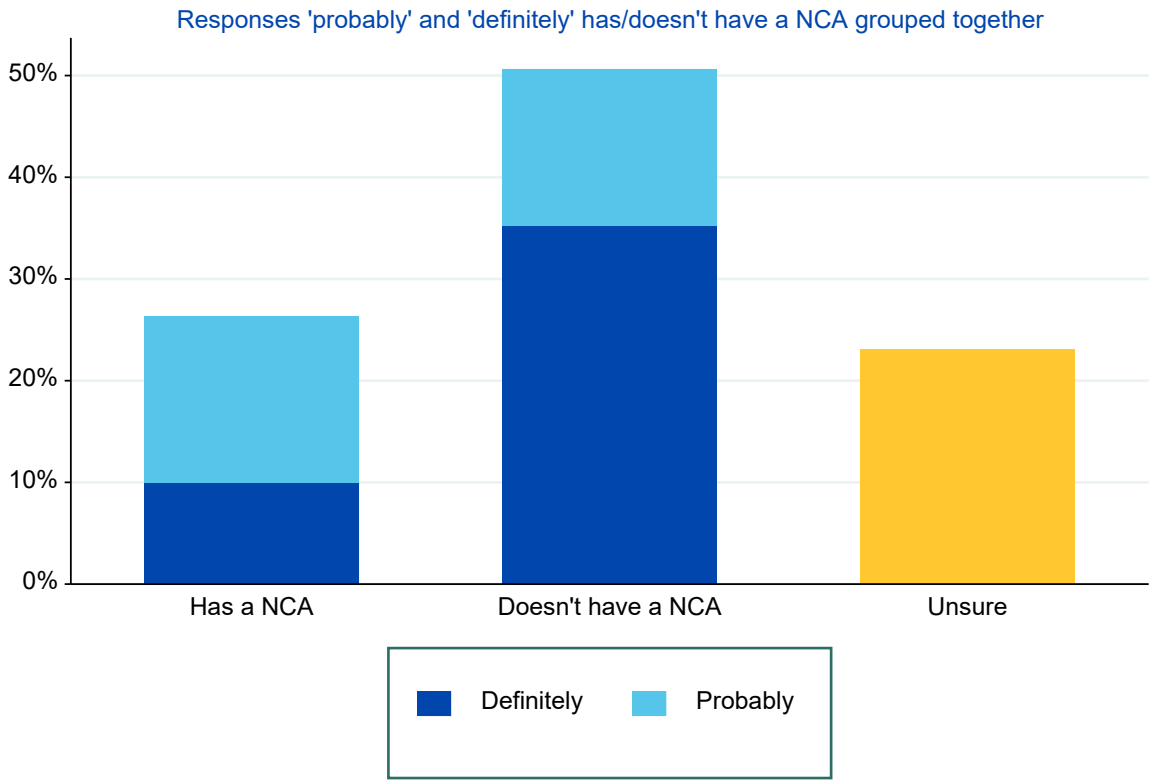
Proportion of firms using non-competes in employee contracts, from the 2021 DBT IFF Research Survey, UK



Source: Department for Business and Trade, IFF Research Employee Survey (2021), with CMA analysis

65. A quarter of all workers think they have a non-compete in their contract

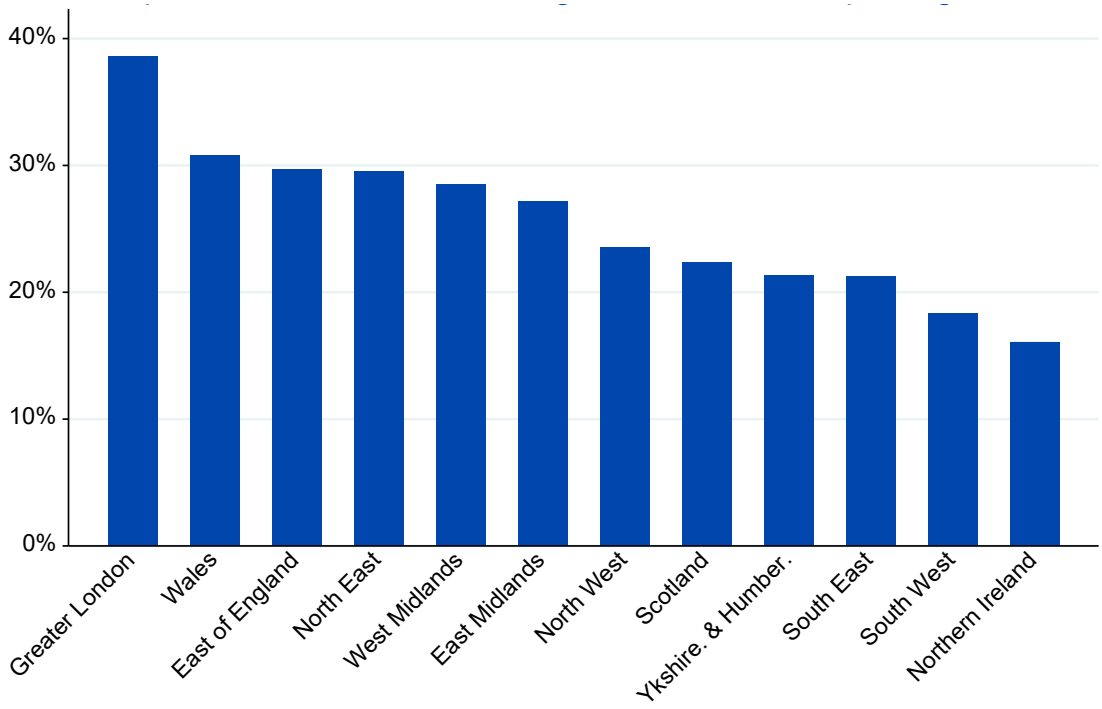
Non-compete (NCA) prevalence amongst workers, from the 2023 YouGov CMA-LSE Capstone Survey, UK



Source: CMA-LSE Capstone Survey

66. Non-competes are prevalent across all regions

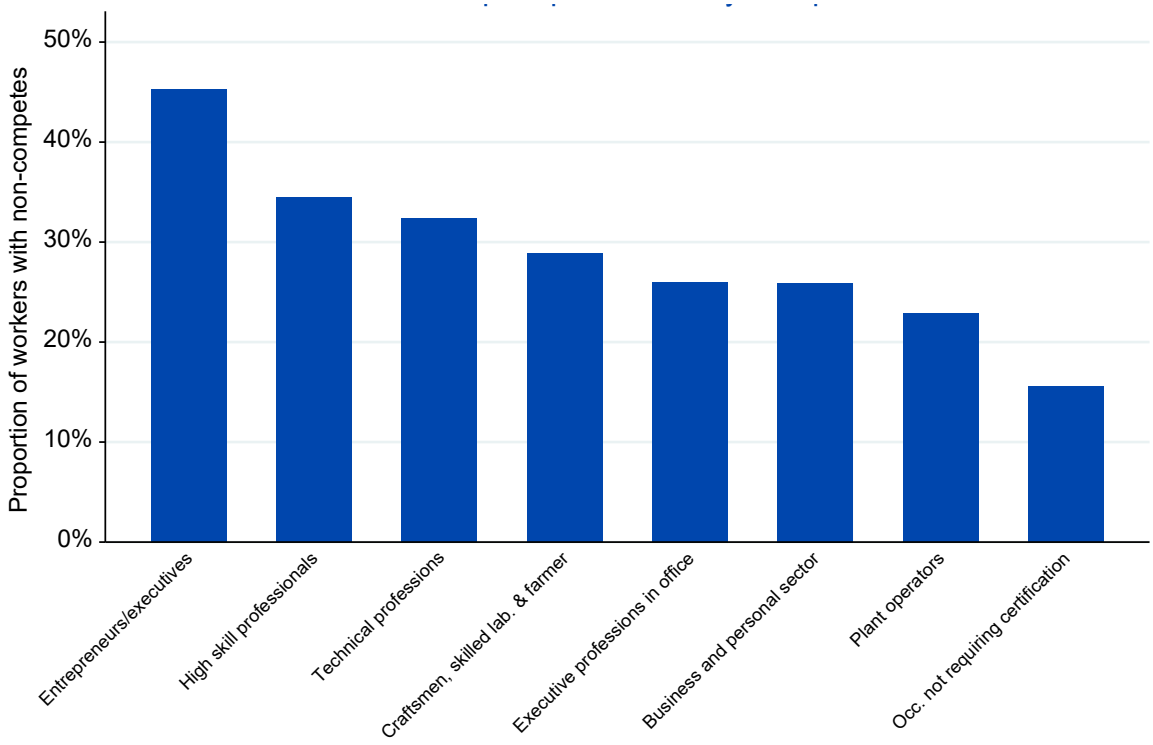
Proportion of workers in each region with a non-compete agreement, from the 2023 YouGov CMA-LSE Capstone Survey, UK



Source: CMA-LSE Capstone Survey

67. Non-competes are prevalent across all occupations

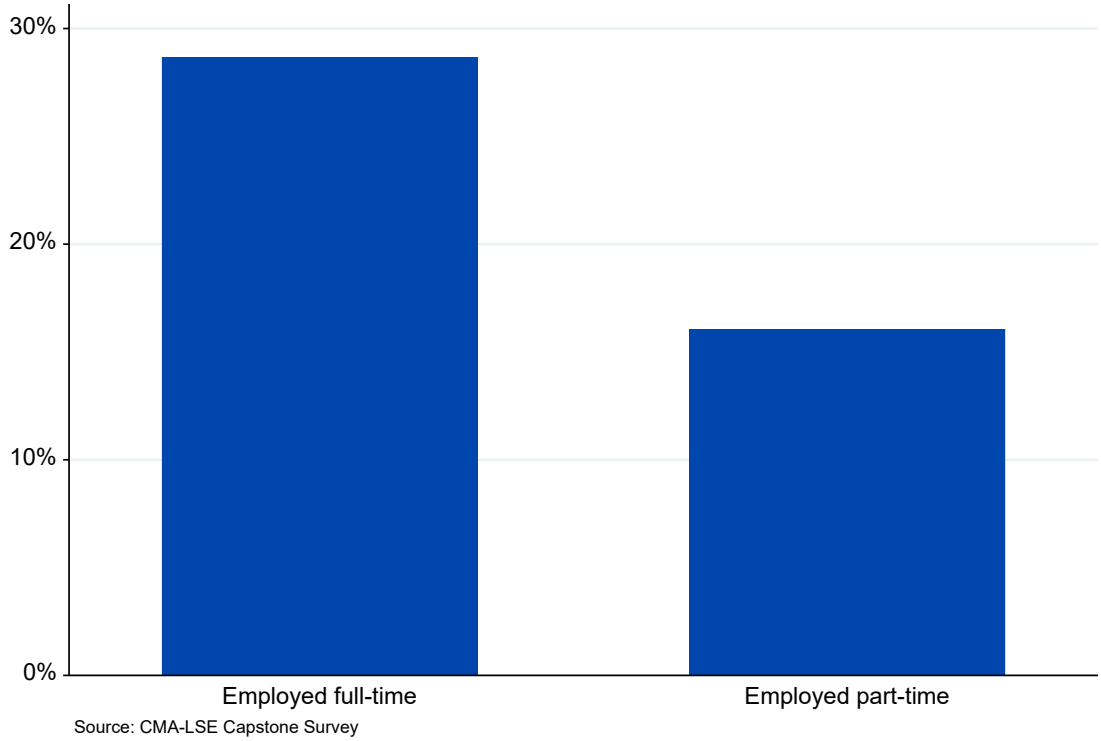
Non-compete prevalence by occupation, from the 2023 YouGov CMA-LSE Capstone Survey, UK



Source: CMA-LSE Capstone Survey

68. Almost 30% of full-time workers believe they have a non-compete agreement in their contract

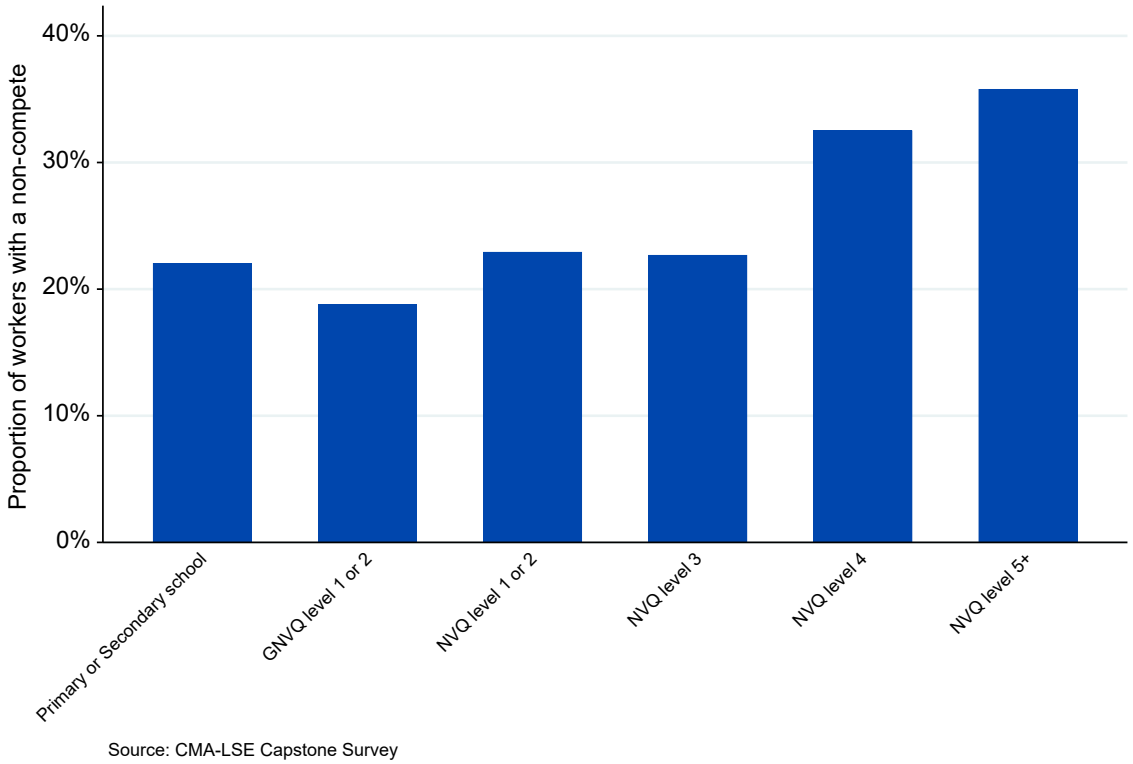
Proportion of workers with a non-compete agreement, from the 2023 YouGov CMA-LSE Capstone Survey, UK



Source: CMA-LSE Capstone Survey

69. Non-competes are prevalent across all education levels

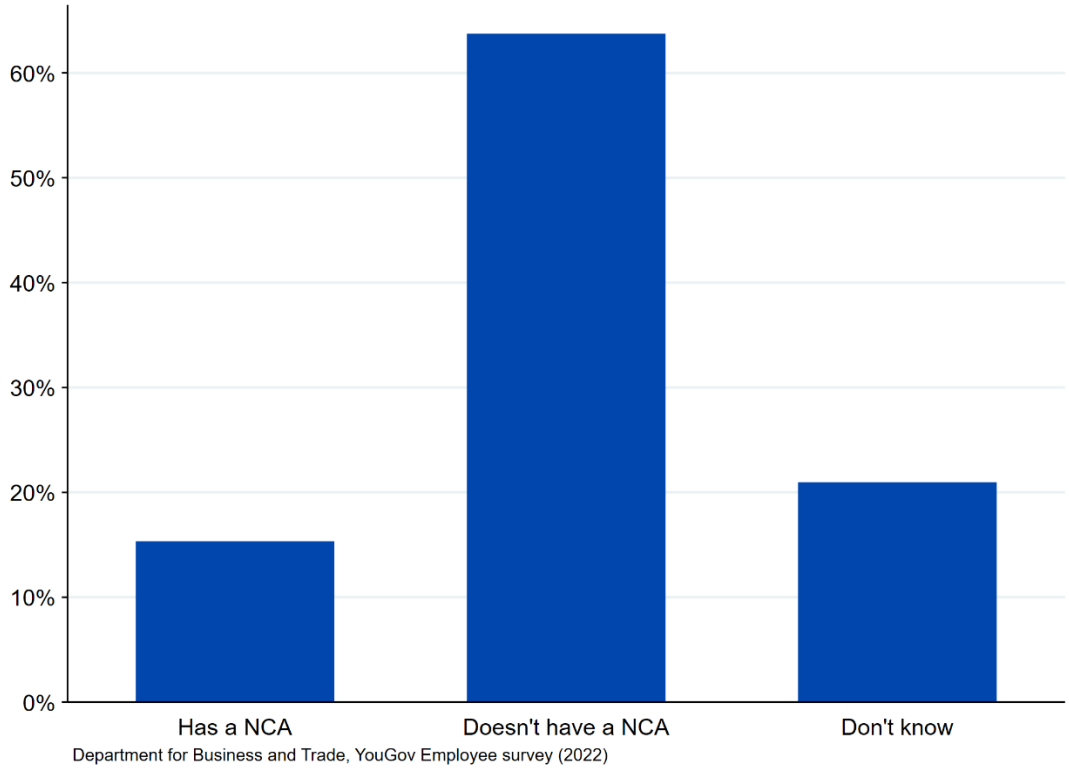
Non- compete prevalence by highest education level, from the 2023 YouGov CMA-LSE Capstone Survey, UK



Source: CMA-LSE Capstone Survey

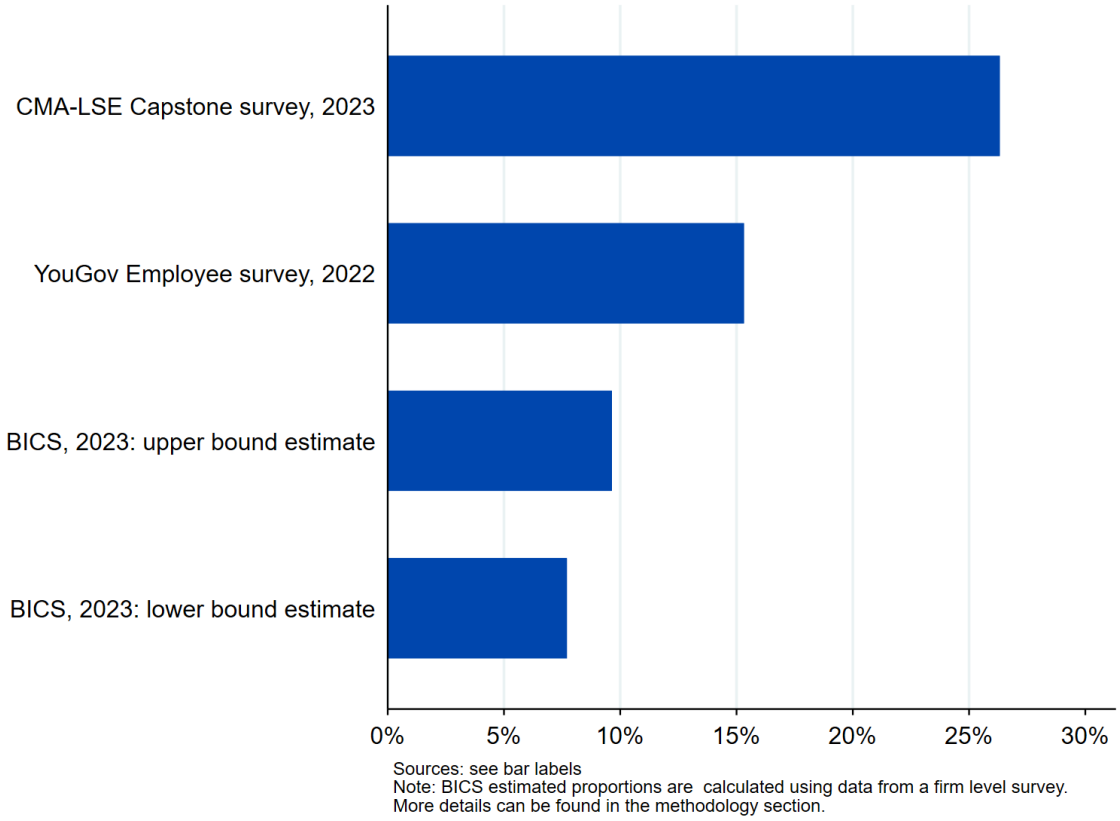
70. 15% of employees believe they have a non-compete in their contract

Proportion of employees under non-compete agreements, from the 2022 DBT YouGov survey, UK



71. Non-compete agreements are prevalent amongst workers in the UK

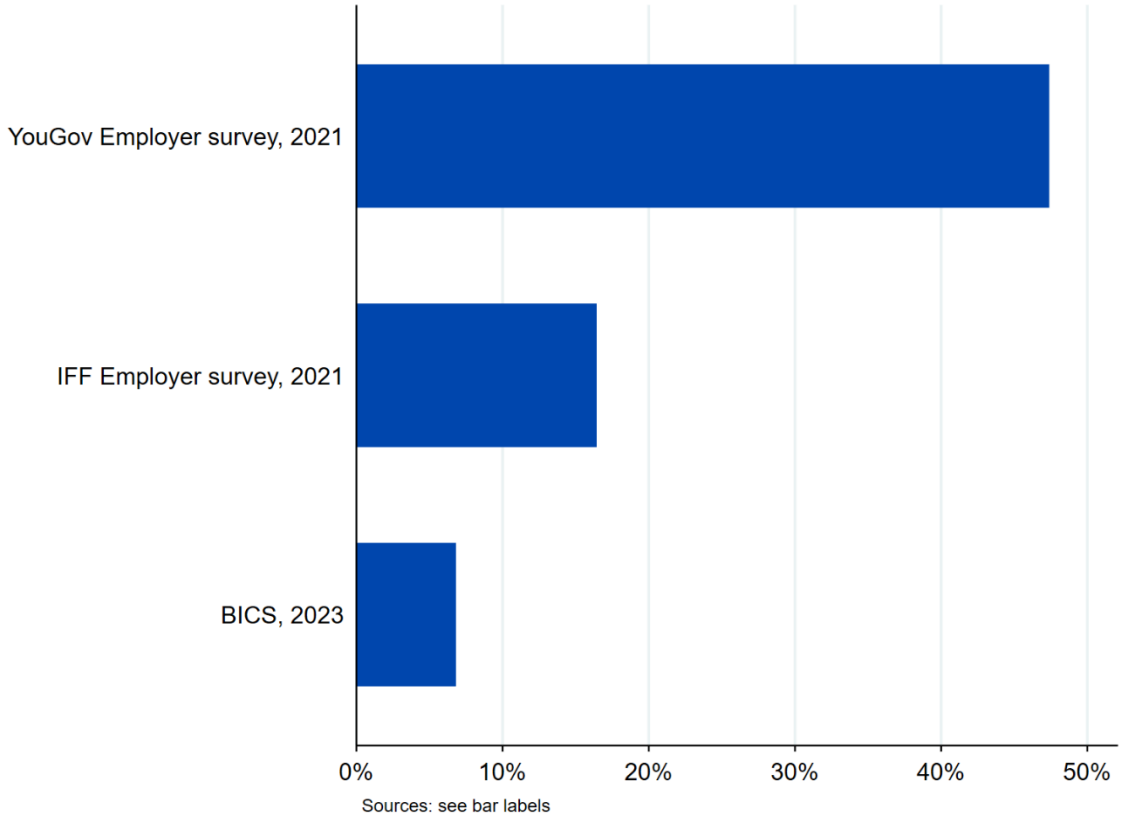
Proportion of workers who believe they/are estimated to have a non-compete agreement in their contract, from multiple sources, UK



Sources: see bar labels
Note: BICS estimated proportions are calculated using data from a firm level survey. More details can be found in the methodology section.

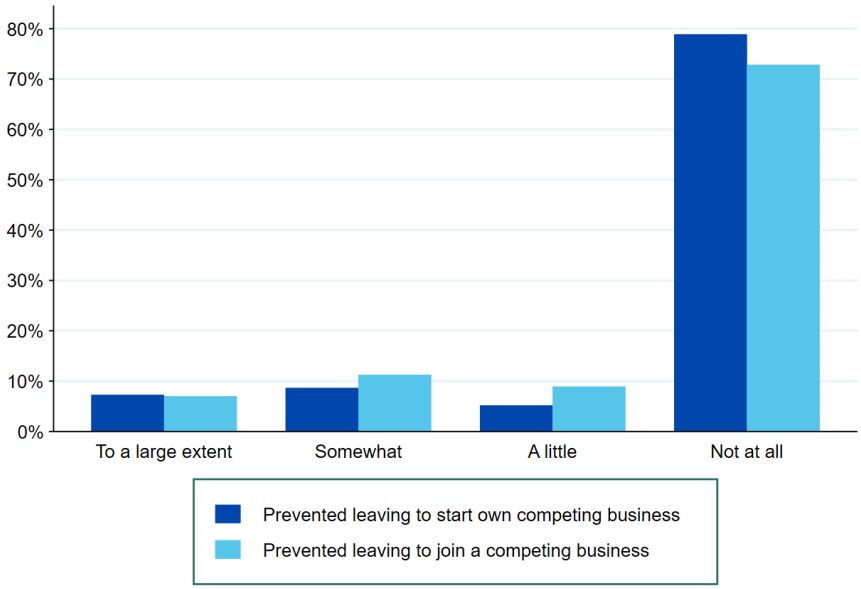
72. Non-compete agreements are prevalent amongst of firms in the UK

Proportion of firms using non-compete agreements in the contract of employees, from multiple sources, UK



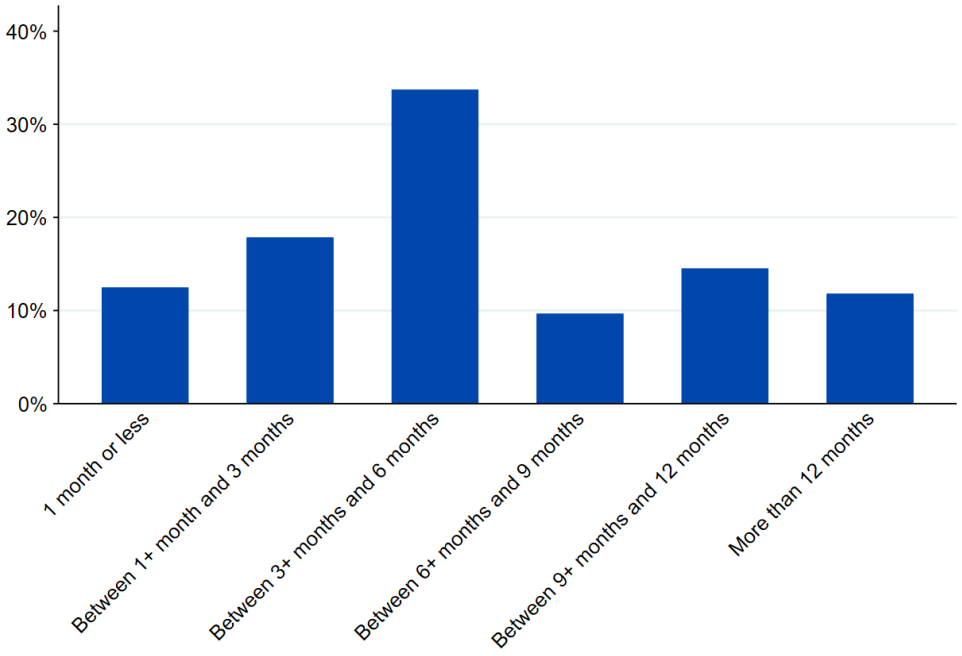
73. Graphs from the DBT YouGov Employer (2021) and YouGov Employee (2022) surveys when dropping responses "Don't know"

Panel 1: Percentage of respondents with a non-compete agreement reporting it prevented them from leaving their current job, from a 2022 DBT YouGov employee survey, UK



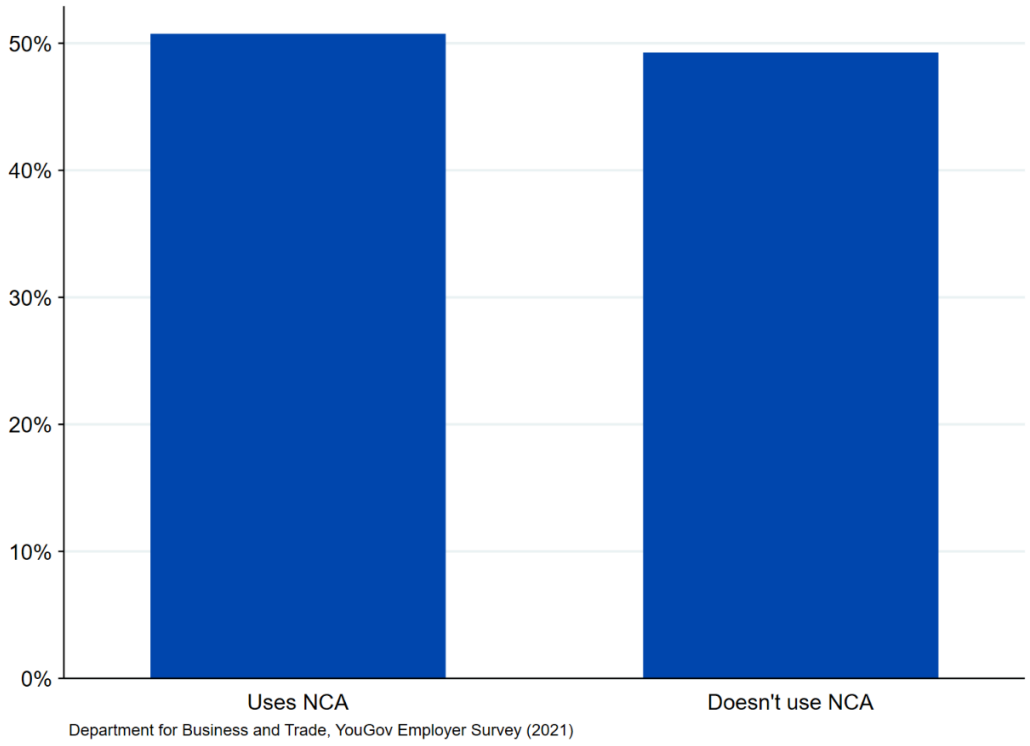
Source: Department for Business and Trade, YouGov Employee survey (2022)

Panel 2: Length of non-compete period after leaving employer, from a 2022 DBT YouGov employee survey, UK

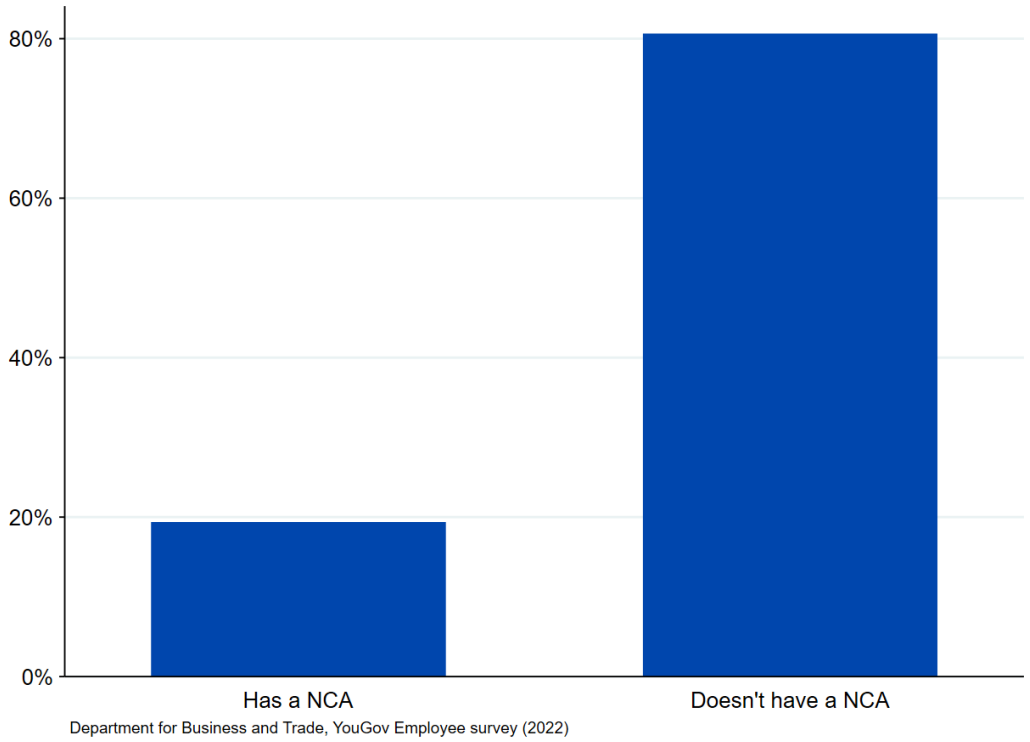


Department for Business and Trade, YouGov Employee survey (2022)

Panel 3: Proportion of firms using non-compete agreements (NCA) in employee contracts, from the 2021 DBT YouGov Survey, UK



Panel 4: Proportion of employees under non-compete agreements, from the 2022 DBT YouGov survey, UK



Appendix F: Additional tables

Wage markdown tables

1. *Markup-markdown regressions, where markups are computed with intermediate consumption*

	OLS (CD)	OLS (TL)	ACF (CD)	ACF (TL)	GNR (CD)
Dependent variable:					
Log markup (intermediate consumption)					
Log markdown	-0.741***	-0.521***	-0.731***	-0.340***	-0.713***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)
Controls:					
Firm Size	✓	✓	✓	✓	✓
Firm Revenue share	✓	✓	✓	✓	✓
Fixed effects:					
Year	✓	✓	✓	✓	✓
2-digit SIC	✓	✓	✓	✓	✓
Firm	✓	✓	✓	✓	✓
Observations	261,428	250,259	242,817	235,267	256,815
R^2	0.924	0.884	0.960	0.877	0.903

Note: Data from the Annual Business Survey covering 2008 - 2021 is used to regress markups on markdowns, firm size (by employment) and firm revenue shares (in their 2-digit sector and year). Standard errors are reported below the regression coefficients in parentheses. They are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

2. *Markup-markdown regressions, where markups are computed with labour*

	OLS (CD)	OLS (TL)	ACF (CD)	ACF (TL)	GNR (CD)
Dependent variable: *Log markup (labour)*					
Log markdown	0.203***	0.433***	0.210***	0.623***	0.230***
	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)
Controls:					
Firm Size	✓	✓	✓	✓	✓
Firm Revenue Share	✓	✓	✓	✓	✓
Fixed effects:					
Year	✓	✓	✓	✓	✓
2-digit SIC	✓	✓	✓	✓	✓
Firm	✓	✓	✓	✓	✓
Observations	263,535	251,434	244,776	237,987	199,781
R^2	0.935	0.917	0.972	0.967	0.922

Note: Data from the Annual Business Survey covering 2008 - 2021 is used to regress markups on markdowns, firm size (by employment) and firm revenue shares (in their 2-digit sector and year). Standard errors are reported below the regression coefficients in parentheses. They are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

3. *OLS translog markup-markdown regressions, where markups are calculated with intermediate consumption*

	(1)	(2)	(3)	(4)	(5)
Dependent variable:					
Log markup (intermediate consumption)					
Log markdown	-0.386***	-0.385***	-0.385***	-0.385***	-0.521***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Controls:					
Firm Size			✓	✓	✓
Firm Revenue Share				✓	✓
Fixed effects:					
Year	✓	✓	✓	✓	✓
2-digit SIC		✓	✓	✓	✓
Firm					✓
Observations	365,486	365,486	365,486	365,486	250,259
R^2	0.475	0.580	0.580	0.580	0.884

Note: Data from the Annual Business Survey covering 2008 - 2021 is used to regress markups on markdowns, firm size (by employment) and firm revenue shares (in their 2-digit sector and year). Standard errors are reported below the regression coefficients in parentheses. They are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

4. OLS translog markup-markdown regressions, where markups are calculated using labour

	(1)	(2)	(3)	(4)	(5)
Dependent variable: *Log markup* (*labour)*					
Log markdown	0.590***	0.585***	0.584***	0.584***	0.433***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Controls:					
Firm Size			✓	✓	✓
Firm Revenue Share				✓	✓
Fixed effects:					
Year	✓	✓	✓	✓	✓
2-digit SIC		✓	✓	✓	✓
Firm					✓
Observations	367,468	367,468	367,468	367,468	251,434
R^2	0.669	0.733	0.733	0.733	0.324

Note: Data from the Annual Business Survey covering 2008 - 2021 is used to regress markups on markdowns, firm size (by employment) and firm revenue shares (in their 2-digit sector and year). Standard errors are reported below the regression coefficients in parentheses. They are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Merit pay tables

5. Worker-level regression of earnings on firm characteristics and pay-related institutions

	(1)	(2)	(3)	(4)	(5)
Dependent Variable: *Log wage per hour*					
Log Firm Size	0.037***	0.036***	0.034***	0.029***	0.029***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log Occupation-Firm Size		0.021***	0.021***	0.021***	0.021***
		(0.003)	(0.003)	(0.004)	(0.004)
Merit			0.044***	0.047***	0.112***
			(0.006)	(0.006)	(0.011)
Union				0.032***	0.067***
				(0.007)	(0.008)
Merit x Union					-0.097***
					(0.012)
Observations	40,221	40,221	40,179	31,566	31,566
R^2	0.378	0.378	0.379	0.370	0.371

Note: Data from Workplace Employment Relations Study in 2004 and 2011. Standard errors are reported below the regression coefficients in parentheses. All regression specifications contain fixed effects for region, industry, occupation, year, and age-band. *** p<0.01, ** p<0.05, * p<0.1. Regression includes intercept.

Labour market concentration tables

6. *Worker-level regression of collective bargaining agreements on employment concentration, controlling for a range of worker and firm characteristics*

	(1)	(2)	(3)	(4)	(5)
Dependent variable: *Collective Bargaining Agreement*					
Log HHI	0.476***	0.387***	0.259***	0.182***	0.098***
	(0.010)	(0.007)	(0.007)	(0.006)	(0.006)
Controls:					
Worker				✓	✓
Firm					✓
Fixed effects:					
Year	✓	✓	✓	✓	✓
1-digit FEs		✓			
2-digit FEs			✓	✓	✓
Observations	2,682,944	2,682,944	2,682,942	2,681,079	2,657,492

Note: Data from Annual Business Survey & Business Structure Database covering 2002 – 2022. Fixed effects are industry, occupation, and region at the 1-digit and 2-digit levels. Standard errors are reported below the regression coefficients in parentheses. They are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

7. Worker-level regression of earnings on labour market concentration, controlling for a range of worker and firm characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable: *Log Gross Pay*								
Log HHI	-0.066***	0.002	-0.018***	-0.016***	-0.020***	-0.020***	-0.020***	-0.031***
	(0.006)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
CBA							0.033***	-0.102***
							(0.001)	(0.009)
Log HHI x CBA								0.022***
								(0.002)
Controls:								
Worker				✓	✓	✓	✓	✓
Firm					✓	✓	✓	✓
Fixed effects:								
Year	✓	✓	✓	✓	✓	✓	✓	✓
1-digit FEs		✓						
2-digit FEs			✓	✓	✓	✓	✓	✓
Worker						✓	✓	✓
Observations	2,670,350	2,670,350	2,670,350	2,668,515	2,646,234	2,495,410	2,495,410	2,495,410
R^2	0.032	0.394	0.451	0.682	0.682	0.734	0.734	0.735

Note: Data from Annual Business Survey & Business Structure Database covering 2002 – 2022. Fixed effects are industry, occupation, and region at the 1-digit and 2-digit levels. Standard errors are reported below the regression coefficients in parentheses. They are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

8. *Employment, at the intensive margin, is negatively associated with a worker being paid the National Minimum Wage (NMW)*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: *Log total hours worked*						
Log HHI	-0.022***	0.005**	-0.003*	-0.004**	-0.005***	-0.004***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
NMW	-0.378***	-0.135***	-0.056***	-0.093***	-0.099***	-0.096***
	(0.023)	(0.018)	(0.017)	(0.016)	(0.016)	(0.011)
Log HHI x NMW	0.016***	-0.002	-0.008*	0.001	0.002	0.001
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Controls:						
Worker				✓	✓	✓
Firm					✓	✓
Fixed effects:						
Year	✓	✓	✓	✓	✓	
1-digit FEs		✓	✓	✓	✓	✓
2-digit FEs			✓	✓	✓	✓
Firm						✓
Observations	2,658,543	2,658,543	2,658,543	2,658,543	2,635,816	2,4859,64
R^2	0.015	0.127	0.181	0.218	0.346	0.652

Note: Data from the Annual Survey of Hours and Earnings covering 2002 - 2022 is used to regress the log of total hours worked on the log of the Herfindahl-Hirschman Index (HHI), an indicator of whether the worker earns at (or below) the National Minimum Wage (NMW), their interaction, alongside worker (age, gender, collective bargaining coverage) and firm (size, labour productivity, public/private) controls. Fixed effects are industry, occupation, and region at the 1-digit and 2-digit levels. Standard errors are reported below the regression coefficients in parentheses. They are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

9. The vacancy Herfindahl-Hirschman Index (HHI) is not economically significantly correlated with the claimant percentage

	(1)	(2)	(3)	(4)
Dependent variable: *Claimant percentage*				
1000*HHI	-0.108***	-0.554***	-0.412***	0.154***
	(0.026)	(0.018)	(0.067)	(0.027)
Fixed Effects:				
Year		✓		✓
TTWA			✓	✓
Observations	2,250	2,250	2,250	2,250
R^2	0.008	0.536	0.399	0.923

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. HHIs calculated using baseline approach with labour markets defined as 3-digit Standard Occupational Classification x Travel to Work Area (TTWA) and calculated at a yearly frequency. Uses vacancy data covering 2013Q1 to 2022Q4. Claimant count from published ONS data. Regression includes intercept when no fixed effects are used.

Hybrid working tables

10. Concentration and hybrid vacancies have no strong relationship

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: *Remote indicator*							
1000*HHI	-0.026***	-0.023***	-0.004***	0.015***	0.005***	0.008***	0.004***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Fixed Effects:							
Year-Quarter		✓	✓	✓	✓	✓	✓
SOC			✓		✓		✓
TTWA				✓	✓		✓
SOC x TTWA						✓	
Firm							✓
Observations	39,594,503	39,594,503	39,594,503	39,594,503	39,594,503	39,594,503	20,832,115
Adj. R^2	0.006	0.051	0.117	0.059	0.119	0.124	0.251

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the labour market level using a labour market indicator. HHIs calculated using baseline approach with labour markets defined as 3-digit Standard Occupational Classification x Travel to Work Area. The hybrid indicator has been supplied to us by Hansen et al. (2023). Uses vacancy data from January 2014 to September 2023. Regression includes intercept when no fixed effects are used.

11. Allowing for a break in the relationship at the start of the pandemic does not change the results

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: *Remote indicator*						
1000*HHI	-0.004***	-0.035***	0.000***	0.002***	0.000*	0.003***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed Effects:						
Year-Quarter			✓	✓	✓	✓
SOC			✓	✓		
TTWA			✓	✓		
SOC x TTWA					✓	✓
Observations	12,033,284	27,561,219	12,033,284	27,561,219	12,033,284	27,561,219
Adj. R^2	0.001	0.009	0.014	0.119	0.02	0.126

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the labour market level using a labour market indicator. HHIs calculated using baseline approach with labour markets defined as 3-digit Standard Occupational Classification x Travel to Work Area. The hybrid indicator has been supplied to us by Hansen et al. (2023). Uses Lightcast vacancy data from January 2014 to September 2023. Data from 2014-2019 includes 12,033,284 observations. Data from 2020-2023 includes 27,561,219 observations. Regression includes intercept when no fixed effects are used.

12. *Allowing for a break in the relationship at the start of the pandemic does not change the results*

	(1)	(2)
Dependent Variable: *Remote indicator*		
1000*HHI	0.008***	-0.007***
	(0.000)	(0.000)
1000*HHI x Pandemic Indicator		0.031***
		(0.002)
Fixed Effects:		
Year-Quarter	✓	✓
SOC x TTWA	✓	✓
Observations	39,594,503	39,594,503
Adj. R^2	0.124	0.126

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the labour market level using a labour market indicator. HHIs calculated using baseline approach with labour markets defined as 3-digit Standard Occupational Classification x Travel to Work Area. The hybrid indicator has been supplied to us by Hansen et al. (2023). Uses Lightcast vacancy data from January 2014 to September 2023.

13. Controlling for company size does not change the relationship between the Herfindahl-Hirschman Index (HHI) and the number of hybrid vacancies

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: *Remote indicator*						
1000*HHI	-0.024***	-0.004***	-0.014***	0.005***	0.008***	0.008***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
1000*Firm size	0.011***	0.005**	-0.010***	-0.004**	-0.002	0.005
	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)	(0.007)
1000*(Firm size^2)						-0.000
						(0.000)
Fixed Effects:						
Year-Quarter	✓	✓	✓	✓	✓	✓
SOC		✓		✓		
TTWA			✓	✓		
SOC x TTWA					✓	✓
Observations	39,594,503	39,594,503	39,594,503	39,594,503	39,594,503	39,594,503
Adj. R^2	0.051	0.117	0.059	0.119	0.124	0.124

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the labour market level using a labour market indicator. HHIs calculated using baseline approach with labour markets defined as 3-digit Standard Occupational Classification x Travel to Work Area. The hybrid indicator has been supplied to us by Hansen et al. (2023). Uses vacancy data from January 2014 to September 2023. Company size defined as number of vacancies in all labour markets in a quarter.

14. There is no relationship between remote vacancies and percentage changes in the Herfindahl-Hirschman Index (HHI)

	(1)	(2)	(3)
Dependent Variable: *Remote indicator*			
Log HHI	-0.033***	0.001	0.006***
	(0.001)	(0.001)	(0.002)
Fixed Effects:			
Year-Quarter	✓	✓	✓
SOC		✓	
TTWA		✓	
SOC x TTWA			✓
Observations	39,594,503	39,594,503	39,594,503
Adj. R^2	0.063	0.119	0.124

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the labour market level using a labour market indicator. HHIs calculated using baseline approach with labour markets defined as 3-digit Standard Occupational Classification x Travel to Work Area. The hybrid indicator has been supplied to us by Hansen et al. (2023). Uses vacancy data from January 2014 to September 2023.

15. The Logit model gives equivalent results, the Herfindahl-Hirschman Index (HHI) is uncorrelated with the prevalence of hybrid vacancies after the lowest levels

	(1)	(2)	(3)	(4)
Dependent Variable: *Remote indicator*				
Log HHI		-0.382***	0.029***	0.038***
		(0.010)	(0.006)	(0.007)
1000*HHI	0.014***			
	(0.005)			
Fixed Effects:				
Year-Quarter	✓	✓	✓	✓
SOC			✓	
TTWA			✓	
SOC x TTWA	✓			✓
Observations	39,429,761	39,594,503	39,594,503	39,429,761
Pseudo R^2	0.200	0.105	0.193	0.200

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the labour market level using a labour market indicator. HHIs calculated using baseline approach with labour markets defined as 3-digit Standard Occupational Classification x Travel to Work Area. The hybrid indicator has been supplied to us by Hansen et al. (2023). Uses vacancy data from January 2014 to September 2023.

Restrictive covenant tables

16. Regression analysis of the incidence of non-compete agreements

	(1)	(2)	(3)
Dependent variable: *Non-compete agreement indicator*			
Formal training towards certification (baseline: no)			
Yes, my current employer has paid for this type of training (either fully or in-part)	0.265***	0.258***	0.240***
	(0.028)	(0.029)	(0.028)
Training unrelated to role (baseline: no)			
Yes, my current employer has paid for this type of training (either fully or in-part)	0.170***	0.152***	0.151***
	(0.027)	(0.027)	(0.026)
Controls:			
Employer industry		✓	✓
Occupation		✓	✓
Tenure		✓	✓
Education			✓
Gender			✓
Income			✓
Region			✓
Full time vs part time			✓
Observations	2,150	1,972	1,972
Pseudo R^2	0.13	0.19	0.22

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Data from LSE-CMA Capstone Survey. Probit models are used to regress whether an employee believes they (definitely or probably) have a non-compete agreement in place with their current employer on whether they have received employer funded training. Additional variables are introduced in specifications 2 and 3 to control for various employer and worker characteristics. Coefficients represent the average marginal effect on the probability of an employee definitely/probably having a non-compete agreement in their contract. The Pseudo R^2 statistics follow Mcfadden's approach.

17. *Regression analysis of the incidence of firms using restrictive covenants*

Dependent variable: *Firm uses…*	*At least 1 restrictive covenant*	*Confidentiality agreements*	*Non-compete agreements*	*Non-solicitation agreements*	*Non-recruitment of co-worker agreements*	*No-poaching agreements*
Firm size, number of employees (baseline: 1-9)						
10-49	0.123***	0.111***	0.068***	0.072***	0.049***	0.027*
	(0.028)	(0.027)	(0.019)	(0.017)	(0.014)	(0.013)
50-99	0.150***	0.138***	0.056*	0.110***	0.072***	0.037
	(0.040)	(0.039)	(0.026)	(0.026)	(0.021)	(0.019)
100-249	0.085*	0.078	0.031	0.089***	0.061**	0.036
	(0.042)	(0.040)	(0.027)	(0.026)	(0.022)	(0.020)
250+	0.020	0.027	0.001	0.059*	0.058*	0.037
	(0.037)	(0.036)	(0.022)	(0.026)	(0.024)	(0.021)
Industry (baseline: Accommodation & Food activities)						
Service Activities	0.108**	0.087**	0.084***	0.042**	0.026*	0.028*
	(0.036)	(0.034)	(0.020)	(0.014)	(0.011)	(0.012)
Arts and Recreation	0.054	0.032	0.018	-0.000	-0.002	0.002
	(0.045)	(0.041)	(0.017)	(0.003)	(0.001)	(0.003)
Construction	0.014	0.011	0.001	0.009	0.017	0.005
	(0.031)	(0.030)	(0.002)	(0.008)	(0.011)	(0.005)
Education	0.125	0.072	0.009	0.063	0.001	0.001
	(0.082)	(0.068)	(0.006)	(0.048)	(0.002)	(0.003)
Health & Social Work Activities	0.125*	0.123*	0.042	0.007	0.005	0.004
	(0.064)	(0.061)	(0.030)	(0.005)	(0.004)	(0.004)
Information & Communication	0.211***	0.186***	0.147***	0.099***	0.068***	0.060***
	(0.043)	(0.041)	(0.029)	(0.023)	(0.019)	(0.018)
Manufacturing & Mining	0.109**	0.069*	0.096**	0.028*	0.009	0.039*
	(0.042)	(0.035)	(0.030)	(0.012)	(0.006)	(0.015)
Professional, Scientific & Technical	0.166***	0.149***	0.109***	0.084***	0.042***	0.031***
	(0.032)	(0.031)	(0.017)	(0.014)	(0.010)	(0.009)
Real Estate	0.063	0.062	0.017*	0.118	0.002	0.006
	(0.066)	(0.065)	(0.008)	(0.065)	(0.003)	(0.005)
Transportation & Storage	0.056	0.002	0.024	0.043	0.000	0.026
	(0.046)	(0.034)	(0.020)	(0.023)	(0.002)	(0.023)
Water & Waste Activities	0.012	0.020	0.036	0.018	0.016	0.018
	(0.043)	(0.042)	(0.023)	(0.015)	(0.016)	(0.018)

Wholesale, Retail & Repair of Motor Vehicles	0.056	0.044	0.063***	0.042**	0.018*	0.017
	(0.030)	(0.029)	(0.015)	(0.013)	(0.008)	(0.009)
Controls:						
Turnover	✓	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓	✓
Observations	10678	10678	10678	10678	10678	10678
Pseudo R^2	0.10	0.11	0.14	0.13	0.14	0.11

Note: Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05. Data from Business Insights and Conditions Survey. Probit models are used to regress whether a firm indicates they use any of the five restrictive covenants in the contracts of, at least some of, their employees on various firm characteristics. Coefficients represent the average marginal effect on the probability of a firm using a restrictive covenant in the contracts of employees. The Pseudo R^2 statistics follow Mcfadden's approach.

18. ***Proportion of firms responding "Not sure" when asked about use of restrictive covenants, from the Business Insights and Conditions survey, 2023***

Category	Proportion of firms responding "Not sure"
All firms	12%
Firm size	
1-9	11%
10-49	19%
50-99	23%
100-249	30%
250+	40%
Industry	
Accommodation & Food Activities	15%
Service Activities	14%
Arts and Recreation	4%
Construction	16%
Education	15%
Health & Social Work Activities	10%
Information & Communication	9%
Manufacturing & Mining	18%
Professional, Scientific & Technical	7%
Real Estate	11%
Transportation & Storage	10%
Water & Waste Activities	10%
Wholesale, Retail & Repair of Motor Vehicles	15%
Region	
East Midlands	16%
East of England	10%
Greater London	11%
North East	7%
North West	16%
Northern Ireland	6%
Scotland	13%
South East	8%
South West	15%
Wales	16%
West Midlands	16%
Yorkshire and the Humber	15%
Turnover Quintile	
1st	11%
2nd	21%
3rd	19%
4th	20%
5th	36%

19. Distribution of the full Business Insights and Conditions Survey (BICS) sample and the BICS and Management Expectations Survey merged sample

Category	Proportion of firms in... BICS sample	BICS x MES sample
Firm size		
1-9	89%	0%
10-49	9%	54%
50-99	1%	24%
100-249	1%	18%
250+	0%	4%
Industry		
Accommodation & Food Activities	8%	4%
Arts and Recreation	3%	8%
Construction	15%	11%
Education	2%	0%
Health & Social Work Activities	3%	1%
Information & Communication	8%	6%
Manufacturing & Mining	6%	29%
Professional, Scientific & Technical	19%	9%
Real Estate	2%	4%
Service Activities	13%	8%
Transportation & Storage	5%	4%
Water & Waste Activities	0%	2%
Wholesale, Retail & Repair of Motor Vehicles	18%	15%
Region		
East Midlands	7%	8%
East of England	11%	13%
Greater London	19%	10%
North East	3%	7%
North West	10%	7%
Northern Ireland	2%	0%
Scotland	5%	6%
South East	16%	15%
South West	9%	9%
Wales	4%	6%
West Midlands	7%	9%
Yorkshire and the Humber	8%	10%
Turnover quintiles		
1st	87%	11%
2nd	9%	28%
3rd	3%	31%
4th	1%	21%
5th	0%	9%

Note: Firms with less than 10 employees and located in Northern Ireland are not sampled in the Management Expectations Survey.