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Great Britain Microbusiness White Paper

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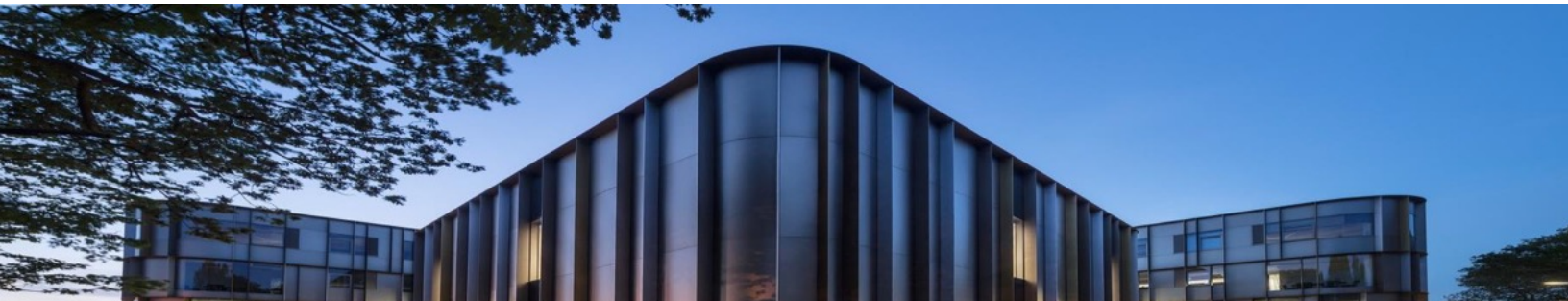

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Foreword

Venture Forward by GoDaddy is an initiative that quantifies the economic impact of the microbusinesses it supports, of which there are over 2 million in Great Britain. These online microbusinesses are essential contributors to their local communities and the national economy. In particular, the GoDaddy Venture Forward initiative brings exclusive data and insight to bear on the value that microbusinesses add to society and the economy. It is a powerful tool that informs and thereby empowers policymakers at the national, regional, and local authority levels, enriching their understanding of how to better support microbusinesses and the people behind them. This Great Britain Microbusiness White Paper is the first empirical analysis undertaken for the United Kingdom (UK) that combines microbusiness data on so large a scale.

The report identifies several themes associated with the activity of online microbusinesses. It provides regional and sectoral analysis of online microbusinesses, indicating and explaining trends and areas of growth and decline. It provides national and regional survey results that highlight the impact of the Covid-19 pandemic and Brexit on the establishment of online microbusinesses. It takes a deeper look at the motivations and needs of the entrepreneurs behind these microbusinesses. It carries out a rich statistical analysis on the regional and national impact that online microbusinesses have on income, unemployment, and wellbeing, emphasising their contribution to economic development and growth. Finally, it includes an extensive and coherent analysis of the effect of online microbusiness activity on the prosperity of local communities.

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Extended executive summary

Online microbusiness[1] venture density offers a lens through which we can understand modern market dynamics and the ways in which web-based entrepreneurial microbusinesses can offer alternative sources of household income, an escape from unemployment, and a career development path. In contrast to the notion that online businesses are distant and impersonal, lacking physical presence and making no significant impact on local communities, we find that these microbusinesses can have an impact on economic conditions and wellbeing of individuals, and benefit local communities and economies by creating economic and social value through entrepreneurship and innovation. Specifically, online microbusinesses can benefit local communities by generating new employment and income opportunities, as well as by creating and servicing new, innovative, and competitive markets. While major cities are often credited as being engines of regional and national economic growth, it is often the case that there are significant differences between the various local areas of a city, with some having a higher venture density than others.

We investigate the impact of online microbusiness venturing on local areas in Great Britain using exclusive data from GoDaddy, a leading provider of domain names and website hosting. This gives us access to a larger data set on British microbusinesses than is typically available, and allows us to gain valuable quantitative insights into an otherwise under-researched area of business activity. The period under investigation covers a particularly volatile period for Britain, who experienced concurrently the effects of the COVID-19 pandemic and the exit of the UK from the EU. The effects of these two events on the economy and society are tricky to disentangle. Brexit had an inevitable impact on the market, with several large firms moving departments and workforces out of the UK to locations in the EU. These departures impacted on the smaller supply-chain firms, and the effects were exacerbated by the COVID-19 pandemic lockdown. The study considers the effects of this dual exogenous effect on the online micro business environment.

"Online microbusiness venturing has a particularly beneficial effect on the local economies of disadvantaged neighbourhoods."

[1] In the UK, a microbusiness is a business that employs fewer than 10 employees. According to the European Union (EU) definition, a microbusiness is a business that employs fewer than 10 employees and has an annual turnover of up to €2 million.

"Several of the relatively deprived neighbourhoods appear to benefit from proximity to entrepreneurship hubs (e.g., East London Tech City), indicating the important spill-over effects from investments in technology and entrepreneurial incentives."

The study uniquely combines online microbusiness venture data from GoDaddy with socioeconomic data from the Office for National Statistics and the statistics departments in Wales and Scotland. It also uses household data from a large UK Household Study (UKHLS) to complement the analysis and evaluate the findings. Using these extensive collections of databases, we find a strong association between online microbusiness venture density and several factors that affect local community prosperity. We find that online microbusiness venturing has a particularly beneficial effect on the local economies of disadvantaged neighbourhoods, improving their economic and social conditions. Moreover, online microbusiness venturing appears to have an even greater benefit on local communities with a gender-balanced population or with a higher proportion of women. Gender demography appears to be an important factor that enables online venturing activities to affect the prosperity of communities more strongly.

The national lockdown that was implemented as a response to COVID-19 appears to have acted as a "gale of creative destruction", which, while forcing many businesses to close their doors to the public, opened up for them a new world of online business and trading. It propelled businesses away from their traditional business models and practices to new ones that required technological innovation and digitalisation. Our results indicate that areas with a higher frequency of internet use were able to adapt to the changing work environment better than those areas where the local population was less 'tech-savvy'. The acquisition of internet skills can thus be viewed as an essential tool for online business creation, as well as a key means of acquiring information and creating linkages between firms and consumers. In particular, we found that frequency of internet use increases the probability of being in the higher categories of income and life satisfaction by about 4 percentage points. However, this positive and statistical association is found to be associated with regions with higher microbusiness venture density those with lower microbusiness venture density (e.g., South East vs North East).

Our results show that the existence of local online (new) microbusinesses can have a short-term impact on unemployment, with an estimated coefficient that was both negative and statistically significant (the estimated elasticity for 3 months ahead was -0.023). The negative

effect is found to be generally robust across regions with high and lower microbusiness venture density, although the coefficient of microbusiness venture density does vary (e.g., in London the estimated effect is found to be nearly 3 times bigger). However, in the medium term, the overall unemployment effect reduces substantially in magnitude, which can be explained by competition and business failure. Nevertheless, regions with high microbusiness venture density (except for the West Midlands) are found to be associated with lower medium-term unemployment compared to the regions with lower microbusiness venture density. Also, in high microbusiness venture densities such as London and South East, the effect of unemployment remains strong even in the medium term. Also, we find that operating in such a high microbusiness venture density region increases the probability of reporting above the mean monthly gross income (i.e., £1,704) in our sample.

When we analyse the map[2] data of the neighbourhoods where high microbusiness venture-density locations are situated, we find that they are in 'middle prosperity' areas – so, they are neither very prosperous nor highly deprived. Taking this finding in conjunction with the positive association we identify between online microbusinesses and local community prosperity, we suggest that these locations may have improved their prosperity through online microbusiness activity. Furthermore, several of the relatively deprived neighbourhoods appear to benefit from proximity to entrepreneurship hubs (e.g., East London Tech City), indicating important spill-over effects from investments in technology and entrepreneurial incentives.

The analysis of official data also suggests a complex relationship between unemployment and microbusiness venture density, and one that differs across England, Wales, and Scotland. The results suggest that online businesses can act as a source of alternative income in periods of economic volatility. Importantly, however, our results also suggest that differences exist between Britain's nations. Specifically, Wales scores low in the microbusiness venture density index such that no location in Wales scores among the top 10, even when London is excluded. Wales is also the only region in Britain where locations in the rural villages and towns in the fringe had a larger positive effect on microbusiness venture density than urban cities. Therefore, investment in tech infrastructure and high-speed broadband is needed to help several areas level up so they can keep pace with the changing business environment.

[2] See Appendix 5 for the maps of the neighborhoods with the highest density locations in Britain.

A snapshot of the key highlights

- *Online microbusiness venturing has a particularly beneficial effect on the local economies of disadvantaged neighbourhoods.*
- *Several of the relatively deprived neighbourhoods appear to benefit from proximity to entrepreneurship hubs (e.g., East London Tech City), indicating important spill-over effects from investments in technology and entrepreneurial incentives.*
- *Online businesses can act as a source of alternative income in periods of economic volatility. This appears to be especially true for the less prosperous neighbourhoods of London (in our sample, Islington and Hackney).*
- *Online microbusiness venturing seems to have more benefit on the prosperity of locations that have either a higher proportion of women or a gender-balanced population (e.g., Stockport).*
- *Self-employment is positively associated with microbusiness venture density, whereas wage-employment negatively associated with it. As such, microbusiness venture density can be seen as an indicator of how entrepreneurial an area is.*
- *Unemployment increases microbusiness venture density, while the increase in microbusiness venture density leads to lower unemployment in the short-run.*
- *Regional differences in microbusiness venture densities alter the effect of microbusiness venture density on unemployment, with the effect being stronger and more persistent in regions with higher microbusiness venture density (e.g., London, South East, North West) compared to regions with lower microbusiness venture density (e.g., South West, North East).*
- *Microbusiness venture density seems to follow turnover, rather than drive it. Turnover has a stronger effect on microbusiness venture density than microbusiness venture density has on turnover. This suggests that higher local turnover encourages the establishment of microbusinesses and allows online microbusinesses to exploit opportunities and flourish.*
- *Internet use is found to improve various aspects of well-being, but the effects are more pronounced in regions with high microbusiness venture density. This may suggest that operating within high microbusiness venture density regions strengthens the benefits of internet use.*
- *Higher regional microbusiness venture density and internet use increase the probability of an induvial reporting above the mean of monthly gross income.*
- *Individuals with high frequency of internet use are more likely to start their own business and are less likely to report being unemployed.*
- *Individuals living in regions with lower microbusiness venture density are less likely to intend to start their own business.*

1. Introduction

1.1. Innovation and online business venturing

Entrepreneurship has been shown to have strong links with economic growth and innovation (Bosma et al., 2020; Haltiwanger et al., 2013). It has also been acknowledged to be an important factor that can improve the prosperity of disadvantaged communities and elevate people from relative poverty (Bhuiyan and Ivlevs, 2019). Clusters of entrepreneurial activity in a local area can produce spill-overs that impact on existing organisations in neighbouring areas (Audretsch and Feldman, 2004). The positive effects of entrepreneurship on economic growth and well-being are evident regardless of the opportunity or necessity incentives that *push* or *pull* people into starting their own business (Amorós and Bosma, 2013; Haltiwanger et al., 2013; Johansson Sevä et al., 2016; Reynolds et al., 2002). Business ventures that were originally established to overcome adverse labour conditions have benefited the entrepreneurs themselves, as well as their local communities (Williams and Shepherd, 2016).

Advancements in internet technologies, such as Web 2.0, mobile internet applications, the *Cloud*, and superfast broadband, have expanded the use of the internet and have greatly simplified its use. Today an unimaginable amount of content can be accessed and shared online. Moreover, the development of user-friendly e-commerce platforms and the advent of the online sharing economy has changed the landscape of entrepreneurship to one that has increasingly become more digital. A Boston Consulting Group report notes with regard to online retail that "Nowhere is the impact more apparent than in the U.K." and that "The U.K. has become a nation of digital shopkeepers" (Dean et al., 2012, p. 8). Owners of online small and microbusinesses who correctly position their businesses in the market can utilise the internet to reach out to customers and grow their businesses. The benefits of online presence and online visibility and adjustment became quickly apparent with the COVID-19 pandemic lockdown and became a key determinant of firm survival.

This report examines the role of online microbusinesses in Great Britain[3]. The period we investigate covers the last four months of 2019 (which was pre-COVID-19) and the first four months of 2020 when the pandemic crisis started to unfold in Britain[4]. This period also coincides with the conclusion of the UK's exit from the EU, also known as Brexit. At 11pm on

[3] The report uses the terms 'Great Britain' and 'Britain' interchangeably.

[4] The first two people to test positive for COVID-19 in Britain were reported on 31st January 2020 in the area of York. The UK had restricted flights to/from China earlier in January.

31st January 2020, the UK officially left the EU and entered a transition period which lasted until 31st December 2020. The effects of the pandemic are therefore not easily disentangled from the effects of Brexit after 31st January 2020. Moreover, the quarantine restrictions that started with the suspension of flights to Wuhan in China gradually developed into a national lockdown of public spaces, including private businesses. The lockdown forced many small and microbusinesses to transition to an online trading milieu. This volatile environment created the conditions from which new small and microbusinesses emerged, having leveraged advancements in technological know-how to benefit from the opportunities presented by the increased volume of online trading.

1.2. Prosperity and business venturing

National growth and prosperity have been traditionally examined from the perspective of national accounts, management of resources, industry forces, and trade. However, the experience of the average citizen is limited to the local area in which they live and work; they are bounded by their neighbourhood. Business venturing increases the prosperity of local communities and therefore it is important to understand the conditions that foster healthy entrepreneurial ecosystems (Bosma et al., 2020; Saridakis et al., 2020; Stam, 2015). Identifying the factors that positively impact the prosperity of local communities can assist policy makers to make the kind of good decisions that foster entrepreneurship and allow local communities to flourish. While London has been hailed as Britain's most important engine of economic growth and a hub for entrepreneurial activity (DEFRA, 2019; Dobbs et al., 2011; ONS, 2017), it is also the UK's most expensive location to live in (Hearne and Ruyter, 2019). In contrast, Wales and the northern regions of England are among the cheapest areas to live.

Nevertheless, despite regional differences in the cost of living (e.g., housing) and the high cost of living in London, the average Londoner remains financially better-off than the average resident of Wales, with London income being 27 percent higher (Hearne and Ruyter, 2019). While average income can arguably be skewed by concentrations of high earners in a particular region, this is only true for London because of the high incomes in districts such as the City of London, Camden, Kensington and Chelsea, Hammersmith and Fulham, and Westminster (Hearne and Ruyter, 2019). However, in the context of an examination of entrepreneurship, it must be noted that some of these areas are residential locations (e.g., Kensington and Chelsea) rather than hubs of intensive business activity (e.g., City of London).

Entrepreneurial activity does not take place in some abstract space. Examining the role of microbusiness venturing and the prosperity of a small community (e.g., a neighbourhood) allows us to consider entrepreneurship not as a relatively abstract phenomenon that somehow impacts on national growth, but rather as one that places emphasis on the collective prosperity of small communities and their social well-being (Mossberger et al., 2021). Income inequality also needs to be accounted for when considering the role online microbusiness venturing plays in ensuring community prosperity. For instance, the median real wage-income of Londoners is the second lowest in the UK, even while the *mean* income shows London to be UK's highest average income area (Hearne and Ruyter, 2019). London has some local authority districts with the highest proportion of university level educated citizens and also some with the lowest in the UK (Blank et al., 2018). Therefore, there is a need to investigate the impact of online microbusiness venturing at local community and regional levels.

Our investigation uncovers important links between online microbusiness venturing and local community prosperity, income, and employment. We find that online microbusiness venturing positively impacts local community income and economically benefits disadvantaged areas. It reduces short-run unemployment (an effect that remains, albeit to a lesser degree, in the medium term), it increases employment inclusion and improves the living conditions/environment of deprived areas. Moreover, we find that neighbourhoods with more women experience an even stronger effect from online microbusiness venture density on the indices of income and employment deprivation; this effect may be explained by differences in online consumption orientation (e.g., shopping enjoyment, brand and fashion consciousness), expansion of economic opportunities and family incomes, and industry concentrations with lower death rates (e.g., Education, Health).

Moreover, we show that unemployment increases microbusiness venture density and that microbusiness venture density, in turn, reduces short-term unemployment. Hence, the creation of an online business, which requires less start-up capital and risk-taking, can be seen as a way of reducing unemployment and enhancing individuals' human capital and experience. We show that unemployed people are more likely to report higher intentions to start their own business. Finally, we find that internet use, especially in regions with high microbusiness venture density, improves wellbeing conditions. Also, living in high microbusiness venture density regions increases the probability of earning a monthly gross income that is above the mean.

To the best of our knowledge, this is the first time such extensive data on small and micro businesses has been used to investigate the local and regional effects of business venturing. The rest of the report is organised as follows: Section 2 discusses the data and methods employed in the analysis. Section 3 explores local microbusiness venture densities using a set of descriptive statistics, while Section 4 analyses the data using a set of multivariate regressions. Section 5 offers a summary of the findings, and concludes.

2. Data and methods

The data we use in this study were provided by GoDaddy, a leading provider of domain name and web hosting. The GoDaddy data comprises monthly information for approximately 2.3 million online microbusinesses. The data provides information about the activity level of websites as well as their locations in the UK. Most of these online businesses are owned by sole business owners/proprietors who have between one and ten employees[5]. The online active presence and health of these websites are monitored by GoDaddy, and categorised as active or inactive. We use this categorisation to determine the factors that affect (i) the activity/inactivity of online microbusinesses and (ii) their activity level clustering.

The GoDaddy data covers the period from September 2019 to April 2020. We complement this data with data from the UK Office for National Statistics (ONS) and the UK Household Longitudinal Study[6] (UKHLS). The UKHLS is an initiative funded by the Economic and Social Research Council (ESRC) and various UK government departments, with scientific leadership being provided by the Institute for Social and Economic Research (ISRER), University of Essex. The survey is delivered by several collaborating fieldwork agencies: the National Centre for Social Research (NatCen), the Central Survey Unit of the Northern Ireland Statistics and Research Agency (NISRA), Kantar Public, and Millward Brown Ulster. Most of the data is collected via face-to-face interviews, supplemented by a small number of telephone and web interviews. The mainstage survey collects data from every household member who is aged 16 and above. For a detailed description of the data see: University of Essex (2019).

5 Using data from the United States as a proxy we know that just 14 percent of microbusiness ventures offer commercial services exclusively in-store.

6 We use data from wave 10, which includes the period covered in the GoDaddy data (i.e., last 4 months of 2019 and first four months of 2020).

The data obtained by the ONS includes information from labour and business surveys for the same period concerning monthly Job Seeker's Allowance claims and public and private business turnover. We also use information on population data from the UK Census of 2011, such as age, gender, population density, and other geographical information (e.g., urban-rural categories, local authority districts, regions, etc.), and data from the 2019 English, Welsh and Scottish Indices of Deprivation. The data is aggregated to the ONS Output Areas (OAs) and to Super Output Areas (SOAs), matching postcodes (zip codes) to the corresponding OA (for a detailed description of OA and SOA, see Appendix 1). We estimate the online microbusiness venture density as the ratio of the number of different microbusinesses in Output Areas over the population of Middle Super Output Areas (per 1000 population). This estimate limits possible bias from Output Areas that have many business locations and only a few residential areas.

We explore the online microbusiness venture density of 191,353 Output Areas (OAs) in Great Britain with an average population[7] of 319 people for our sample. These OAs are aggregated into 41,518 Lower Super Output Areas (LSOA) with an average population of 1,600 people. The LSOAs are in turn grouped into 8,480 Middle Super Output Areas (MSOA) with an average population of 7,715 people (See Appendix 1). These numbers are close to the ONS description of populations of 250, 1,500, and 7,500 respectively for each OA, LSOA, and MSOA. Considering that data is collected based on the location of online microbusinesses, the slightly higher averages likely indicate that microbusiness activity is observed in areas with, on average, a higher population. The average number of microbusinesses in each area is 400 for OAs, 566 for LSOAs, and 1,205 for MSOAs. When we exclude the online microbusinesses that do not have an active presence online, the number of microbusinesses changes significantly. The average number of microbusinesses with a healthy presence online is identified as 218 at OA level, 376 at LSOA level, and 983 at MSOA level.

We use this information to create a microbusiness venture density variable for the active online microbusinesses, which we employ in a set of multiple regression analyses. Microbusiness venture density is estimated using the number of online business websites in each Output Area, divided by the number of people living at the associated Middle Super Output Area. The analyses attempt to determine the factors that influence local microbusiness venture density and the factors that are influenced by it. In our investigation we employ several

[7] The population estimations are based on the UK 2011 Census. We assume that the population of Output Areas has not changed dramatically since 2011.

methods of quantitative analysis: Ordered Least Square (OLS), Probit with the Huber-White sandwich estimator of variance, and Ordered Probit for the equivalent ordinal variable estimate (Aldrich and Nelson, 1984; Winship and Mare, 1984; Wooldridge, 2010). We implement the above methods in the STATA quantitative analysis software. The regressions are of the general form:

$$y_i = b_0 + b_i X + u_i$$

where *y* is the dependent variable of interest, b_0 is the intercept and b_i is the coefficient of the explanatory variables of a matrix *X*. The u_i is the unobservable disturbance for observation *i.* Regressions are run separately for different months and the UK's different nations. The data are mainly analysed using Ordinary Least Squares (OLS). We take the natural logarithms of the continuous variables so that the coefficients in a log-log model can be interpreted as elasticities (i.e., if the explanatory variable changes by one percent, the dependent variable changes by *b* percent). Where appropriate, we use probit models (for binary outcome variables), ordered probit specifications (for ordinal dependent variables), and we report marginal effects at the mean.

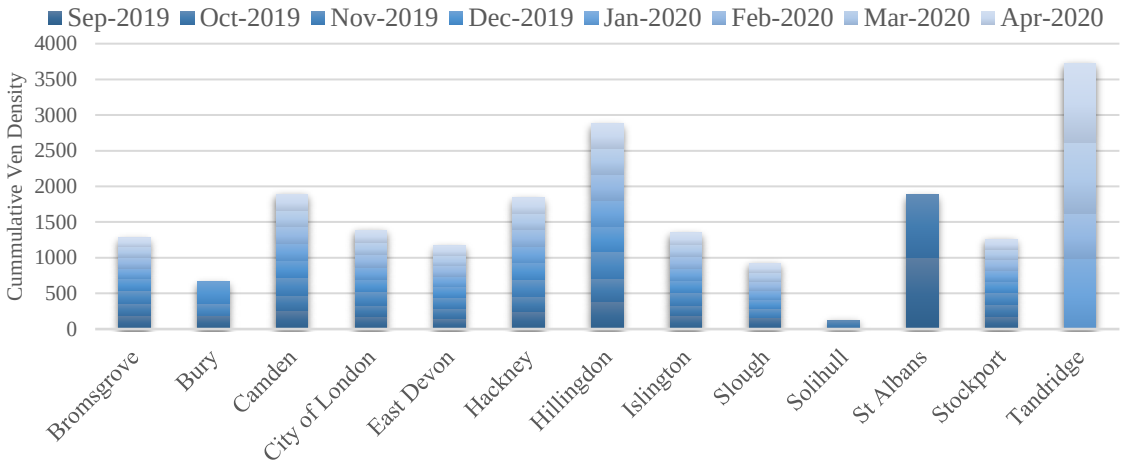
In our models we control for various socio-economic and demographic characteristics and we control of outliers. To account for the heterogenous composition of Output Areas, all the models include a control with detailed information about the Output Area Classification from the ONS (see Appendix 2). This control variable classifies the Output Areas into 77 different categories based on their socioeconomic composition, allowing us to capture discrepancies between Output Areas across Britain. Other controls we use in the analysis include share of women and men, age, region, rural-urban area, the presence of public organisation in the area, the per capita private business turnover, a control for high or low website activity, a control for new microbusiness ventures (i.e., created within the most recent 6 months), and a microbusiness venture density outlier control, where applicable. For a description of the variables used in the models, see Appendix 2.

3. Online microbusinesses and local communities

3.1. What areas have the highest microbusiness venture densities?

Our analysis explores the information in the merged dataset using a series of descriptive statistics analyses. Using the online microbusiness venture density estimate, we identify the Top 10 areas of Britain with the highest microbusiness venture density scores. Figure 1 presents the 10 areas with the highest microbusiness venture density scores for each month. Some areas appear only slightly changed from one month to the next, whereas others show significant changes. Figure 1 suggests location has an effect on microbusiness venture density. Of these 13 locations, 4 lie in London (i.e., Camden, City of London, Islington, and Hackney), as well as Hillingdon, which lies in Greater London. Of the locations outside London, St Albans and Slough are corporate centres in their own right but they also lie within commuting distance from London.

Figure 1. Highest microbusiness venture density locations: Sep 2019-Apr 2020.



The frequency of high microbusiness venture density locations in London is perhaps to be expected, given that London is both a major hub for national and international trade and a magnet for international business venturing. Moreover, as the UK's capital, London (specifically, Westminster) is the political centre of the country, as well as one of the world's most important financial centres (City of London). According to the ONS, London is credited with generating about a fifth of the UK's Gross Domestic Product; for 2019, that was £487 billion ($640 billion U.S.) (ONS, 2019). For reference, if London were a country, its GDP would be the 35th highest in the world, which is similar to the GDP of the United Arab Emirates, greater than the GDP of Switzerland, and almost twice that of Israel.

The high microbusiness venture density in areas on the outskirts of London and in its commuter belt (i.e., the London Metropolitan area) could indicate that a high level of microbusiness activity is driven, in part, by proximity to London in locations with cheaper rents (Ryan-Collins, 2018). The high rents in London have forced residents to find homes away from its central areas where housing prices are about 7 times the UK's median income. Those who have been pushed out of major urban areas by rising costs often commute distances of more than 20 km for work (Stockdale, 2005). It is also the case that many people who move from major urban areas to more rural areas are experienced professionals who start their own businesses (Litsardopoulos et al., 2020). Semi-urban locations that are situated on the outskirts of major urban centres but within commuting distance enjoy a functional and perhaps optimal compromise, combining the ease of doing business with a better quality of life away from the urban environment (Abreu et al., 2019).

Hillingdon, a borough west of central London, is the location in the vicinity of London with the most consistently high microbusiness venture density over time. Hillingdon is situated within London's M25 orbital motorway (which encircles Greater London) and next to the A40/M40 fast diagonal roadway that connects the North-West with central London. Hillingdon appears to have a second advantage in its close proximity to Heathrow airport. Tandridge (Surrey) lies further out from London but appears to have a similar advantage in being close to Gatwick, another London airport. St Albans, too, is near a large airport: Luton.

Additionally, proximity to major airports might also be advantageous with regards to a transport infrastructure intended to ease travel (and therefore commuting) from London to the airports. For instance, St Albans is situated about 20 miles from central London, but with a direct public transport connection (Thameslink) that takes about 35 minutes to reach central London. Slough is a corporate centre in its own right. Stockport and Bury are in Greater Manchester, and so they may also have the benefit of being satellite locations to a major city without the high cost of properties of a major urban city. Bromsgrove lies between Worcester and the UK's second largest city, Birmingham. The range of Local Authority Districts (LAD) included in Figure 1 suggests that location plays an important role but that it is not the only driver of microbusiness venture density.

Figure 2 presents the monthly change in the microbusiness venture density of each of the top locations in comparison to each other. Figure 2 shows some variation in microbusiness venture density across locations and over time. Tandridge stands out as the location with the greatest monthly change; for other locations, the monthly changes are more modest. While

Tandridge shows high density, it also shows higher variation over time. This would suggest that while its microbusinesses do not survive, they are quickly replaced by other microbusiness start-ups. Tandridge Borough Council (2017) note that while, in general, start-up rates are high in the Borough, survival rates are lower than in other local areas (Tandridge Borough Council, 2017).

Figure 2. Top 10 microbusiness venture density locations monthly change.

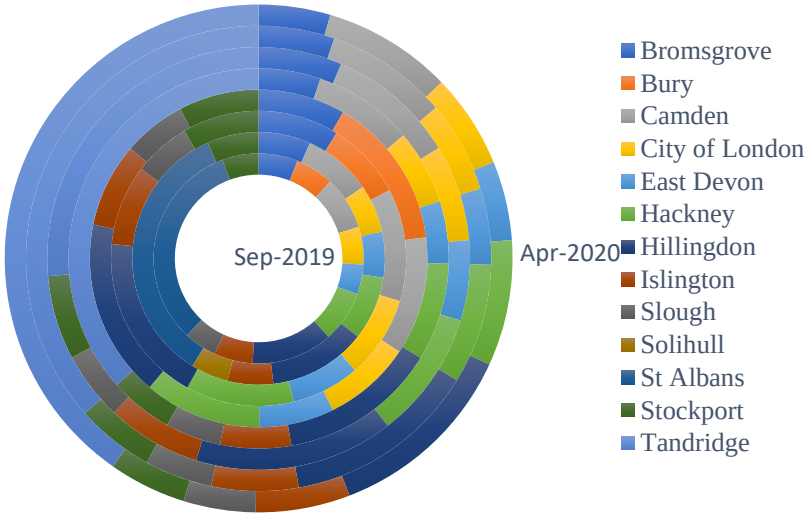


Table 1 presents the Top 10 district locations with the highest microbusiness venture density for April 2020. For each location, Table 1 shows the distribution of microbusiness health/activity scores. This reveals some interesting patterns. Table 1 seems to suggest that healthy online microbusinesses in the top 10 highest microbusiness venture density locations are mainly found within London (e.g., City of London, Hackney, and Camden), in Stockport, and in East Devon. In other locations, the majority of microbusinesses fall towards the lower end of the health metric. Tandridge, despite its high microbusiness venture density, shows the lowest number of healthy microbusinesses, which would explain the high variation in density over time. Overall, we observe that only a small proportion of online microbusinesses located in districts with high microbusiness venture density have scores concentrated in the upper levels of the website health metric. This can indicate that while creating a business website is, especially now, relatively straightforward, building a healthy and successful online business remains as hard as it ever was. Often, the three key ingredients for growing a successful business are funding, training, and time (Coad et al., 2016). Government support for new businesses at key stages can allow microbusiness start-ups to survive in the short-run and accumulate the instrumental experience that can allow them to flourish.

Table 1. Apr-20: Activity metric for Top 10 microbusiness venture density location (%).

	1	*2*	*3*	*4*	*5*	*6*	*7*
Tandridge	**86**	**5**	**1**	**8**	**0**	**0**	**0**
Islington	6	30	24	14	17	7	1
Camden	6	26	21	18	22	6	2
City of London	4	30	19	13	24	7	2
Hackney	4	28	19	15	23	10	1
Hillingdon	0	80	8	5	5	2	0
Slough	0	92	2	1	5	0	0
Bromsgrove	0	76	5	9	8	1	0
East Devon	0	48	21	16	13	2	0
Stockport	0	6	38	30	22	4	0

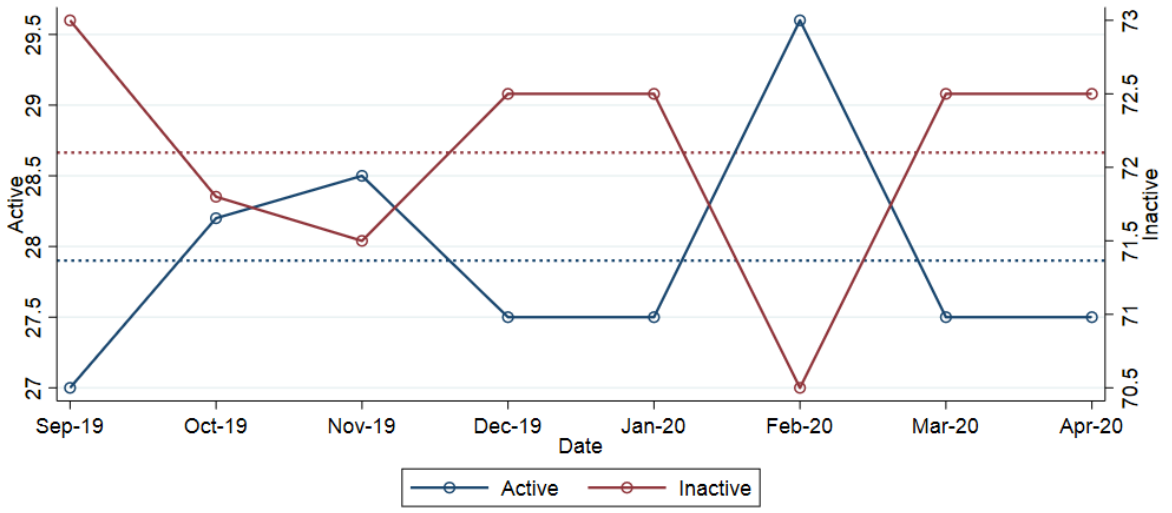
Note: The health/activity scores range from 1 to 7, with 7 indicating the top health score.

3.2. How did Brexit and the pandemic affect microbusinesses?

We identify the presence of large differences across geographies and time. For instance, there are some locations in London with an average of over 4,000 microbusinesses with a healthy online presence, and several other locations elsewhere in Britain with more than 1,500 microbusinesses (e.g., in Manchester). It is possible that the highly concentrated online presence in such locations can include professional businesses that are active in the information technology sector and involved in the provision of web services to third parties. The data also indicate that the distribution of business activity across Britain is concentrated in and around major urban areas. Moreover, based on the monthly data, we observe temporal variations in the ranking of areas with the highest online microbusiness venture density, which is indicative of substantial changes in the microbusiness venturing environment. The variation reflects the ease with which an online presence can be established, and also the difficulty of maintaining a healthy online business.

When we plot the number of active and inactive microbusinesses ventures for each month, we observe a jump in the number of inactive microbusinesses in December 2019. The number of inactive microbusinesses remained high since then, with the exception of February, when the number of inactive microbusinesses plunged. At the same time, the number of active microbusinesses followed the opposite direction from that of the inactive microbusinesses, as illustrated by Figure 3. The horizontal dot-lines show the average value for each cluster of microbusinesses.

Figure 3. Number of active-inactive microbusinesses.



The period the data covers includes two UK events that coincided: the formal exit (Brexit) of the UK from the EU, and the start of the coronavirus pandemic (COVID-19). However, the trend appears to begin prior to the first recorded COVID-19 incidents (i.e., 31st January 2020). Indeed, the start of the pandemic seems to have temporarily encouraged more microbusinesses online, with a mini peak in active microbusinesses being seen in February 2020 along with a fall in the number of inactive websites. However, this was short-lived, and the upward trend of inactive online microbusinesses resumed from March 2020. During the period leading to the conclusion of the Brexit negotiations and the formal exit of the UK from the EU, several large businesses chose to manage the Brexit-induced volatility by moving parts of their business (e.g., departments and personnel) out of the UK and into countries that were EU members. Since these businesses had been part of the business environment in their UK localities, it is reasonable to expect that those localities were thus affected by Brexit. There was a similar temporary shift online seen in November 2019, which was perhaps also driven by uncertainties over Brexit.

To see how the microbusiness venture density of the Top 10 locations changes over time, we plot the microbusiness venture densities for each month. Figures 4A to 4H present bubble diagrams of the top 10 areas with the locations with the highest microbusiness venture density for each month from Sep-2019 to Apr-2020, ranked from highest to lowest. We locate these output areas in their individual local authority districts.

Figure 4A. Sep-2019.

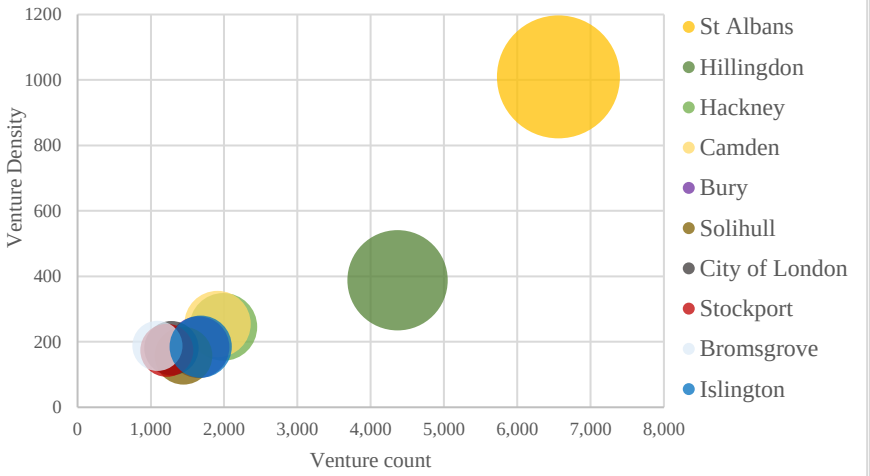


Figure 4B. Oct-2019.

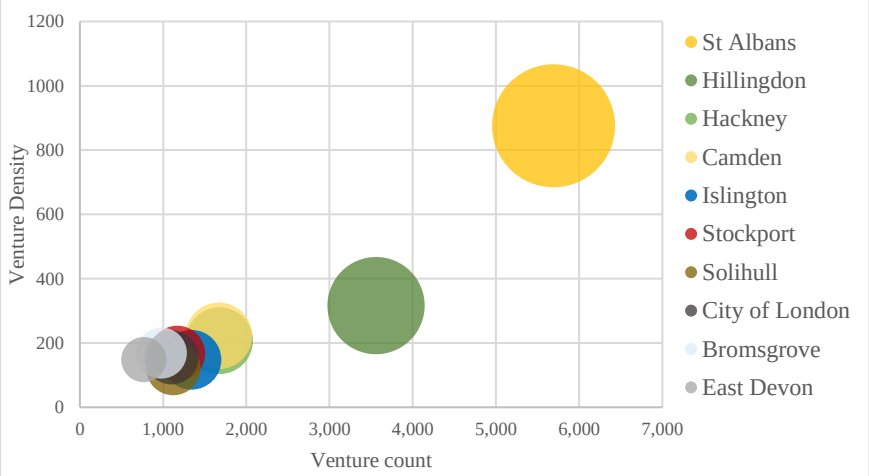


Figure 4C. Nov-2019.

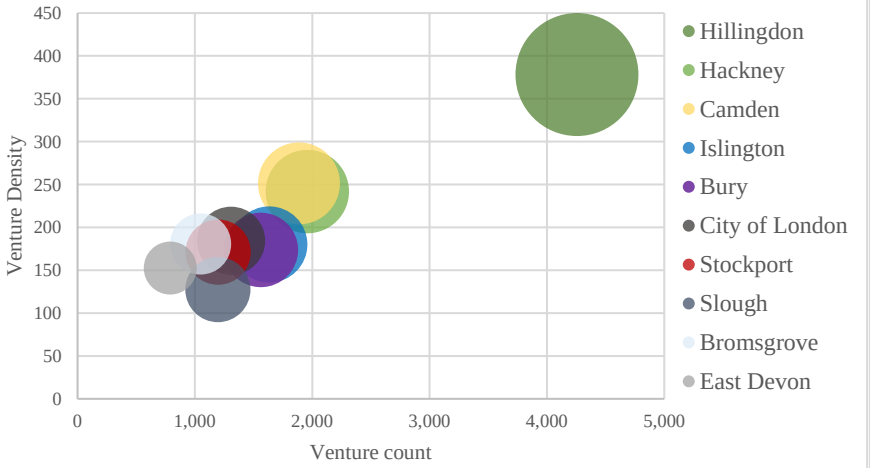


Figure 4D. Dec-2019.

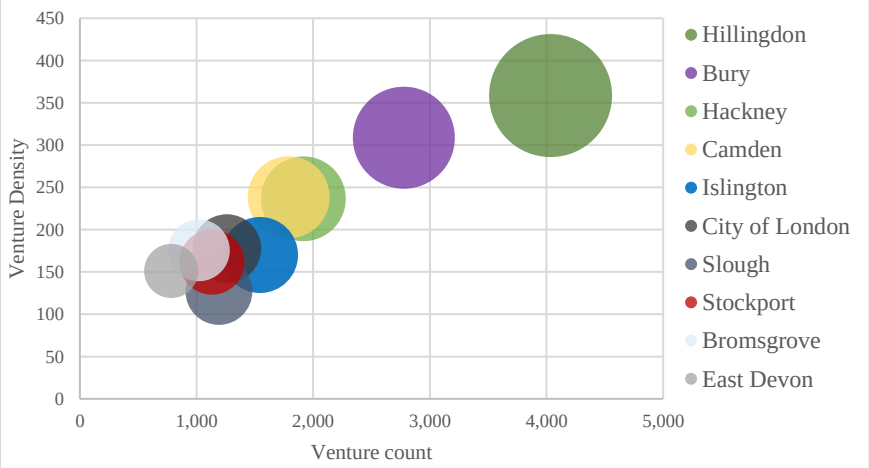


Figure 4E. Jan-2020.

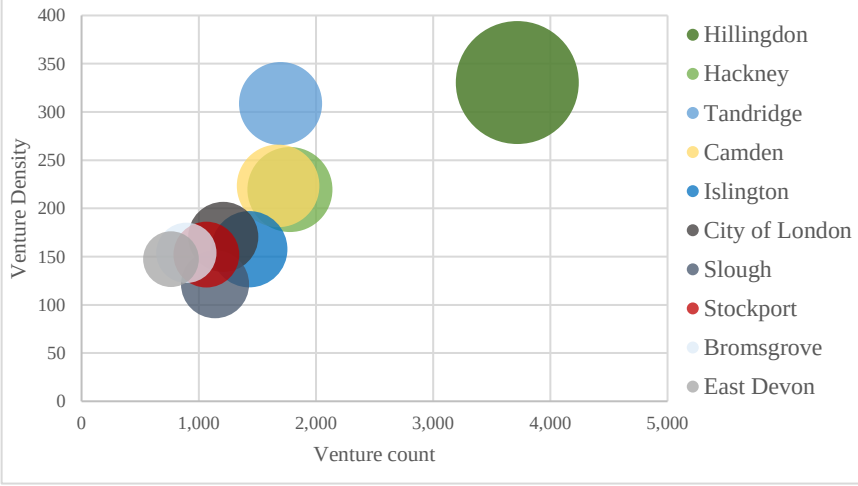


Figure 4F. Feb-2020.

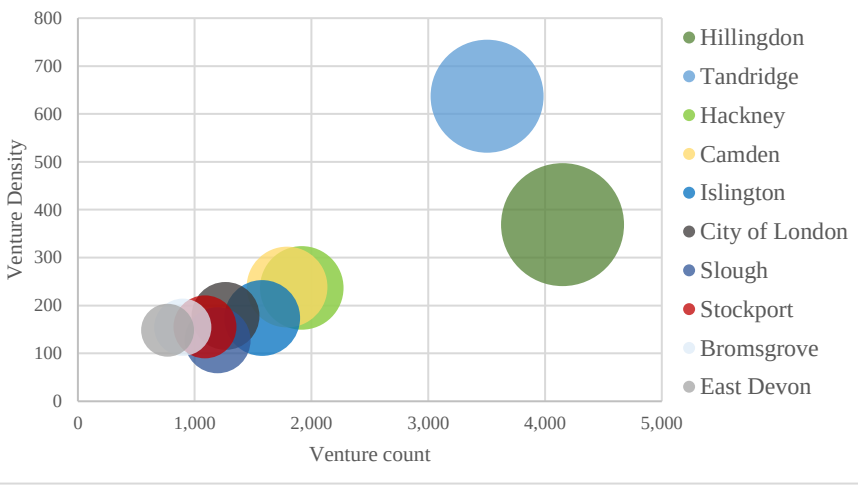


Figure 4G. Mar-2020.

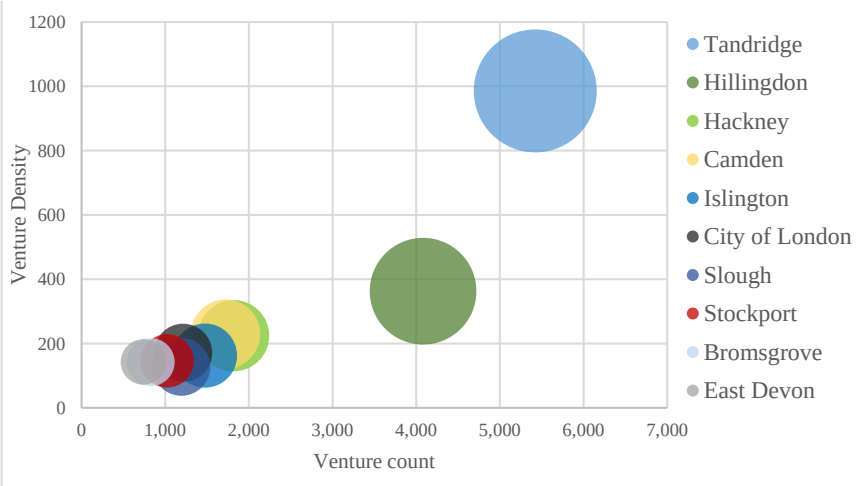
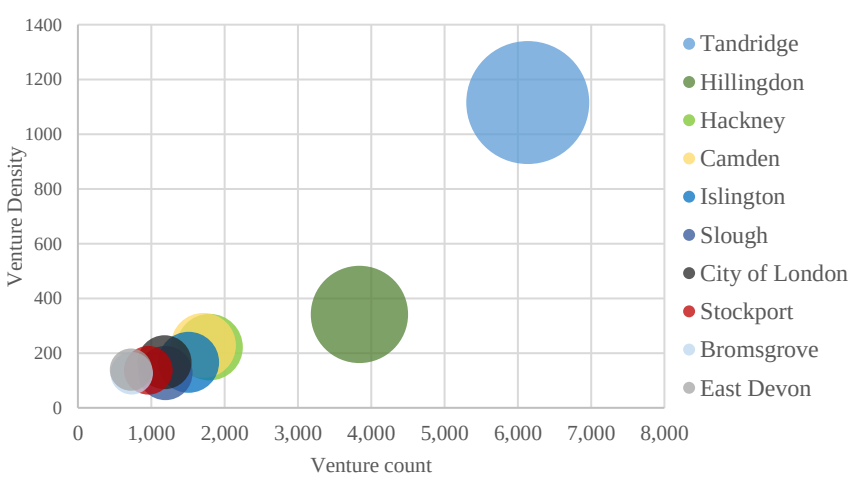


Figure 4H. Apr-2020.



The descriptive statistics show a substantial increase in the microbusiness venture density of a location in the district of Tandridge in East Surrey during the first months of 2021. Surrey is an area with a low share of elderly population (Blank et al., 2018), which has invested substantially in high-speed broadband, and a recent report suggests that the area has 98 percent superfast broadband coverage (Surrey Future, 2019). The combination of wide access to high-speed broadband and a relatively younger population can suggest a higher level of technology adoption in the area, since even when broadband infrastructure is present the elderly are unlikely to use the internet as much as younger people (Blank et al., 2018). However, such extreme increases in microbusiness venture density over so short a period can often be attributed to enterprising individuals or businesses, who take advantage of the business climate in an attempt to capitalise on prevailing market trends. In this case, this burgeoning of venturing seems to have been supported by the development of broadband infrastructure.

The pandemic forced many businesses to find alternative ways of serving their customers, which led to a substantial increase in online services and the websites that had the capacity to offer those online services. It is also notable that some areas that had previously been Top 10 high-density locations, such as the district of Stockport in Greater Manchester and the district of St. Albans, dropped out of the Top 10 in the first months of 2021. The descriptive statistics also suggest that the high-density locations in and to the west of London (i.e., Hillingdon, Slough) and in the broader area of Birmingham (i.e., Bromsgrove, Solihull) also lost ground in these first months because fewer microbusinesses were active in those areas. A pattern that emerges from the plots is the consistently strong performance of Hillingdon in terms of both microbusiness venture density and microbusiness counts, and the rise of Tandridge, which appears to coincide with the decline of locations in West London, such as Slough. This perhaps indicates a shift of microbusinesses to less expensive locations (although some microbusinesses will be tied to particular locations).

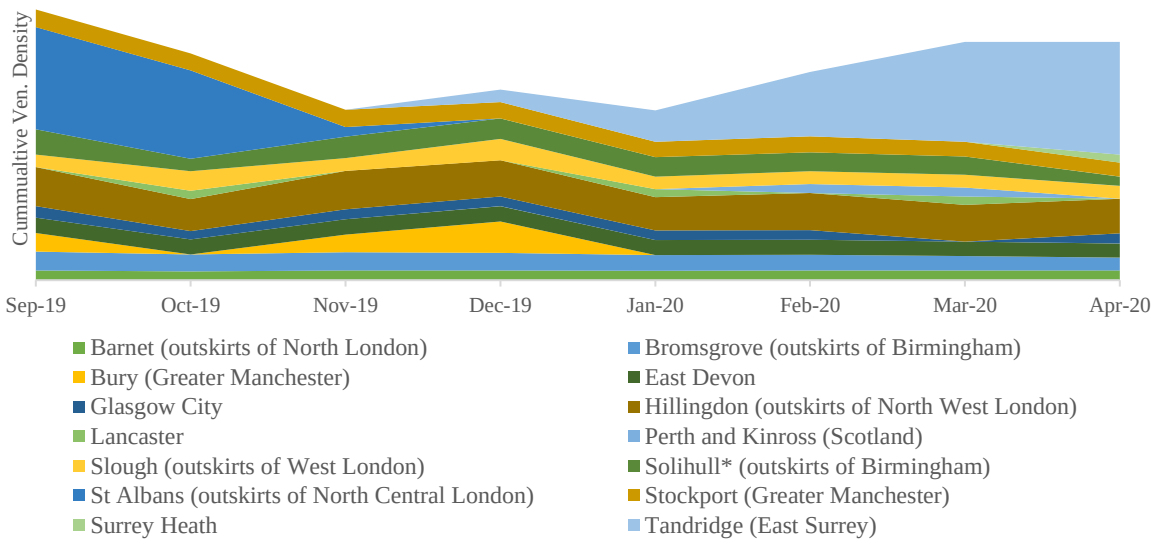
The ONS reports that London accounts for almost a fifth of the UK's GDP (ONS, 2019), and a third of the economy in England and Wales (ONS, 2017). Since the area of London is an entrepreneurial hub that accounts for a large share of the national economic output[8], we identify the Top 10 locations with the highest microbusiness venture density across Great Britain excluding London, and we examine the microbusiness venture density changes across the period from September 2019 to April 2020. We also identify the Top 10 locations with the

[8] In our sample, about 23 percent of the microbusiness ventures are located within London.

highest microbusiness venture density separately for England (excluding London), Wales, and Scotland. It must be noted that the highest microbusiness venture densities were observed in England, with those observed in Scotland much lower, and those in Wales lower[9] still. Figure 5 presents these results for Great Britain.

What we see is that, even when London is excluded, several high-density locations[10] are proximate to the broader area of Greater London. It is likely that the microbusinesses in these areas are part of the business activity in nearby London. Additionally, while it seems that some locations gained during December 2019, which can most likely be attributed to the increased consumption that is typical of the Christmas season, Figure 5 nevertheless indicates a decrease around the end of 2019, which continues into 2020. The exception seems to be Tandridge (East Surrey). Therefore, it is likely that this decreased microbusiness venture density might have been the result of the uncertainty associated with the official exit of the UK from the EU on 31st January 2020, rather than with the effects of the pandemic.

Figure 5. Density changes in Britain for Top 10 (excl. London).

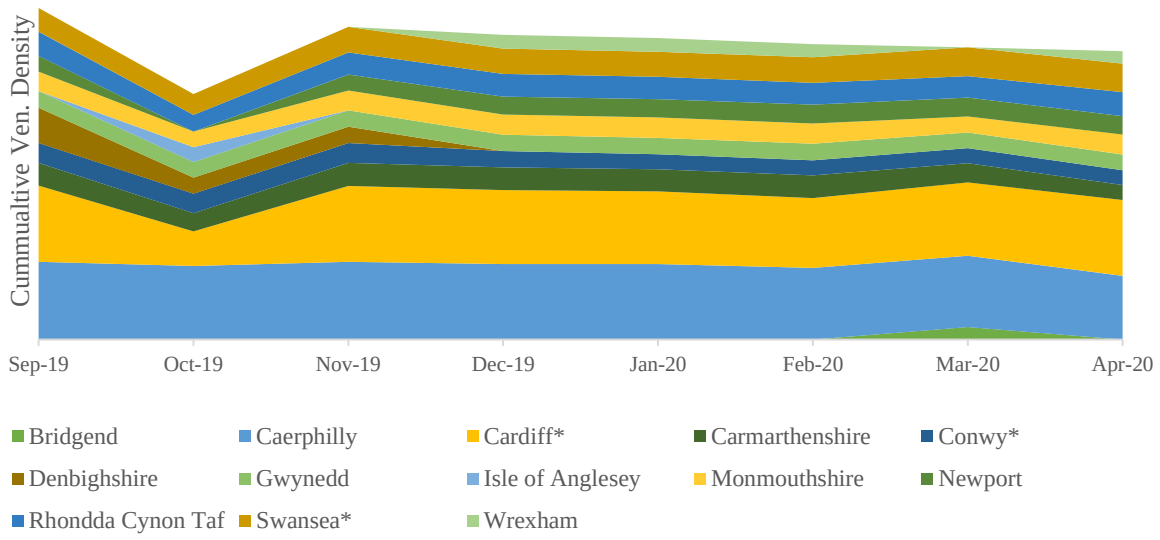


Note: Districts marked with *had more than one location within high microbusiness venture density score.

[9] The average microbusiness venture densities of the top 10 locations in Scotland were about one quarter of those observed in England, and the microbusiness venture densities of Wales about half of those observed in Scotland.
[10] Barnet, St. Albans, Hillingdon, and even Surrey Heath and Tandridge (East Surrey) are located within 1 hour of traveling time from London.

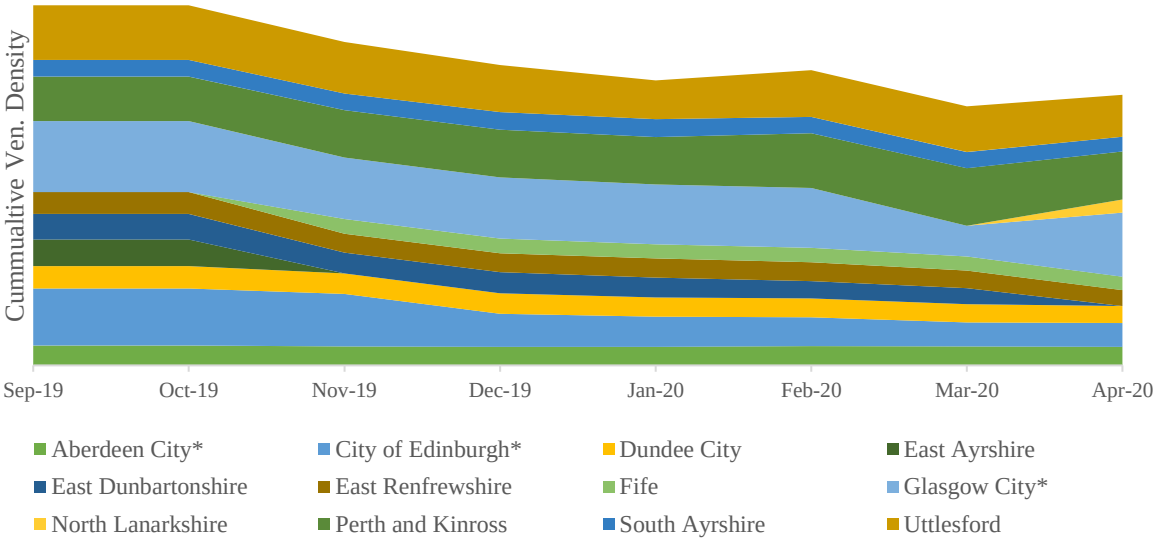
Figures 6 and 7 present the results for the 10 district locations in Wales and Scotland with the highest microbusiness venture densities. Interestingly the microbusiness venture density in Wales appears to be less volatile than the rest of Britain, except for a dip in October 2019. Scotland, on the other hand, shows a continuous decrease in the microbusiness venture density of its Top 10 locations.

Figure 6. Density changes in Wales for Top 10.



Note: Districts marked with *had more than one location within high microbusiness venture density score.

Figure 7. Density changes in Scotland for Top 10.



Note: Districts marked with *had more than one location within high microbusiness venture density score.

Again, we see a major town/city effect, with Edinburgh and Glasgow in Scotland and Cardiff in Wales showing the highest microbusiness venture densities. The strong performance of Caerphilly bucks the trend, it being the 13th largest town in Wales by population. This seems to suggest that size matters, but not on its own.

3.3. What is the association of districts and neighbourhoods?

Local authority districts are local government structures with a local council as their governing body. The local council commands local resources and government funding over a moderate geographic area that has several neighbourhoods (LSOA). Identifying the locations of the neighbourhoods in the districts with the highest online microbusiness venture density offers further insights into the characteristics of the locations with the highest online microbusiness venture densities. We analyse these locations in more depth using socioeconomic information about the neighbourhoods and the districts. Some districts appear to have greater inequality than others (Table 3A in Appendix 3 presents all the Indices of Deprivation for the local authority districts).

Table 2 presents the local authority district Indices of Multiple Deprivation (IMD) and the LSOA neighbourhoods' deprivation ranking for the local economy, employment, and living environment (for a graphical presentation of the local authority districts' IMD, see Appendix 4). The local authority districts and the LSOA neighbourhoods rank from most deprived (1) to prosperous (10). The ranking allows us to compare how the neighbourhood scores against the average score of the district. The indices show that more than half of the neighbourhoods score higher in the overall IMD than their district's average score (i.e., Barnet, Camden, City of London, East Devon, Hackney, Islington, Lancaster, Slough, and Tandridge).

Table 2. High microbusiness venture density locations and Indices of Multiple Deprivation.

LSOA name	*Local Authority District name*	*Local Authority District Derived Index of Multiple Deprivation Decile (where 1 is most deprived 10% of LAD)*	*LSOA Index of Multiple Deprivation (IMD) Decile (where 1 is most deprived 10% of LSOAs)*	*LSOA Income Decile (where 1 is most deprived 10% of LSOAs)*	*LSOA Employment Decile (where 1 is most deprived 10% of LSOAs)*	*LSOA Living Environment Decile (where 1 is most deprived 10% of LSOAs)*
Barnet 014A	Barnet***	6	**10**	**9**	**9**	5
Bromsgrove 007B	Bromsgrove^{+}	9	5	5	4	7
Bury 026E	Bury*	9	5	6	3	5
Camden 028C	Camden***	5	**5**	4	**5**	1
City of London 001F	City of London***	7	**7**	**10**	**10**	1
East Devon 012C	East Devon$^{\pm}$	8	**9**	**8**	6	**8**
Hackney 026A	Hackney***	1	**3**	**3**	**4**	**2**
Hillingdon 027B	Hillingdon***	9	4	4	3	4
Islington 023A	Islington***	1	**3**	**3**	**4**	**1**
Lancaster 014E	Lancaster*	4	**4**	**6**	**7**	1
Slough 011B	Slough**	3	**4**	**4**	**7**	2
Solihull 018B	Solihull^{+}	7	6	4	5	5
St Albans 007A	St Albans×	10	9	7	8	9
Stockport 020A	Stockport*	5	3	3	3	**8**
Surrey Heath 002C	Surrey Heath**	10	6	5	5	9
Tandridge 005A	Tandridge**	9	**9**	**10**	**10**	7

Notes: The regions of which the local authority districts are part of: *** London, ** South East, * North West, $^{+}$ West Midlands, $^{\pm}$ South West, $^{\times}$ East of England.

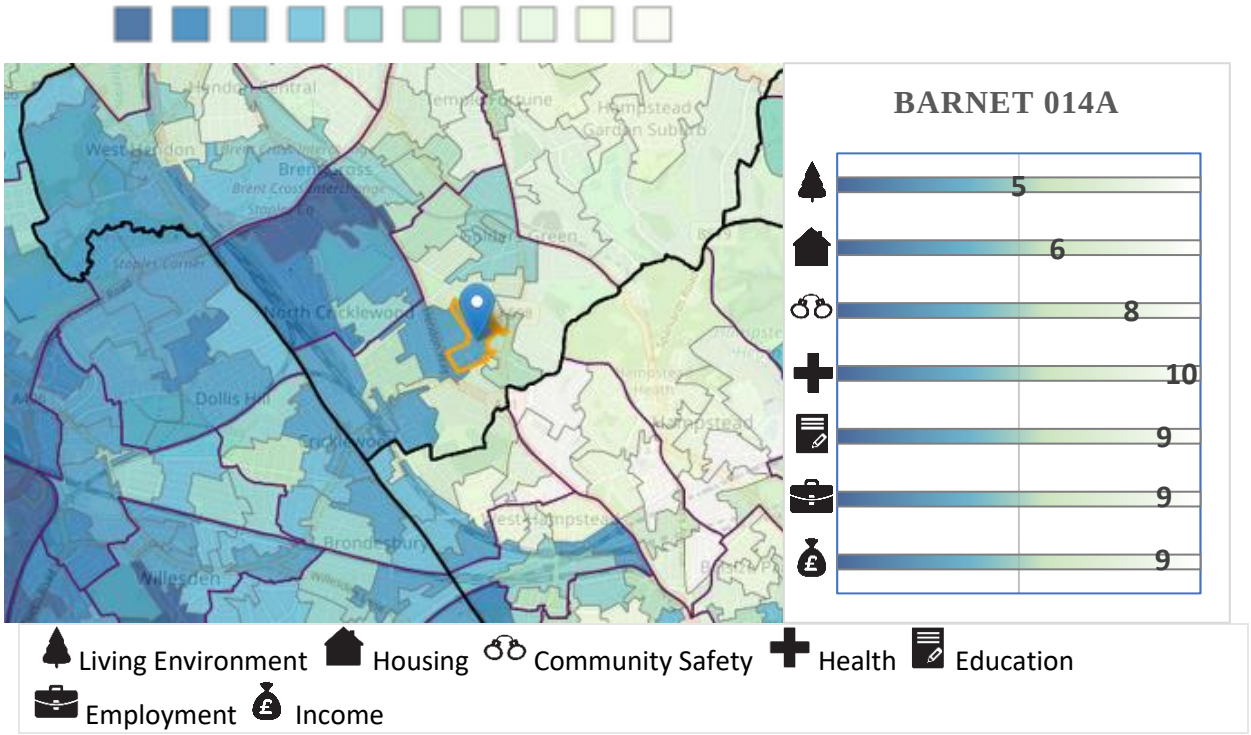
Interestingly, six of the locations with the highest microbusiness venture densities are in local authority districts with an IMD score of five or lower (i.e., at the less prosperous end of the scale). Three of six are neighbourhoods that have an IMD score that is higher than their respective district's IMD score, even if these locations can still be considered as relatively deprived neighbourhoods. Three of the more prosperous neighbourhoods (Barnet, City of London, Tandridge) have lower scores in the living environment index (this includes housing affordability) whereas two of the most deprived areas, (Hackney, Islington) score the same or better on the living environment index. This is likely an indication of housing affordability issues in those locations (Ryan-Collins et al., 2017). As Table 2 above shows, high density locations are found in both prosperous and deprived locations. This might suggest two different mechanisms leading to the higher densities: online microbusinesses may be founded as a response to opportunities arising in prosperous areas or as a response to the lack of opportunities in more deprived areas.

3.4. Does the neighbourhood location matter?

Using English, Welsh, and Scottish socioeconomic data about the local relative deprivation of local authority districts and neighbourhoods, we identify the locations of the neighbourhoods where we detect the 10 highest microbusiness venture densities. What we find is that the locations in the Top 10 microbusiness venture densities are situated in averagely prosperous neighbourhoods that are bordered by more prosperous neighbours. Hence, we suspect that these neighbourhoods take advantage of their proximity to better-off areas to maximise their business returns from a potentially more affluent clientele. An indicative location for the neighbourhood in Barnet (LSOA: Barnet 014A) is presented in Figure 8. Appendix 5 maps the neighbourhoods where the areas with the highest microbusiness venture densities.

Two areas with the highest microbusiness venture density are among the least prosperous locales in the country: Hackney and Islington. These two neighbourhoods, although adjoining, belong to two different local authority districts. Figure 9 shows the LSOA of Hackney 026A, with the addition of a location pointer for the neighbouring LSOA of Islington 023A (blue location pointer). Both neighbourhoods likely take advantage of their proximity to the East London Tech City (white location pointer), and also benefit from spill-over effects from their proximity to the broader area of the City of London (red location pointer).

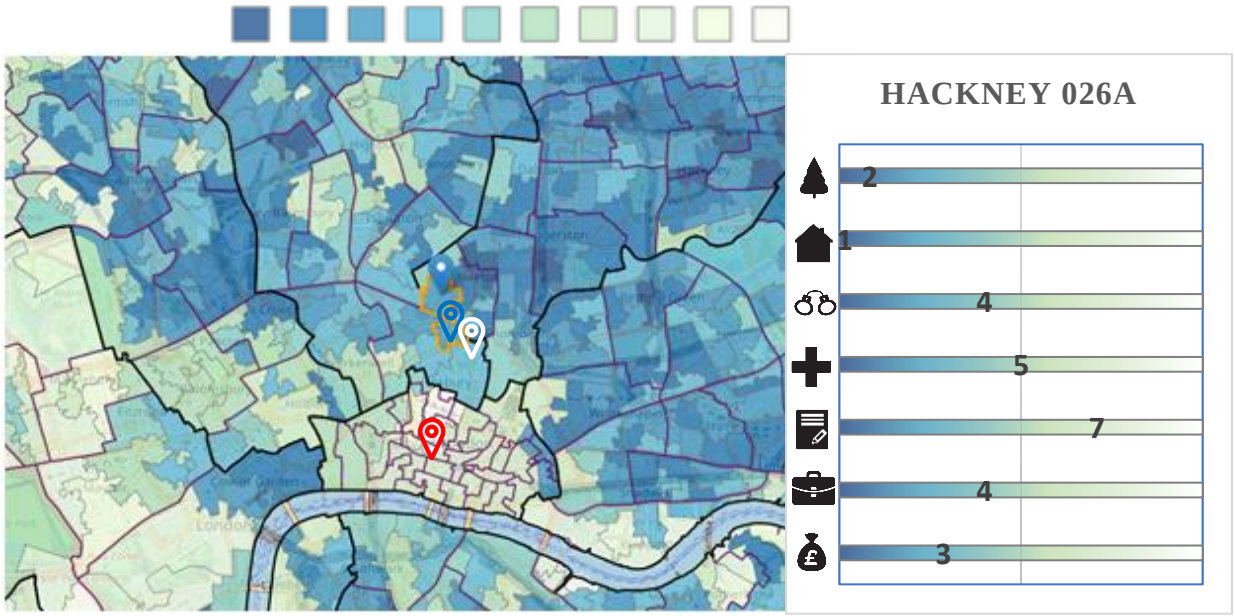
Figure 8. The LSOA of Barnet 014A in the Local Authority District of Barnet.
From 10% most deprived, to 10% least deprived.



The growth in the number of businesses in nearby locations likely creates a need for complementary goods and services, which the microbusinesses fulfil (i.e., pull factors). Additionally, the high unemployment level in Hackney and Islington also suggests that people might have turned to entrepreneurship because of the lack of employment alternatives (i.e., push factors). While both these neighbourhoods score higher than their respective local authority districts in the IMD ranking, the intensity of business activity in the area has doubled the price of properties over the last decade, making it difficult for people to afford housing. The local government of Hackney seems to have taken steps to protect affordable workspaces, recognising that "Alongside the economic growth the borough has experienced, Hackney is challenged by unacceptable levels of poverty and growing inequalities. Economic development here has not benefited everyone in our community as well as it might or led to a balanced local economy yet" (Hackney Council, 2019, p. 12).

Figure 9. The LSOA of Hackney 026A and Islington 023A.

From 10% most deprived, to 10% least deprived



4. Empirical analysis

4.1. Is microbusiness venturing associated with business turnover?

We attempt to explain the changes we observe in the rise and fall of high microbusiness venture density locations among the various areas using business turnover, Job Seeker's Allowance (JSA) claims, and the age structure of the population in these locations. We first test if local business turnover and local unemployment (i.e., JSA) play a role in the volatility observed in Figure 3 (active vs inactive microbusinesses). We estimate a model with two dummy variables[11] for high local business turnover and one for low local unemployment, along with other controls (see Appendix 2). Table 3 presents the probit results (marginal effects) for the months where the largest changes in the share of active and inactive online microbusiness are observed. The marginal effects capture the effect exerted by a change in a variable on the probability of a website being active. The results suggest that of the two indicators we utilised in the model, business turnover has a consistent (negative) effect, whilst unemployment has a smaller, more variable effect. Hence, short-run unemployment, as measured by the number of JSA claims, indicates predictive properties on the number of active online microbusinesses.

[11] The dummies are constructed in this way so that a positive effect indicates a beneficial outcome. The low_unemployment dummy accounts for the average jobseeker allowance claims during the trimester prior to the month in question. Both variables use mean values and estimate values above and below the mean.

Table 3. The effects of business turnover and unemployment.

Active (inactive=0)	***SEP19***	***NOV19***	***DEC19***	***FEB20***	***MAR20***
high_turnover	-0.040***	-0.034***	-0.034***	-0.046***	-0.054***
low_unemployment	0.005**	-0.013***	-0.011***	0.003	0.017***
ln_women	0.071***	0.070***	0.067***	0.082***	0.093***
ln_ratio_0-9	-0.044***	-0.044***	-0.047***	-0.057***	-0.066***
ln_ratio_10-14	0.000	-0.012***	-0.012***	-0.018***	-0.018***
ln_ratio_15-24	0.000	0.000	-0.001	0.006**	0.009***
ln_ratio_25-29	-0.009***	-0.015***	-0.011***	-0.011***	-0.014***
ln_ratio_30-44	0.071***	0.063***	0.059***	0.068***	0.073***
ln_ratio_45-64	-0.010**	-0.012***	-0.012***	-0.003	0.000
ln_pop_density	-0.009***	0.000	0.000	-0.005***	-0.006***
Controls	Yes	Yes	Yes	Yes	Yes
Constant	-0.776***	-0.720***	-0.770***	-0.755***	-0.785***
Statistics					
χ^2	8826	7731	8102	9188	11499
Log Likelihood	-1326809	-1332749	-1314318	-1326054	-1304411
Observations	2181285	2200666	2216084	2224486	2226148

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

We further examine the effects by estimating two more model specifications using microbusiness venture density. In the first model specification (OLS), microbusiness venture density is used to explain turnover in 2020. In the second model (OLS), turnover in 2019 is used to explain microbusiness venture density in 2020. This is to allow for an iterative relationship where density can affect turnover, which in turn can affect future density.

Table 3.1 presents the results for the effect of microbusiness venture density on the average local business turnover of 2020. We find a significant positive effect of microbusiness venture density on turnover that shows little variation over time. As both turnover and microbusiness venture density are transformed into natural logarithms, the coefficients can be interpreted as elasticities that capture how responsive turnover is to changes in microbusiness venture density. The results suggest that although there is a significant positive relationship, turnover is not very responsive to changes in microbusiness venture density (i.e., the relationship is inelastic). This result is not unexpected. However, while high online microbusiness venture density might not affect average local turnover, it can be an indicator of a buoyant local economy in a healthy business ecosystem. It is noteworthy that the effect with greatest magnitude is the proportion of women, with the second largest magnitude being seen in the effect of ages 30-44.

Table 3.1. The effects of microbusiness venture density on business turnover.

Business Turnover (MSOA level)	***SEP19***	***OCT19***	***NOV19***	***DEC19***	***JAN20***	***FEB20***	***MAR20T***	***APR20***
ln_Ven.density	0.093***	0.101***	0.106***	0.106***	0.107***	0.101***	0.105***	0.101***
ln_women	-1.106***	-1.154***	-1.067***	-1.067***	-1.077***	-1.087***	-1.077***	-1.066***
ln_ratio_0-9	-0.139***	-0.143***	-0.133***	-0.133***	-0.128***	-0.120***	-0.126***	-0.125***
ln_ratio_10-14	-0.024***	-0.024***	-0.017***	-0.017***	-0.023***	-0.022***	-0.032***	-0.035***
ln_ratio_15-24	-0.035***	-0.032***	-0.035***	-0.035***	-0.033***	-0.033***	-0.030***	-0.031***
ln_ratio_25-29	-0.050***	-0.052***	-0.048***	-0.048***	-0.055***	-0.061***	-0.069***	-0.070***
ln_ratio_30-44	0.095***	0.089***	0.101***	0.101***	0.106***	0.109***	0.114***	0.115***
ln_ratio_45-64	0.194***	0.212***	0.196***	0.196***	0.201***	0.192***	0.197***	0.195***
(Baseline: 65-over)								
Outlier Control	0.417***	0.328***	0.459***	0.459***	0.411***	0.467***	0.417***	0.431***
Constant	-4.008***	-3.969***	-4.022***	-4.022***	-3.976***	-3.965***	-3.939***	-3.932***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Statistics								
F	7685	6227	7832	7832	6937	7571	7259	7143
r2	0.5253	0.5304	0.5307	0.5307	0.5251	0.5284	0.5268	0.5234
Adj.r2.	0.5252	0.5303	0.5306	0.5306	0.525	0.5283	0.5267	0.5233
Observations	652916	518443	651222	651222	589876	635355	613027	611636

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

Furthermore, the results suggest that a percentage increase in the proportion of women decreases average turnover by more than one percent. This outcome may capture the persistent lower participation of women in entrepreneurial activities (e.g., as business owners or self-employed). The result may also be associated with the longstanding financing obstacles faced by women entrepreneurs, which acts as a barrier to business growth (Ughetto et al., 2020). Overall, the model can explain around 52 percent of the variation in turnover. Additionally, we use a control variable[12] that captures the effect of outlier locations with uncharacteristically high number of websites. We also estimate the effect of local business turnover on microbusiness venture density. Table 3.2 presents the results.

Table 3.2 (perhaps unsurprisingly) shows that business turnover has a stronger influence on microbusiness venture density. Business turnover can be a key indicator of the economic prosperity that can generate opportunities for entrepreneurs to exploit. The coefficients are closer to 1, suggesting an almost proportional relationship such that when turnover changes, microbusiness venture density changes by approximately the same proportion. Unlike the results in Table 3.1, turnover has the biggest effect on microbusiness venture density, implying that higher turnover attracts the establishment of microbusinesses. This suggests links between the local business ecosystem and online microbusinesses venturing.

The effect of women is also notable, with a 1 percent increase in the proportion of women in the local area reducing the microbusiness venture density by 0.5 percent. From the results so far, we can infer that while women might not increase microbusiness venture density (Table 3.2), the online business website they establish are more likely to be active than inactive (Table 2). This outcome can be linked to the fact that more women than men experience periods of labour inactivity (by, say, taking care of family) (Joona, 2018), and therefore operating an online microbusiness might be an alternative source of employment and income. The recent growth of part-time self-employment (both for men and women) and full-time self-employment (for women) may be connected to the increased availability of online marketplace platforms and e-commerce websites (Yuen et al., 2018). If online microbusinesses offer a way to increase women's participation in the labour force, then this can have important implications for economic growth and human capital (Bloom et al., 2009; OECD, 2009).

[12] Rather than removing outliers altogether, this control is employed to capture their effect when venture density is the explanatory variable.

Table 3.2. The effects of business turnover on microbusiness venture density.

Venture Density	***SEP19***	***OCT19***	***NOV19***	***DEC19***	***JAN20***	***FEB20***	***MAR20***	***APR20***
ln_Bus.Turnover	0.914***	0.902***	0.869***	0.888***	0.844***	0.864***	0.877***	0.854***
ln_women	-0.567***	-0.315***	-0.543***	-0.708***	-0.414***	-0.510***	-0.627***	-0.644***
ln_ratio_0-9	0.011*	-0.089***	-0.016***	0.029***	-0.138***	-0.142***	-0.149***	-0.192***
ln_ratio_10-14	0.155***	0.115***	0.074***	0.118***	0.075***	0.104***	0.148***	0.143***
ln_ratio_15-24	-0.027***	-0.005	-0.017***	-0.053***	0.004	-0.010*	-0.018***	-0.019***
ln_ratio_25-29	0.136***	0.081***	0.107***	0.175***	0.115***	0.174***	0.212***	0.215***
ln_ratio_30-44	-0.173***	-0.050***	-0.203***	-0.328***	-0.150***	-0.225***	-0.281***	-0.243***
ln_ratio_45-64	-0.181***	-0.130***	-0.191***	-0.225***	-0.135***	-0.141***	-0.148***	-0.122***
(Baseline: 65-over)								
Constant	2.117***	1.826***	2.358***	2.399***	1.962***	1.964***	1.872***	1.643***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Statistics								
F	2960	2430	2819	2652	2456	2802	2995	2995
r2	0.2966	0.3036	0.2871	0.2829	0.2792	0.2909	0.3125	0.3129
Adj.r2	0.2965	0.3035	0.287	0.2828	0.279	0.2908	0.3124	0.3128
Observations	652916	518443	651222	625118	589876	635355	613027	611636

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

4.2. Does the presence of public organisations affect microbusiness venture density?

To gain further insight into the business activity effect on microbusiness venture density, we disentangle the effects of private from public organisations. While private businesses are present in every location in our sample, not every location hosts a public organisation. Therefore, to capture the effect of the presence of (i) private and public organisations, and (ii) only private organisations, we employ an interaction term between the two types of organisations. Note that although all three nations categorise areas as urban or rural, Scotland differs in its methodology for defining the urban–rural continuum due to the morphology of the landscape (i.e., the Highlands). Hence, we separately examine England, Wales, and Scotland.

The results indicate a positive association between business turnover and the microbusiness venture density of a location. The results are not unexpected, since the overall higher business turnover of an area likely suggests there are more businesses across the business turnover distribution. Interestingly, both the presence of public organisations and the interaction of public and private organisations in a location has an overall negative effect on microbusiness venture density in England and Wales, perhaps suggesting a form of crowding out. This contrasts with the situation in Scotland where the effects of both the presence of public sector organisations and the interaction are positive. The results might indicate that public organisation in the different countries of Britain have different breadth, depth, operational focus, and allocation of resources (Jourdan and Kivleniece, 2017).

Regarding the urban-rural geographies, the overall message is that major urban areas have the strongest positive effect when compared to other geographies. Minor urban areas appear in some cases to have a stronger positive effect, but only in limited cases. What is surprising is the consistent positive effect of rural villages in Wales, compared to its urban cities or towns. This may be associated with evidence of stronger entrepreneurial traditions in rural Wales compared to the industrial urban areas (Robert and Thompson, 2015). It may also suggest that Wales' business activity is less centralised around large urban areas compared to England or Scotland (see Tables 3D, 3E, and 3F in Appendix 3).

4.3. Is microbusiness venturing associated with unemployment?

We estimate three OLS models to test the effect of online microbusiness venture density on short-run and medium-run unemployment (proxied by the number of JSA claims). In this model we use only microbusinesses that were created within the previous 6 months[13]. Hence, what we capture is the effect of new online microbusiness ventures on unemployment. We find that online microbusiness venture density has a significant negative impact on short-run and medium-run unemployment, with an effect comparable in size to that of the age profile. We observe that microbusiness venture density has a greater impact on short-run unemployment compared to medium-run unemployment, with the 3 months' ahead reduction having the largest effect (i.e., 1% increase in local new microbusiness venture density reduces the number of local jobseekers by 0.023% three months ahead). This is consistent with the literature that indicates the relatively low survivability of start-ups (Coad et al., 2016; Kritikos, 2014; Saridakis et al., 2008). The Global Entrepreneurship Monitor (GEM) 2019/2020 report appears to capture the sentiment of the times showing that in the UK the highest agreement on the aspirations for starting a business was the "Motivation to earn a living because jobs are scarce" (Bosma et al., 2020, p. 46).

The results also suggest that the presence of a larger proportion of women in the population also reduces unemployment, as does the presence of a public organisation in the local community. Moreover, the effect of an increase in the proportion of women appears to become stronger as the unemployment period tested goes further into the future. Similarly, the effect of the presence of a public organisation on unemployment nine months' ahead is twice that of the effect on three months ahead. These two elements could be indicators of a more sustainable business environment. Figure 10 presents the decrease in short-run unemployment as the number of new microbusiness ventures increases. Table 4 presents the analysis results. Although are not presented here, we also examine whether the magnitude of the effect of unemployment differs across regions that, on average, experience higher microbusiness venture density than others. Generally, we find that microbusiness venture density estimated for newly established firms has a negative impact on regions that experience higher and lower online business activity, but the effect for London becomes nearly 3 times bigger than the overall effect. Although this effect lessens after 6 months, it remains strong and relatively high compared to other regions. This is an important finding since London has experienced an

[13] The reference point in this model specification is September 2019.

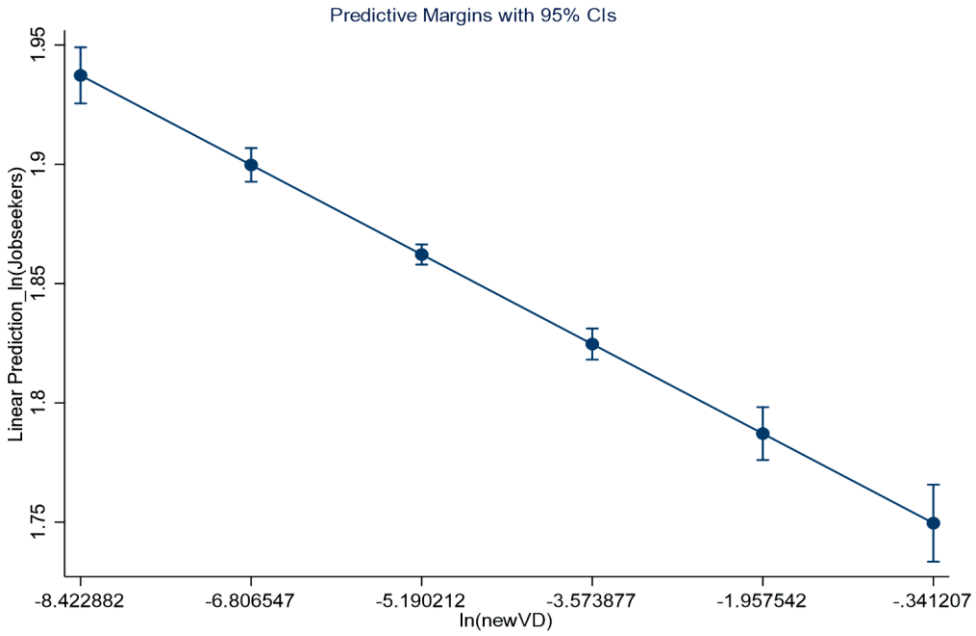
increase in its unemployment rate such that it is now the region with the highest unemployment rate in the UK. We also find that the coefficient of the South East is nearly half the overall coefficient, and the magnitude of this effect remains 6 months later.

Table 4. The effect of microbusiness venture density on unemployment.

	SHORT-RUN UNEMPLOYMENT		*MEDIUM -RUN UNEMPLOYMENT*
Unemployment	***3 months ahead***	***6 months ahead***	***9 months ahead***
ln_Ven.density	-0.023***	-0.017***	-0.003*
ln_women	-0.164***	-0.221***	-0.285***
ln_ratio_0-9	0.036***	0.041***	0.032***
ln_ratio_10-14	0.019***	0.007	-0.018***
ln_ratio_15-24	0.020***	0.008	0.006
ln_ratio_25-29	0.025***	0.034***	0.067***
ln_ratio_30-44	-0.051***	-0.059***	0.055***
ln_ratio_45-64	-0.005	-0.013	-0.036***
(Baseline: 65-over)			
Public_organisation_dummy	-0.147***	-0.134***	-0.310***
Public#Private	-0.041***	-0.037***	-0.096***
ln_private_organisation	0.026***	0.004	0.029***
Ln_pop_density	-0.020***	-0.022***	-0.014***
Regions (Baseline: London)			
North East	0.446***	0.384***	0.192***
North West	0.130***	0.083***	-0.024*
Yorkshire and The Humber	0.286***	0.215***	0.040***
East Midlands	0.193***	0.149***	0.045***
West Midlands	0.302***	0.260***	0.127***
East of England	0.027*	0.016	-0.051***
South East	0.063***	0.033***	-0.055***
South West	0.025	0.005	-0.073***
Scotland	-0.012	-0.033	-0.286***
Wales	0.197***	0.097***	0.082***
Active website	0.004	0.007	-0.006
Outlier Control	-0.29	-0.294	-0.204
Constant	1.680***	1.636***	1.680***
Controls	Yes	Yes	Yes
Statistics			
F	101.2	88.24	209.6
r2	0.239	0.211	0.283
Observations	32412	33105	53302

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

Figure 10. The effect of new microbusiness ventures on short-term unemployment.



4.4. Does the frequency of internet use affect unemployment?

We utilise data from the UKHLS to explore further the issue of unemployment. Internet use has been associated with income growth and access to jobs (Blank et al., 2018). During the pandemic lockdown, it also became a key factor in business survival; indeed, access to and use of the internet became essential to work and business operations. We model 4 probit specifications[14] for Great Britain, England, Scotland, and Wales. The results (marginal effects) presented in Table 5 show that high frequency use of the internet has a negative effect across all model specifications. In fact, high frequency of internet use reduces the probability of being unemployed by 5 percentage points in England and 3.2 percentage points in Scotland. When we split the English sample between the regions that experience higher microbusiness venture density versus those with lower microbusiness venture density, the effect remains strong and similar in magnitude. Nevertheless, it is worth noting that internet use in Wales has a comparatively low effect on reducing unemployment compared to Scotland and England. This suggests that unemployment in England and Scotland arises in part from a lack of awareness of opportunity (which may be countered by internet searching). However, if there are no

[14] This model combines information from the GoDaddy data and the UKHLS survey.

opportunities to find, it will be futile to use the internet to hunt for them, as may be the case in Wales.

Table 5. Internet and unemployment.

Variables	*Unemployed (GB)*	*Unemployed (England)*	*Unemployed (Scotland)*	*Unemployed (Wales)*
High frequency of internet use	-0.046***	-0.050***	-0.032**	-0.002
Age	-0.001***	-0.001***	-0.001***	-0.001
Female	-0.006*	-0.003	-0.029***	-0.011
Married	0.039***	0.037***	0.031***	0.054***
Child	-0.001	-0.001	-0.013*	0.006
No qualification	0.080***	0.082***	0.076***	0.038
Disability	0.041***	0.043***	0.033***	0.020*
Urban	0.015***	0.021***	0.007	-0.010
Non-British	0.036***	0.037***	0.026	-0.028
Regions (Baseline: London)				
South East	-0.010*	-0.009		
West Midlands	0.010*	0.011*		
North West	0.006	0.007		
East of England	-0.007	-0.006		
South West	-0.011	-0.009		
Yorkshire and the Humber	0.010*	0.011*		
East Midlands	0.006	0.008		
North East	0.028***	0.029***		
Scotland	0.009			
Wales	0.002			
Statistics				
Log Likelihood	-3,662.395	-3,145.089	-289.137	-209.693
Observations	18,005	15,282	1,559	1,164

Note: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Interestingly, being married is associated with a higher probability of unemployment across all model specifications. This likely captures the barriers to labour force participation for those with family care responsibilities. While this is often assumed to be the case for women, the results show that women are in fact less likely to be unemployed (Saridakis et al., 2014). An alternative explanation is that marriage provides a safety net in terms of household income (as long as only one of the couple is unemployed). Not surprisingly, having no formal educational qualification increases the chances of being without a job, which confirms the importance of human capital.

The regional differences reveal that individuals in the South East are less likely to be unemployed compared to those in London, whereas residents of Yorkshire the Humber, and the West Midlands are more likely to be unemployed. The West Midlands has some of the

economically poorest regional governments[15] in the UK, and it is therefore unsurprising that the region is associated with higher unemployment (Hearne and Ruyter, 2019). In contrast, the South East is one of the Britain's most prosperous regions, with incomes that are comparable to London's. Also, among the highest microbusiness venture density areas discussed in section 3.2, there were two local authority districts that are located in the South East: Tandridge and Surrey Heath[16]. Interestingly, the West Midlands has, as a region, a higher online microbusiness venturing average, but its regional profile is quite different from that of other regions with high microbusiness venture densities, such as London or the South East (Hearne and Ruyter, 2019).

4.5. Is income associated with frequency of internet use and venture density?

The rapid growth of online retail and e-commerce in Britain has changed the landscape of doing business (Dean et al., 2012). The expansion of access and of superfast broadband has surely contributed to the explosion of internet users and online businesses. The internet has been one of the highest contributors to nation's income, with a level of income generation that now surpasses that of the construction industry (Dean et al., 2012). What is more, the sales of businesses that have an online presence have increased much faster than those of businesses with no online presence (Dean et al., 2012). Arguably, creating the infrastructure to accommodate a digital transformation is important, but it is also essential to offer IT training and support to local communities and businesses in an effort to espouse an inclusive community. Therefore, we examine the link between frequency of internet use and income[17].

Table 6 presents the full results[18]. We find that individuals in regions with high online microbusiness venture densities are more likely to earn higher monthly incomes and are less likely to earn lower or zero incomes. This is in line with our finding that individuals living in regions with higher microbusiness venture density are also more likely to be earning higher incomes, and less likely to be earning lower or zero incomes. In particular, living in higher microbusiness venture density regions increases the probability of being in the category 'above the mean' by 12 percentage points (in our sample the gross monthly income is estimated at

15 The Brexit campaign was strongly supported by several local authority districts in West Midlands

16 The local authority district of Tandridge is identified as being in the Top 10 highest microbusiness venture density locations when London is included, and Surrey Heath is also identified when London is excluded.

17 This model combines information from the GoDaddy data and the UKHLS survey.

18 In Table 6 the effects of 'Monthly income' are reported as probit coefficients (Coef.), whereas the effects of 'No income', 'Below the mean', and 'Above the mean' are reported as marginal effects (ME). Our estimates include those in employment.

£1,704). We also find that being a non-British individual or disabled individual reduces the probability of being in the 'above the mean' category. As can be seen from Table 5, these individuals are also more likely to be unemployed. However, as we see from Table 7 (which is presented in the next section) these two groups are more likely to report higher intentions to become self-employed; encouraging these groups to engage with online business activity can therefore help improve their economic conditions and wellbeing.

Table 6. Internet use and income.

Variable	*Monthly income (Lower to Higher)*	*Monthly income (Lower to Higher)*	*No income*	*Below the Mean*	*Above the mean*
	Coef.	Coef.	ME	ME	ME
High frequency of internet use	0.312***	0.314***	-0.002***	-0.118***	0.120***
High microbusiness venture density regions		0.222***	-0.001***	-0.080***	0.081***
Self employed	-0.582***	-0.574***	0.004***	0.218***	-0.222***
Age	0.013***	0.013***	-0.000***	-0.005***	0.005***
Female	-0.595***	-0.594***	0.002***	0.212***	-0.214***
Married	-0.083***	-0.076***	0.000**	0.028***	-0.028***
Child	0.109***	0.106***	-0.000***	-0.039***	0.039***
No qualification	-0.621***	-0.633***	0.005***	0.242***	-0.247***
Disability	-0.122***	-0.127***	0.000***	0.047***	-0.047***
Urban	-0.070**	-0.061**	0.000**	0.022**	-0.022**
Non-British	-0.121***	-0.068**	0.000**	0.025**	-0.025**
Regions (Baseline: London					
South East	-0.193***				
West Midlands	-0.389***				
North West	-0.403***				
East of England	-0.337***				
Scotland	-0.324***				
South West	-0.437***				
Yorkshire and the Humber	-0.484***				
East Midlands	-0.399***				
Wales	-0.553***				
North East	-0.403***				
Statistics					
Log Likelihood	-9,082.51	-9,127.6	-9,127.60	-9,127.60	-9,127.6
Observations	15,588	15,588	15,588	15,588	15,588

Note: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

4.6 Is there a link between entrepreneurial intentions and internet use?

People may desire to become self-employed and start their own business, but for a variety of reasons do not go ahead with starting up a business. The GEM notes that entrepreneurial intentions rest in the prevailing societal norms, local culture, and political context, which can either encourage or discourage entrepreneurial activity (Bosma et al., 2020). In the 21st century, the internet has become such a context.

The rapid development of e-commerce platforms and the sharing economy have been empowered by tech companies that have simplified the user interface (Dean et al., 2012). These developments have impacted on entrepreneurial activity. Advancements in online applications since Web 2.0 have transformed the web to an almost 'drag and drop' interface, where the average user can easily build a website and start selling online in an afternoon. However, the ease of doing business online does not guarantee the survival of online microbusinesses. Figure 2 and Table 1 in section 3.1, and also Figure 3 in section 3.2, suggest that online microbusiness venturing is a fast-paced and turbulent business environment. We analyse the impact of internet use on the entrepreneurial intentions of those who are not yet self-employed. We use the aspiration of individuals to create their own job as an indication for entrepreneurial intentions.

The results in Table 7 indicate the link between high frequency of internet use and entrepreneurial intentions. Specifically, we find that high internet use increases the probability of intending to start one's own job by 3.9 percentage points. The marginal effect is significant and positive. When we compare the effect between regions with high microbusiness venture density and lower microbusiness venture density, we find that the effect becomes stronger for the former group. Specifically for high microbusiness venture density regions, high frequency of internet use increases the probability of intending to start one's own job by 6.2 percentage points, whereas in lower microbusiness venture density regions this effect is nearly halved. We also find that being in paid employment is positively associated with the likelihood of starting up a business, indicating the allure of entrepreneurship and of 'being your own boss' (Benz and Frey, 2004; Boden, 1999; Kahneman, 2011; Knight, 1921). That being said, being unemployed also increases (by 10.4 percentage points) the probability of reporting an intention to start one's own business. This is line with our previous findings that show the link between unemployment and entrepreneurship. Looking at the regional effects, it is notable that the South East does not have a statistically significant difference from baseline London, offering further evidence of its more affluent status compared to other regions in Britain.

Table 7. Internet use and entrepreneurial intentions.

Variables	*Like to start your own job*
High frequency of internet use	0.039***
Paid employment	0.028**
Unemployed	0.104**
Age	-0.004***
Female	-0.056***
Married	0.012
Child	0.013***
No qualification	-0.044*
Disability	0.021***
Urban	-0.024***
Non-British	0.092***
Regions (Baseline: London)	
South East	-0.019
West Midlands	-0.022*
North West	-0.041***
East of England	-0.033**
Scotland	-0.085***
South West	-0.044***
Yorkshire and the Humber	-0.059***
East Midlands	-0.055***
Wales	-0.043***
North East	-0.037*
Statistics	
Log Likelihood	-6,492.97
Observations	14,887

Note: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Another notable result is the negative effect of the lack of formal educational qualifications on the aspiration to start one's own business, which likely captures the uncertainty that accompanies a lack of skills and a lack of self-efficacy. It might also indicate the difficulties encountered by the less well-educated in trying to secure start-up funding from financial institutions. While financial difficulties are cited as a barrier by many aspiring entrepreneurs (Fielden et al., 2000), these can be greatly exacerbated by having no formal educational qualification. The likelihood of individuals without formal qualifications belonging to disadvantaged groups points to the need for inclusive training and transfer of knowledge across all social segments. The rapid advances in technology and extensive use of smartphones will only increase the disadvantages of people who lack formal qualifications. Local

governments should consider such issues when designing and implementing programs to support their constituents and local businesses.

4.7 Does microbusiness venturing affect local prosperity and well-being?

Young firms account for the bulk of new jobs (Haltiwanger et al., 2013). The supply of jobs has important implications that go beyond mere generation of income. Jobs allow people to maintain their skills and develop their human capital (OECD, 2009). They allow people to escape unemployment and/or the inactivity that has detrimental effects on psychological health and well-being (Stiglitz et al., 2009). The development of entrepreneurial opportunities is key to the creation of new businesses. Entrepreneurs receive stimuli from their local environment. They can thus become aware of opportunities (Kirzner, 1973), whether great or small, upon which they can act to establish a business. Essentially, opportunities are socially constructed even if they are recognised and exploited at individual level (Seyb et al., 2019). Therefore, entrepreneurs and the local communities of which they are part are interlinked in the creation of business ventures and economic growth.

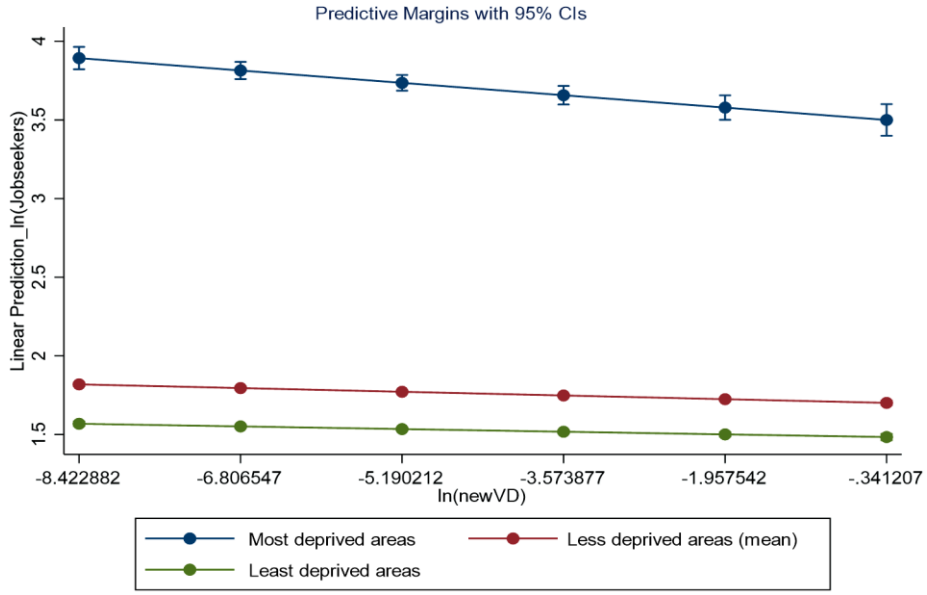
To examine the association of online microbusiness venturing on the prosperity of local communities, we use the 2019 Indices of Deprivation (DCLG, 2019). According to the Ministry of Housing, Communities & Local Government[19], "The Indices of Deprivation are designed primarily to be small-area measures of relative deprivation" (DCLG, 2019, p. 7). The investigation of small-area locations allows us to link information on online microbusiness venture density to the prosperity of local communities. The Indices of Deprivation rank over 32 thousand neighbourhoods (i.e., LSOA) from the most deprived (indexed as 1) to the most prosperous.

We investigate the effect of microbusiness venture density on unemployment, taking into account the level of community prosperity using the information from the index of multiple deprivation (IMD). The IMD combines the weighted average of seven local area deprivation rankings: income, employment, living environment, education, crime, health, and housing. Using the IMD information, we analyse the effect of online microbusiness venturing on the least prosperous (most deprived) neighbourhood, the neighbourhood in the mean, and the most prosperous (least deprived) neighbourhood. Figure 11 shows that online microbusiness venture

[19] The Ministry of Housing, Communities & Local Government is now called Department for Levelling Up, Housing & Communities.

density reduces unemployment in all neighbourhoods (see Table 3B in Appendix 3 for the OLS results). However, the reduction is larger for the least prosperous neighbourhoods. This is evidence of a significant positive effect of online microbusiness venturing in the most disadvantaged areas.

Figure 11. The effect of microbusiness venture density on community prosperity.



We examine the effect of online microbusiness venture density on IMD overall, and also on the following sub-indices of local deprivation: income, employment, and living environment. The analysis allows us to connect online microbusiness venture density with local community prosperity. We use OLS to test 4 model specifications. We include an interaction term between microbusiness venture density and the distribution of women and men in the local populations. We create an index variable with three categories: when the population is generally balanced (i.e., when the proportion of women ranges from ~42% to ~52% of the population), when women are over-represented (i.e., over ~52%), and when women are under-represented in the population (i.e., less than ~42%). The results suggest that online business venturing is largely associated with the prosperity of local communities (see Table 3C in Appendix 3 for the OLS results). Figures 12A to 12D show the interaction effect of microbusiness venturing/the proportion of women on the prosperity of local communities.

Figure 12A. Ven. Density effect on Multiple Deprivation.

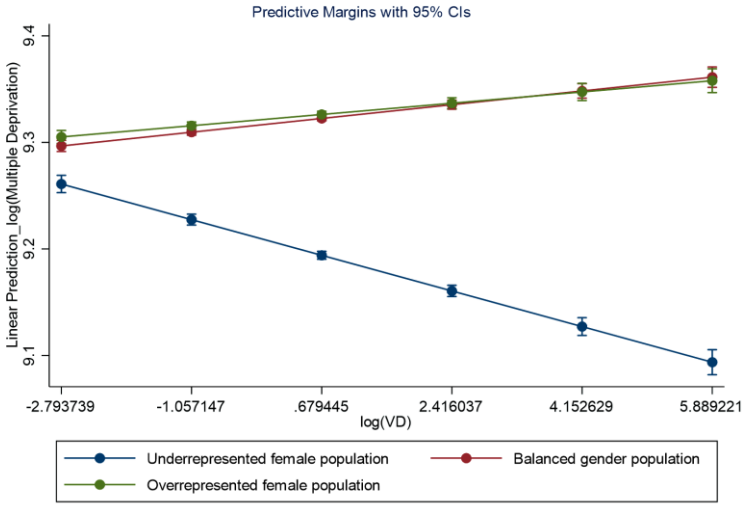


Figure 12B. Ven. Density effect on Income Deprivation.

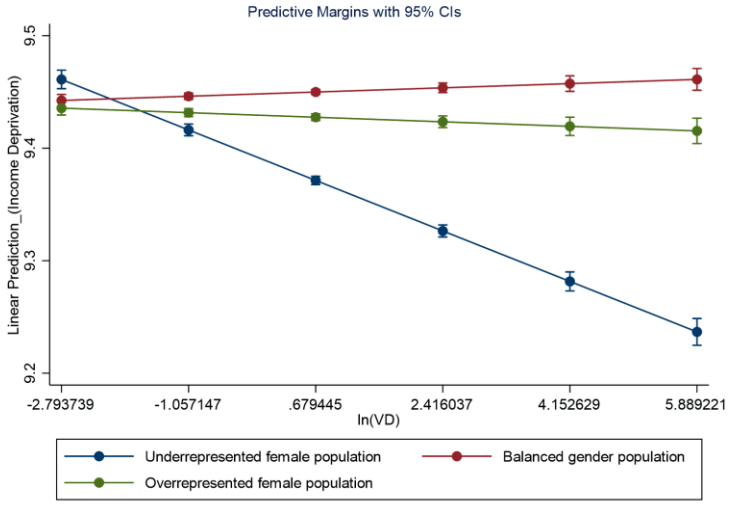


Figure 12C. Ven. Density effect on Employment Deprivation.

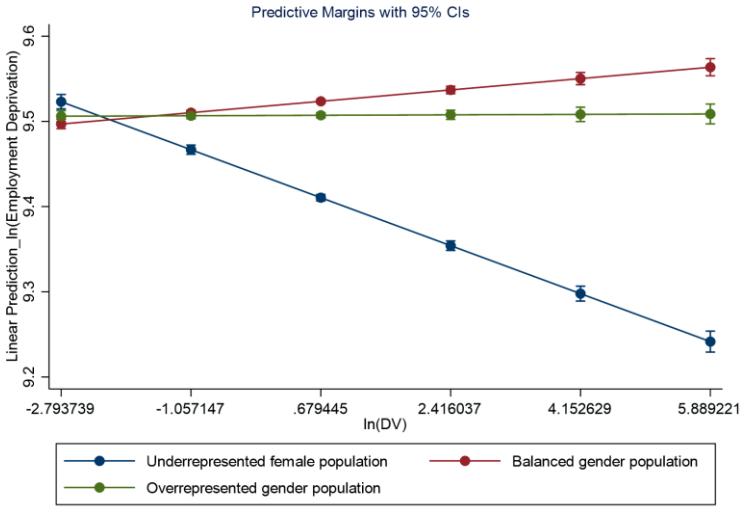
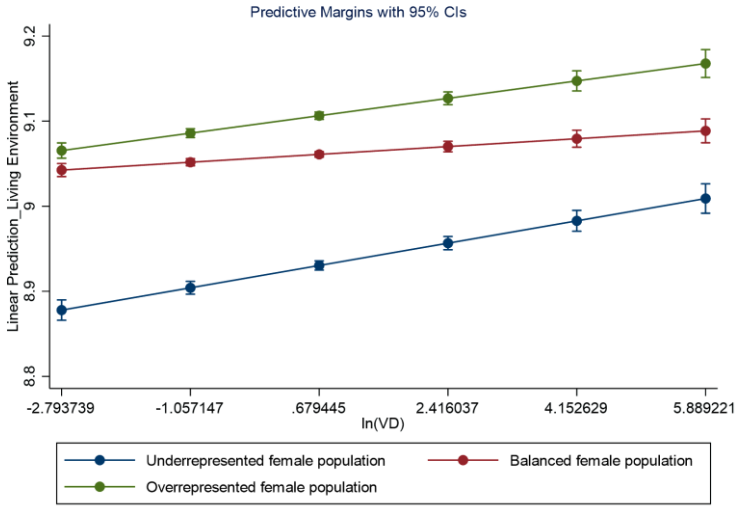


Figure 12D. Ven. Density effect on Living Environment.



What we find is that neighbourhoods benefit from the presence of online microbusinesses, with microbusiness venturing having a positive effect on the Index of Multiple Deprivation. Looking at the sub-indices, we see that online microbusiness venture density has a small negative effect on income deprivation, and a larger positive effect on living environment. However, since we noted earlier that online microbusiness venturing has a more pronounced effect on the less prosperous neighbourhoods, these results are not unexpected. What is surprising, however, is the statistically significant effect of online microbusiness venture density in locations where women are over-represented or where the gendering of the population is relatively balanced. A recent GEM report on women's entrepreneurship shows that the proportion of women in the UK that start a business focusing on their local market is more than double the proportion of men that do so (Elam et al., 2021). Hence, our analysis might be capturing the positive effect that women's entrepreneurship has on their local neighbourhoods.

Additionally, we link the effect of internet use and regional microbusiness venture density to facets of well-being, such as life satisfaction, health satisfaction, income satisfaction, and leisure satisfaction. What we see from Table 8 is that high frequency of internet use has a statistically significant positive effect across all facets of well-being (on average increasing the probability of reporting higher levels of satisfaction by 3.85 percentage points). This likely captures the interconnectedness of the contemporary world through the internet and its importance for modern living. Moreover, by ranking regions with reference to the regional microbusiness venture densities from highest to lowest, we can see that the South scores higher than London (which has the highest regional microbusiness venture density in our sample) for every facet of well-being we examined. The results suggest that the South East scores high in overall well-being and also ranks second only to the capital in online microbusiness venturing. When we estimate the effect of the high frequencies of internet use in these two regions, we find that the effects increase in magnitude, which suggests that high frequency internet use plays an increased role in high microbusiness venture density regions. For example, in the South East, high frequency of internet use increases the probability of reporting higher levels of life satisfaction by 9 percentage points. Interestingly, satisfaction with leisure is observed in several regions where we have identified lower average microbusiness venture densities, which can indicate some form of lifestyle trade-off.

Table 8. Internet use and satisfaction with health, income, leisure and life (Marginal effects).

Variables	*Satisfaction with life*	*Satisfaction with health*	*Satisfaction with income*	*Satisfaction with leisure*
High frequency of internet use	0.041***	0.036***	0.039***	0.038***
Self employed	-0.066***	-0.006	-0.092***	-0.184***
Paid employment	-0.085***	-0.034***	-0.093***	-0.232***
Unemployed	-0.211***	-0.124***	-0.225***	-0.134***
Age	0.003***	0.001***	0.003***	0.006***
Female	-0.005	-0.017***	-0.007	-0.021***
Married	-0.076***	-0.019**	-0.047***	0.014
Child	-0.022***	-0.013***	-0.050***	-0.070***
No qualification	-0.033***	-0.033***	-0.046***	-0.024**
Disability	-0.242***	-0.359***	-0.188***	-0.169***
Urban	-0.032***	-0.048***	-0.041***	-0.017**
Non-British	-0.080***	-0.034***	-0.090***	-0.071***
Regions (Baseline: London)				
South East	0.028**	0.037***	0.035***	0.033**
West Midlands	0.002	-0.016	0.004	0.003
North West	0.025**	0.009	0.011	0.027**
East of England	0.016	-0.003	0.011	0.037***
Scotland	0.009	0.007	-0.002	0.008
South West	0.031**	0.038***	0.019	0.044***
Yorkshire and the Humber	0.022	-0.005	0.021	0.034**
East Midlands	0.021	0.003	0.023	0.029**
Wales	-0.019	-0.036**	-0.019	-0.004
North East	0.014	-0.005	0.004	-0.014
Statistics				
Log Likelihood	-19,145.92	-18,727.00	-19,113.85	-18,013.35
Observation	29,343	29,370	29,346	29,350

Note: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

5. Further analysis

We further explore the data using industrial sector information for the locations where we identified the highest online microbusiness venture densities[20]. We use the Herfindahl-Hirschman Index (HHI) method to identify the dominant industries in these locations (Calkins, 1983). The HHI uses firm level market share to identify the dominant firms in an industry. We transform the index to allow us to use the industrial share in each neighbourhood. This offers an indication of the particularly dominant concentrations of industries among the locations with high microbusiness venture densities. Additionally, we supplement the neighbourhood information with the share of women in the local population, both for all microbusinesses with an online presence and for only those with an active website. Finally, we include information about the neighbourhood level of prosperity using the ONS IMD data (see Table 6A in Appendix 6).

Overall, the tables show that high microbusiness venture density is not associated with higher concentrations of particular industries. Whilst areas like Bromsgrove, Stockport, City of London and East Devon do show higher industrial concentrations, the industries which are concentrated differ across areas. We further observe that in locations where women are under-represented in the population, there is less evidence of industry concentration. In contrast, in locations with either an over-representation of women or a relatively balanced population, there is some evidence of higher concentration in the industries of health and education. The concentration of women in education and health is a typical finding in the literature (Kelley et al., 2015). Similarly unsurprising is the high microbusiness venture density of the City of London, which has an under-represented population of women and a high concentration of finance & insurance organisations. There is some notable concentration in the industry of professional, scientific & technical sector, mostly in areas where women are under-represented. Rather more surprising is the high microbusiness venture density location in East Devon, which shows a concentration in the construction industry (typically dominated by men), even though women are over-represented in the population. Moreover, the locations with concentrations in the health and education industries have an IMD score of 5 or lower, indicating that these locations are relatively less prosperous (i.e., Bromsgrove 007B, Lancaster 014E, and Stockport 020A).

[20] These are the locations in Britain with the highest densities when London was both included and excluded.

6. Summary and conclusion

Over the past decade, Britain has seen rapid growth in its e-commerce activities. The internet economy has developed to become one of the country's largest contributing sectors to GDP (Dean et al., 2012). Our findings identify a positive link between the presence of online microbusiness ventures in an area and its overall business activity and turnover. Despite this, the results seem to suggest that high microbusiness venture density follows rather than drives turnover. This is in line with previous research in the entrepreneurship field that suggests that entrepreneurship is mainly a 'consequence rather than cause of growth' (for a discussion, see Deakins and Freel, 2012)Additionally, the study indicates that there is a significant association between online microbusiness venturing and a reduction in unemployment (proxied by JSA claims).

We observe that the link between microbusiness venture density and unemployment is stronger for short-run unemployment and somewhat weaker for medium-run unemployment. This finding is consistent with the literature suggesting that the direct effect of new job creations is followed by a stagnation or downturn period (see Kritikos, 2014). Moreover, while it is difficult to disentangle the effects of Brexit from the effects of the Covid-19 pandemic, the increase of microbusiness venture density in multiple locations in Britain may suggest that individuals are willing to create an online business as a source of alternative income. The results also likely capture the move of several businesses to online trading and the expansion of e-commerce driven by the national lockdown in response to the COVID pandemic.

Fuelled by high internet penetration, widespread use of credit card transactions, and delivery of high-speed broadband internet, Britain had already experienced a period of fast digital transformation prior to Brexit and the COVID pandemic. The digital transformation of the country had generated an urban decentralisation trend that was accelerated during the COVID pandemic and the national lockdown, when businesses were forced to transition to an online business model. There is little evidence to suggest that the easing of lockdown will see the businesses that shifted to an online model return entirely to their pre-pandemic business model. Businesses that survived the turbulence of 2020 have discovered that they do not need to be physically present in the major city centres to survive and grow; this will inevitably impact on city centres that had previously acted as key business hubs.

However, Britain has large spatial differences in the income, productivity, and prosperity of its regions, and Brexit and the COVID pandemic may have exacerbated these. For

instance, several of the effects we observe for Wales are likely to be the outcome of structural weaknesses in its economy deriving from the region's historic dependence on the nationalised industries and the local characteristics of the entrepreneurial economic culture (Robert and Thompson, 2015). Furthermore, the relatively slow development of the region's digital infrastructure development may have negatively impacted its resilience. It has been noted that Wales lags behind the rest of Britain in terms of access to the internet and overall low use of the net (IWA, 2021), something that may be associated with its low share of people with university level education (Blank et al., 2018). However, the entrepreneurial economic culture of Wales, for example, is unlikely to change just by further investment in broadband infrastructure.

There are also interesting urban versus rural comparisons in Wales, where microbusiness venture density was higher in rural villages than in urban cities. While this can be associated with localism and Welsh cultural attributes, it may also be the case that labour market opportunities are more limited in rural areas and an online business might provide access to a wider range of opportunities. This has strong policy implications for regional development that extend beyond the particularities of Wales, highlighting the need to support businesses and individuals in identifying opportunities that exist beyond the borders of their local area. It is likely that the expansion of digital infrastructure has benefited rural areas that, for historic reasons, have been shielded from the culture of employment repetitiveness and limited autonomy that is prominent in the UK's urban centres, and which was predominately cultivated by the national industrial policies of the 19th century (Huggins et al., 2021; Huggins and Thompson, 2021, 2015). The localism of these microbusiness owners places strong emphasis on their links with both the local community and the other microbusinesses active within their area. Effective government support policies need to consider the symbiotic characteristics of microbusinesses. To this end, the development and support of institutions that have a sound awareness of the local needs for entrepreneurship can play an important role (e.g., the Business Wales service offered by the Welsh government).

Levelling up is about people, resources, and management. Ongoing innovation within entrepreneurial ecosystems will need further development of the skills and talent that can accommodate digital connectivity efforts. Focusing on productivity alone might not be enough to drive growth in the areas that lie outside of the major urban business centres. Several regions of Britain have deep-rooted inequalities, and even the wealthier regions have their own highly deprived areas. Some of the most affected local authority districts during the pandemic were

located in Wales, the North East, and the West Midlands (PWC, 2019). In the aftermath of Brexit and the pandemic, we see an opportunity to focus on tackling inequalities with an inclusive and sustainable recovery plan. Fostering a commercial culture and offering support for digital enterprising in local communities can strengthen local resilience and improve community prosperity. However, the results suggest that high microbusiness venture density is a better indicator of a region levelling up (when those microbusinesses are healthy) than it will be a driver of it.

One of the strongest associations we uncovered was a link between online microbusinesses and a preponderance of women in the local population, which is something that significantly increases the prosperity of the local community in which they live. Recent evidence shows that self-employment has particularly strong links with the social mobility of women (Aparicio et al., 2022). The latest GEM report also reveals that women focus their business activity on their local area far more than men do (Elam et al., 2021). Therefore, it is important that government considers the needs of women when designing policies. There have been recent government policy changes that allow the self-employed to participate in previously inaccessible benefit schemes, such as regulation on the gender pay gap, the maternity leave allowance, Tax-Free Childcare, or the Employment and Support Allowance (ESA). These all are good examples of policies that support women who wish to become business owners. Nevertheless, the large difference in the proportion of women and men who are self-employed indicates that further policies are necessary to level the self-employment playing field.

Haltiwanger et al. (2013) ask an important question: who creates jobs? Is it small or large businesses? What they find is that it is not the size that matters, but rather the newness of firms. Young firms "contribute substantially to both gross and net job creation", but "young firms have a much higher likelihood of exit, so job destruction from exit is also disproportionately high among them" (Haltiwanger et al., 2013, p. 348). This demonstrates the importance of support for new entrepreneurs, not only with funding but also with the training that can allow them to overcome the obstacles rooted in ineffective public guidance. The pandemic revealed the importance of developing digital skills and knowledge of navigating the web. Developing these types of skill-sets can help aspiring entrepreneurs to build-up resilient businesses and foster economic and social wellbeing.

Overall, our analysis suggests that high microbusiness venture density can be an indicator of successful local economies, but it can also indicate a less healthy economy with

low survival rates and high churn. The former tends to be found in and around the corporate centres and major cities. The high microbusiness venture density locations that are in relatively more deprived areas may benefit from greater support being given to microbusiness owners in terms of online skills training and how to navigate the web more effectively. Our results indicate that Britain has several locations where there is a dynamic marketplace of online microbusiness venturing activity. The varied online activity we observe is indicative of the need for tailored policy making that takes under consideration the local community or broader area characteristics. The analysis shows that online microbusiness activity has a beneficial effect on the prosperity of local communities. This is particularly evident for those communities that face greater challenges, such as relative economic and employment deprivation.

However, even when individuals start a business out of a lack of alternative employment and source of income, it is still a choice that depends on entrepreneurship being at least marginally better than something else. Many individuals who turn to self-employment are highly skilled professionals (Dellot, 2014; Henley, 2005). Findings from self-employment studies over the years show that even when there are limited employment choices in the labour market, factors such as autonomy, meaningfulness, creativity, and job satisfaction are important to those who become self-employed (Abreu et al., 2019; Dellot, 2014; Millán et al., 2013). When considering online microbusiness venturing in less prosperous neighbourhoods, we need to consider their local environment and community, access to necessary resources such as fast broadband, availability of skills, and availability of web skills training; these are elements that may foster and support online microbusiness development. The immediate benefit for the individual is the access to an alternative source of income, whereas for the local community the benefit is the lowering of local unemployment. Beyond these immediate effects, we must also consider the middle to long-term effects, such as business growth and its effect on local business activity and job creation (particularly in deprived neighbourhoods, where even a few jobs are important).

Consistent with the existing literature, we find that online microbusiness venturing reduces the number of short-run Job Seeker's Allowance claims and the effect persists into the medium-run, suggesting that online microbusinesses offer individuals an alternative opportunity for earning income. When individuals are pushed into starting their online microbusiness because of difficulties in securing salaried work, they are likely to operate their online microbusiness only until such time as an opportunity for salaried employment appears. That being said, many business ventures have been initially started out of necessity and have

later grown to become successful businesses. Even necessity-driven online microbusiness venturing can secure sufficient income to allow individuals to stand on their feet and build something of their own. This not only bestows psychological benefits to these individuals and develops their human capital, but also lowers the government direct transfers (e.g., JSA). However, these businesses require collaboration with suppliers if customer-needs are to be serviced. Local governments and councils have a key role to play in planning interventions that can support local entrepreneurs, help to bring together local vendors and suppliers, and offer skills training.

The local governments in Britain (e.g., local authority districts) are responsible for the management of local resources and the management of funding from the British government (Local Government Act, 2003) and have various powers at their disposal (e.g., capital expenditure, power to invest, etc.). Thus, they can implement changes that can improve their districts' employment, economy, and living environment. Local authorities should also focus on raising awareness among the self-employed and microbusiness owners about existing government schemes from which they can seek assistance. These include the Employment Allowance and the Youth Contract programme, which can make it easier for businesses to afford to take on employees. Also, there are the Help to Grow, and the Help to Grow: Digital schemes, which offer access to training and software discounts for eligible businesses. Finally, there are Working Tax Credits, which low income self-employed can claim. Prior to Brexit, the EU Structural Fund financed the support of online skills training and digital connectivity. There is therefore now a need for an alternative source of funding to support local interventions that will improve digital inclusion and create the prosperous communities of the future.

Policies that can advance digital skills-building and equip aspiring entrepreneurs with the tools to build modern businesses for the online era are essential. To conclude, we suggest that there are several policies that can help shape the future, some of which are summarised below:

- Building better living environments by ensuring the affordable housing and workspaces, improved safety, and inclusivity that can foster a vibrant community. These are important elements associated with the localism of microbusinesses and their symbiosis with other microbusinesses active in the area.
- To fully realise the benefit of greater internet connectivity, peer online learning and training for the unemployed, the elderly, and other disadvantaged groups would be needed. This is important for an inclusive society and it will allow both local microbusinesses and local communities to benefit from the growth of e-commerce.

- Local government can partner with university business schools to advance business training through workshops to enhance individuals' specialised knowledge and skills, and build inclusive social capital. Universities are an integral part of their local communities and are uniquely placed to disseminate knowledge.
- Funding for technology infrastructure, such as quality high-speed broadband, particularly to rural town & fringe, and rural villages. Online businesses do not have to be physically located close to customers, so a long as the infrastructure is in place, online businesses could provide additional employment opportunities in rural areas (as well as making job searching easier).

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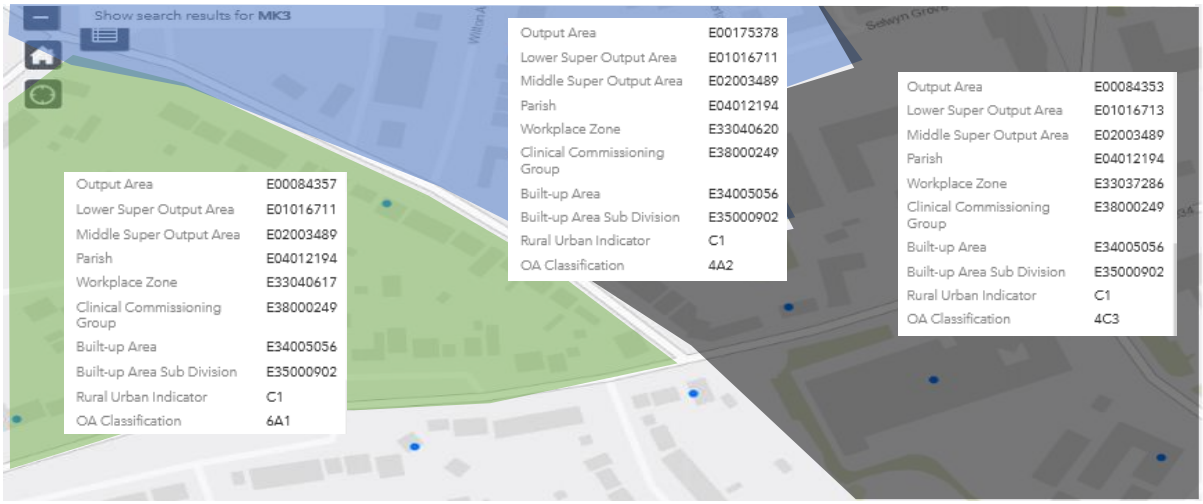
Appendix 1

The main unit of analysis of the UK Census is the Output Area (OA), which acts as the base unit, and its subsequent aggregates, the Super Output Area (SOA). The OA and SOA geographies, that is, the Lower Super Output Areas (LSOA) and Middle Super Output Areas (MSOA) were created to accommodate the analysis of population statistics. The 2011 Census had a total of 171,372 OAs for England and 46,351 for Scotland (released in 2013). The OAs and SOAs align to Local Authority Districts (LAD). LADs are responsible for the economic, social, and environmental well-being of their area (LGA, 2010; Local Government Act, 2003). All OAs and their aggregate SOAs are identified by a unique 9-character geocode (ONS, 2011). Map 1 shows three Output Areas in different colorations (i.e., Blue, Green, and Grey) in the urban town of Bletchley (Bletchley is famous as the site of Bletchley Park, the World War II code-breaking centre where Alan Turing and his colleagues broke the Enigma code).

Map 1. Output areas in Bletchley.



Each Output Area accounts for several postcode units. The Blue and Green Output Areas are part of the same Lower Super Output Area (i.e., geocode: E01016711), whereas the Grey Output Area is part of another (i.e., geocode: E01016713). These three Output Areas are part of the same Middle Super Output Area (i.e., geocode: E02003489) that, together with some other Middle Super Output Areas, are part of the electoral ward of Bletchley (i.e., geocode: E05009407) and the urban town with the same name. Bletchley postcodes start with ‘MK’; this is the identifier of the urban city and same-name local authority district of Milton Keynes (i.e., geocode: E06000042). Every postcode within the local authority district and urban city of

Milton Keynes has a postcode starting with ‘MK’. However, not every postcode starting with MK is part of Milton Keynes. For instance, the nearby towns of Buckingham and Bedford also have postcodes starting with ‘MK’. The distance between Milton Keynes and Bedford is about 18.5 miles, and it takes roughly 1 hour by fast train. To overcome such limitations, we use in this study the ONS Output Areas geographical structure (for details on the limitation of using postcodes see (ONS, 2016).

Appendix 2

Table 2A. Output Area Classifications.

1	Output Area Classification
2	Achieving Minorities
3	Ageing Communities and Families
4	Ageing Industrious Workers
5	Ageing Rural Flat Tenants
6	Ageing Rural Industry Workers
7	Ageing in Suburbia
8	Agricultural Communities
9	Asian Terraces and Flats
10	Bangladeshi Mixed Employment
11	Challenged Transitionaries
12	Comfortable Suburbia
13	Communal Retirement
14	Commuters with Young Families
15	Constrained Commuters
16	Constrained Neighbourhoods
17	Constrained Young Families
18	Delayed Retirement
19	Deprived Blue-Collar Terraces
20	Deprived Neighbourhoods
21	Detached Retirement Living
22	Detached Rural Retirement
23	EU White-Collar Workers
24	Eastern European Communities
25	Endeavouring Flat Dwellers
26	Established Farming Communities
27	Established Renting Families
28	Established Tech Workers
29	Families in Terraces and Flats
30	Hampered Aspiration
31	Hard-Pressed Ethnic Mix
32	Hard-Pressed European Settlers

33	Hard-Pressed Rented Terraces
34	Highly-Qualified Quaternary Workers
35	Indian Tech Achievers
36	Industrious Hardship
37	Industrious Transitions
38	Inner City Ethnic Mix
39	Migrant Commuters
40	Migrant Families
41	Multi-Ethnic Hardship
42	Multi-Ethnic Professional Service Workers.
43	Multi-Ethnic Professionals with Families
44	Multi-Ethnic Suburbia
45	Multicultural New Arrivals
46	Multicultural Student Neighbourhoods
47	New EU Tech Workers
48	Old EU Tech Workers
49	Older Farming Communities
50	Older Workers and Retirement
51	Outer City Hardship
52	Pakistani Communities
53	Private Renting New Arrivals
54	Professional Service Cosmopolitans
55	Renting Hard-Pressed Workers
56	Renting Rural Retirement
57	Retired City Hardship
58	Retired Communal City Dwellers
59	Retired Independent City Dwellers
60	Rural Employment and Retirees
61	Rural Life
62	Rural White-Collar Workers
63	Rural Workers and Families
64	Self-Sufficient Retirement
65	Semi-Detached Ageing
66	Social Renting Young Families
67	Striving Service Workers
68	Student Communal Living
69	Student Digs
70	Students and Commuters
71	Students and Professionals
72	Transitional Eastern European Neighbourhood
73	Urban Cultural Mix
74	White Professionals
75	White Suburban Communities
76	Young Families and Students
77	Young Hard-Pressed Families

Table 2B. Variables used in the quantitative analysis.

Variable name	Description
low_unemployment.	*Dummy of below/above average jobseeker allowance claims*
ln_women	*The logarithm of the proportion of women in the area*
Underrepresented female population	*Index value 1: proportion of women <= 47%*
Balanced gender population	*Index value 2: proportion of women >48% but <52%*
Overrepresented female population	*Index value 3: proportion of women >= 52%*
ln_ratio_0-9	*The logarithm of people 0-9 years of age*
ln_ratio_10-14	*The logarithm of people 10-14 years of age*
ln_ratio_15-24	*The logarithm of people 15-24 years of age*
ln_ratio_25-29	*The logarithm of people 25-29 years of age*
ln_ratio_30-44	*The logarithm of people 30-34 years of age*
ln_ratio_45-64	*The logarithm of people 45-64 years of age*
Other_65over	*The baseline: Age of people is 65 years of age or over*
ln_pop_density	*The logarithm of population per hectare of land*
Rural town and fringe	*Areas listed as Rural town and fringe*
Rural town and fringe in a sparse setting	*Areas listed as Rural town and fringe in a sparse setting*
Rural village and dispersed	*Areas listed as Rural village and dispersed*
Rural village and dispersed in a sparse setting	*Areas listed as Rural village and dispersed in a sparse setting*
Urban city and town	*Areas listed as Urban city and town*
Urban city and town in a sparse setting	*Areas listed as Urban city and town in a sparse setting*
Urban minor conurbation	*Areas listed as Urban minor conurbation*
Urban Major Conurbation	*The baseline: Areas listed as Urban Major Conurbation*
ln_Bus.Turnover	*The logarithm of LSOA overall Business Turnover*
Public Org Dummy	*Control for the presence of a public business in LSOA*
ln_Private_Turnover	*The logarithm of LSOA Private Business Turnover*
Public#Private	*Interaction term between the control a public business and the logarithm of Private Business Turnover*
Self-employed	*Control of whether the observation is Self-employed*
Wage-employee	*Control of whether the observation is Wage-employee*
Unemployed	*Control of whether the observation is unemployed*
Disability	*Control of whether the observation is disabled*
Caring for family	*Control of whether the observation is caring for family*
Other (student, retired etc.)	*Control of whether the observation is other job status*
Female	*Control of whether the observation is female*
Age	*Continuous variable for years of Age*
Satisfaction with health	*Satisfaction with health is measured on 1-7 scale where 1 is the lowest level of satisfaction.*
Satisfaction with income	*Satisfaction with income is measured on 1-7 scale where 1 is the lowest level of satisfaction.*
Satisfaction with leisure	*Satisfaction with leisure is measured on 1-7 scale where 1 is the lowest level of satisfaction.*
Satisfaction with life	*Satisfaction with life is measured on 1-7 scale where 1 is the lowest level of satisfaction.*
Several times a day	*Control variable for use of internet: frequency is Several times a day*

Several times a week	*Control variable for use of internet: frequency is Several times a week*
Once a month	*Control variable for use of internet: frequency is Once a month*
Less than once a month	*Control variable for use of internet: frequency is Less than once a month*
Never use	*Control variable for use of internet: frequency is Never use*
No access to the internet	*Control variable for use of internet: frequency is No access to the internet*
Every day	*Baseline for internet use: frequency is Every day*
Elementary educ.	*Highest educational achievement is: Elementary school*
High school	*Highest educational achievement is: High school*
+16 educ.	*Highest educational achievement is: +16 education*
Vocational educ.	*Highest educational achievement is: Vocational education*
Higher Educ.	*Highest educational achievement is: Higher Education*
No qualification	*Highest educational achievement is: No qualification*
Single/Never married	*Marital status is: Single/Never married*
Divorced/separated	*Marital status is: Divorced/separated*
Widowed	*Marital status is: Widowed*
Living as couple	*Marital status is: Living as couple*
Married	*Baseline of Marital status is: Married*
Own Child in HH	*Control of the presence of own children in the household*
Homeownership	*Control for full or partial homeownership vs renting*
Born in UK	*Control for being born in the UK*
Non-British	*Control for belonging to a British/ English/ Scottish/ Welsh/ Northern Irish ethic group*
Urban dummy	*Control for the household being in an urban area*
North East	*The region is North East (England)*
North West	*The region is North West (England)*
Yorkshire and The Humber	*The region is Yorkshire and The Humber (England)*
East Midlands	*The region is East Midlands (England)*
West Midlands	*The region is West Midlands (England)*
East of England	*The region is East of England*
London	*The region is London*
South East	*The region is South East (England)*
South West	*The region is South West (England)*
Scotland	*The region is Scotland*
Wales	*The region is Wales*
New venture	*Control for ventures created in the 6 most recent months*
Active website	*Control for high or low activity websites (1 is high)*
Outlier_control	*Control for extreme values of venture density*

Appendix 3

Table 3A. Local Authority District Indices of Deprivation and proportion of most deprived LSOAs.

Local Authority District name	**IMD - Average Multiple Deprivation Rank** (out of 317 lads)	**IMD - Rank of proportion of LSOAs in most deprived 10% nationally** (most deprived is 0.49)	**Income - Rank of average rank**	**Income - Rank of proportion of LSOAs in most deprived 10% nationally** (most deprived is 0.5)	**Employment - Rank of average rank**	**Employment - Proportion of LSOAs in most deprived 10% nationally** (most deprived is 0.5)	**Education, Skills and Training - Rank of average rank**	**Education, Skills and Training - Proportion of LSOAs in most deprived 10% nationally** (most deprived is 0.4286)
Barnet	184	0.0047	137	0.0142	201	0.0000	302	0.0000
Bromsgrove	271	0.0000	265	0.0000	242	0.0000	275	0.0000
Bury	110	0.1000	97	0.1000	61	0.1500	174	0.0417
Camden	132	0.0000	87	0.0827	151	0.0075	274	0.0000
City of London	208	0.0000	292	0.0000	286	0.0000	314	0.0000
East Devon	238	0.0000	221	0.0000	198	0.0000	218	0.0123
Hackney	7	0.1111	5	0.1944	57	0.0347	214	0.0069
Hillingdon	151	0.0000	126	0.0062	188	0.0000	185	0.0000
Islington	28	0.0488	17	0.1057	63	0.0732	244	0.0000
Lancaster	112	0.1461	131	0.1124	129	0.1461	180	0.1011
Slough	73	0.0000	82	0.0000	165	0.0000	126	0.0000
Solihull	206	0.1194	201	0.1343	190	0.1493	225	0.1418
St Albans	306	0.0000	291	0.0000	292	0.0000	316	0.0000
Stockport	154	0.0895	155	0.0842	127	0.1000	224	0.0632
Surrey Heath	309	0.0000	313	0.0000	310	0.0000	289	0.0182
Tandridge	258	0.0000	275	0.0000	269	0.0000	245	0.0000

Table 3A. Local Authority District Indices of Deprivation and proportion of most deprived LSOAs (continued).

Local Authority District name	**Health Deprivation and Disability - Rank of average rank**	**Health Deprivation and Disability - Proportion of LSOAs in most deprived 10% nationally** (most deprived is 0.6702)	**Crime - Rank of average rank**	**Crime - Proportion of LSOAs in most deprived 10% nationally** (most deprived is 0.6135)	**Barriers to Housing and Services - Rank of average rank**	**Barriers to Housing and Services - Proportion of LSOAs in most deprived 10% nationally** (most deprived is 1)	**Living Environment - Rank of average rank**	**Living Environment - Proportion of LSOAs in most deprived 10% nationally** (most deprived is 1)
Barnet	0.0000	297	0.0000	111	0.0237	20	0.2038	71
Bromsgrove	0.0000	212	0.0172	160	0.0345	204	0.0517	271
Bury	0.0417	88	0.1083	51	0.1333	275	0.0083	124
Camden	0.0000	207	0.0000	70	0.1128	132	0.0000	22
City of London	0.0000	247	0.0000	317	0.0000	10	0.6667	10
East Devon	0.0123	254	0.0000	296	0.0000	226	0.0494	148
Hackney	0.0069	67	0.0208	15	0.2292	3	0.9375	14
Hillingdon	0.0000	194	0.0000	83	0.0683	28	0.1615	117
Islington	0.0000	82	0.0081	13	0.1545	27	0.0325	13
Lancaster	0.1011	62	0.2135	124	0.1461	274	0.0112	49
Slough	0.0000	100	0.0125	49	0.0875	8	0.5125	89
Solihull	0.1418	174	0.0597	159	0.0448	150	0.0224	252
St Albans	0.0000	307	0.0000	195	0.0230	138	0.0230	275
Stockport	0.0632	86	0.1211	65	0.1316	292	0.0000	143
Surrey Heath	0.0182	284	0.0000	262	0.0000	143	0.0364	288
Tandridge	0.0000	251	0.0000	103	0.0000	116	0.1000	169

Table 3B. Microbusiness venture density and unemployment using IMD.

Variable	*Unemployment*
ln_Ven.density	-0.019*
Ln_IMD	-0.235***
ln_Ven.density)#ln_IMD	0.000
ln_women	-0.011
ln_ratio_0-9	0.018**
ln_ratio_10-14	0.001
ln_ratio_15-24	0.004
ln_ratio_25-29	0.022***
ln_ratio_30-44	0.030***
ln_ratio_45-64	-0.022**
Public_organisation_dummy	-0.177***
Public#Private	-0.054***
ln_private_organisation	0.063***
Regions (Baseline: London)	
North East	0.246***
North West	-0.073***
Yorkshire and The Humber	0.121***
East Midlands	0.094***
West Midlands	0.183***
East of England	-0.019
South East	0.011
South West	-0.050***
Scotland	-0.441***
Wales	-1.702***
Rural area	-0.025*
Ln_pop.density	-0.012***
Active websites	0.002
Outlier dummy	-0.228
Constant	3.956***
Statistics	
F	180.6
r^2	0.3632
Observations	32412

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

Table 3C. Venture density and local community prosperity.

	Multiple Deprivation	Income Deprivation	Employment Deprivation	Living Environment
ln_Ven.density	0.006***	-0.002*	0.000	0.012***
Gender (Baseline:Overrepresented women)				
Underrepresented women	-0.115***	-0.040***	-0.074***	-0.178***
Balanced gender	-0.005**	0.019***	0.011***	-0.041***
ln_Ven.density #Gender dummies				
ln_Ven.density#Underrepresented women	-0.025***	-0.024***	-0.033***	0.003
ln_Ven.density#Balanced gender	0.001	0.004***	0.007***	-0.006***
New ventures	-0.006**	-0.009***	-0.006*	0.015***
ln_ratio_0-9	-0.034***	-0.063***	-0.037***	0.060***
ln_ratio_10-14	-0.024***	-0.037***	-0.034***	0.056***
ln_ratio_15-24	-0.082***	-0.061***	-0.047***	-0.089***
ln_ratio_25-29	-0.056***	-0.045***	-0.035***	-0.066***
ln_ratio_30-44	0.178***	0.163***	0.191***	0.016***
ln_ratio_45-64	-0.043***	-0.057***	-0.146***	-0.016***
Public_organisation_dummy	-0.143***	-0.093***	-0.144***	-0.505***
Public#Private	-0.065***	-0.048***	-0.064***	-0.198***
ln_private_organisation	0.151***	0.156***	0.155***	-0.089***
Rural area	0.028***	0.053***	0.088***	-0.372***
Ln_pop.density	0.037***	0.015***	0.009***	0.011***
Regions (Baseline: London)				
North East	-0.537***	-0.552***	-0.736***	0.663***
North West	-0.549***	-0.413***	-0.582***	-0.214***
Yorkshire and The Humber	-0.439***	-0.292***	-0.418***	-0.254***
East Midlands	-0.279***	-0.248***	-0.338***	0.295***
West Midlands	-0.375***	-0.329***	-0.400***	-0.184***
East of England	-0.124***	-0.087***	-0.137***	0.388***
South East	-0.090***	-0.035***	-0.074***	0.252***
South West	-0.230***	-0.176***	-0.266***	0.031***
Scotland	-1.644***	-1.607***	-1.637***	-1.556***
Wales	-8.165***	-3.011***	-3.092***	-2.634***
Active websites	0.001	0.002	0.002	-0.004*
outlier_control	0.127***	-0.062***	0.011	0.279***
Constant	9.756***	9.756***	9.709***	9.078***
Controls	Yes	Yes	Yes	Yes
Statistics				
F	36335.02	11021.07	9849.45	5883.48
r^2	0.8637	0.6577	0.632	0.5064
N	596598	596598	596598	596598

*Note: * p<0.05; ** p<0.01; *** p<0.001.*

Table 3D. England: The effects of private and public organisations turnover on venture density.

Venture Density	***SEP19***	***OCT19***	***NOV19***	***DEC19***	***JAN20***	***FEB20***	***MAR20T***	***APR20***
Public_organisation_dummy	-0.432***	-0.412***	-0.150***	-0.183***	-0.174***	-0.313***	-0.445***	-0.453***
ln_privatate_organisation	1.055***	1.034***	0.957***	0.987***	0.936***	0.983***	1.015***	0.991***
Public#Private	-0.044***	-0.040***	0.017***	0.009	0.008	-0.040***	-0.079***	-0.084***
ln_women	-0.474***	-0.109***	-0.527***	-0.786***	-0.281***	-0.391***	-0.559***	-0.520***
ln_ratio_0-9	0.005	-0.140***	0.013*	0.083***	-0.150***	-0.153***	-0.163***	-0.225***
ln_ratio_10-14	0.175***	0.151***	0.059***	0.091***	0.089***	0.119***	0.161***	0.168***
ln_ratio_15-24	0.012*	0.066***	-0.018***	-0.084***	0.040***	0.040***	0.033***	0.050***
ln_ratio_25-29	0.177***	0.110***	0.145***	0.210***	0.168***	0.234***	0.273***	0.285***
ln_ratio_30-44	-0.148***	0.091***	-0.286***	-0.493***	-0.115***	-0.170***	-0.217***	-0.119***
ln_ratio_45-64	-0.146***	-0.043***	-0.234***	-0.309***	-0.136***	-0.126***	-0.124***	-0.073***
(Baseline: 65-over)								
Urban-Rural continuum								
Rural town and fringe	-0.324***	-0.259***	-0.366***	-0.475***	-0.508***	-0.647***	-0.797***	-0.823***
Rural town and fringe in a sparse setting	-0.620***	-0.518***	-0.731***	-0.823***	-0.800***	-0.914***	-1.014***	-1.032***
Rural village and dispersed	-0.361***	-0.320***	-0.434***	-0.554***	-0.571***	-0.733***	-0.896***	-0.942***
Rural village and dispersed in a sparse setting	-0.884***	-0.812***	-0.998***	-1.112***	-1.056***	-1.213***	-1.313***	-1.345***
Urban city and town	0.099***	0.211***	-0.039***	-0.136***	-0.157***	-0.284***	-0.429***	-0.457***
Urban city and town in a sparse setting	-0.520***	-0.485***	-0.680***	-0.797***	-0.784***	-0.858***	-0.928***	-0.929***
Urban minor conurbation	0.087***	0.220***	0.026	-0.039**	-0.056***	-0.135***	-0.277***	-0.279***
(Baseline: Urban Major Conurbation)								
Constant	2.655***	2.072***	2.959***	3.201***	2.293***	2.380***	2.330***	1.958***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Statistics								
F	2880	2379	2695	2560	2384	2760	3014	3052
r2	0.3226	0.3313	0.3089	0.3067	0.3039	0.3193	0.3467	0.35
Adj.r2dj.	0.3225	0.3311	0.3088	0.3065	0.3038	0.3191	0.3466	0.3499
Observations	604767	480392	603087	578958	546062	588603	568144	566984

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

Table 3E. Wales: The effects of private and public organisations turnover on venture density.

Venture Density	***SEP19***	***OCT19***	***NOV19***	***DEC19***	***JAN20***	***FEB20***	***MAR20T***	***APR20***
Public_organisation_dummy	-1.465***	-1.687***	-1.213***	-1.224***	-1.277***	-1.222***	-1.250***	-1.242***
ln_privatate_organisation	0.379***	0.387***	0.377***	0.370***	0.354***	0.358***	0.383***	0.362***
Public#Private	-0.434***	-0.496***	-0.368***	-0.374***	-0.397***	-0.377***	-0.387***	-0.396***
ln_women	0.320**	0.284*	0.112	0.151	0.295**	0.172	0.038	0.035
ln_ratio_0-9	-0.034	0.013	-0.027	-0.024	-0.02	-0.019	-0.006	-0.013
ln_ratio_10-14	0.147***	0.134***	0.140***	0.131***	0.123***	0.110***	0.125***	0.095***
ln_ratio_15-24	-0.126***	-0.124***	-0.098***	-0.091***	-0.098***	-0.089***	-0.079***	-0.072***
ln_ratio_25-29	-0.051***	-0.035*	-0.064***	-0.061***	-0.055***	-0.058***	-0.029*	-0.047***
ln_ratio_30-44	-0.044*	-0.052*	-0.023	-0.013	-0.011	-0.013	-0.056*	-0.033
ln_ratio_45-64	-0.034	-0.062*	-0.038	-0.035	-0.01	-0.02	-0.022	0.003
(Baseline: 65-over)								
Urban-Rural continuum								
Rural town and fringe	-0.011	0.038	0.084	0.095	0.062	0.125	0.086	0.101
Rural town and fringe in a sparse setting	0.166	0.271**	0.033	0.088	0.123	0.14	0.067	0.098
Rural village and dispersed	0.379***	0.482***	0.514***	0.530***	0.551***	0.587***	0.510***	0.516***
Rural village and dispersed in a sparse setting	-0.052	0.098	0.058	0.073	0.06	0.11	0.034	0.042
Urban city and town	0.097	0.108	0.179*	0.195**	0.172*	0.211**	0.14	0.192**
(Baseline: Urban city and town in a sparse setting)								
Constant	0.701***	0.680***	0.577***	0.553***	0.635***	0.547***	0.655***	0.610***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Statistics								
F	83.13	48.88	83.87	82.31	79.99	80.25	88.79	89.73
r2	0.2931	0.2384	0.2954	0.2995	0.3039	0.2914	0.3177	0.3201
Adj.r2dj.	0.2895	0.2335	0.2919	0.2958	0.3001	0.2878	0.3141	0.3165
Observations	17132	13360	17089	16453	15664	16675	16104	16096

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

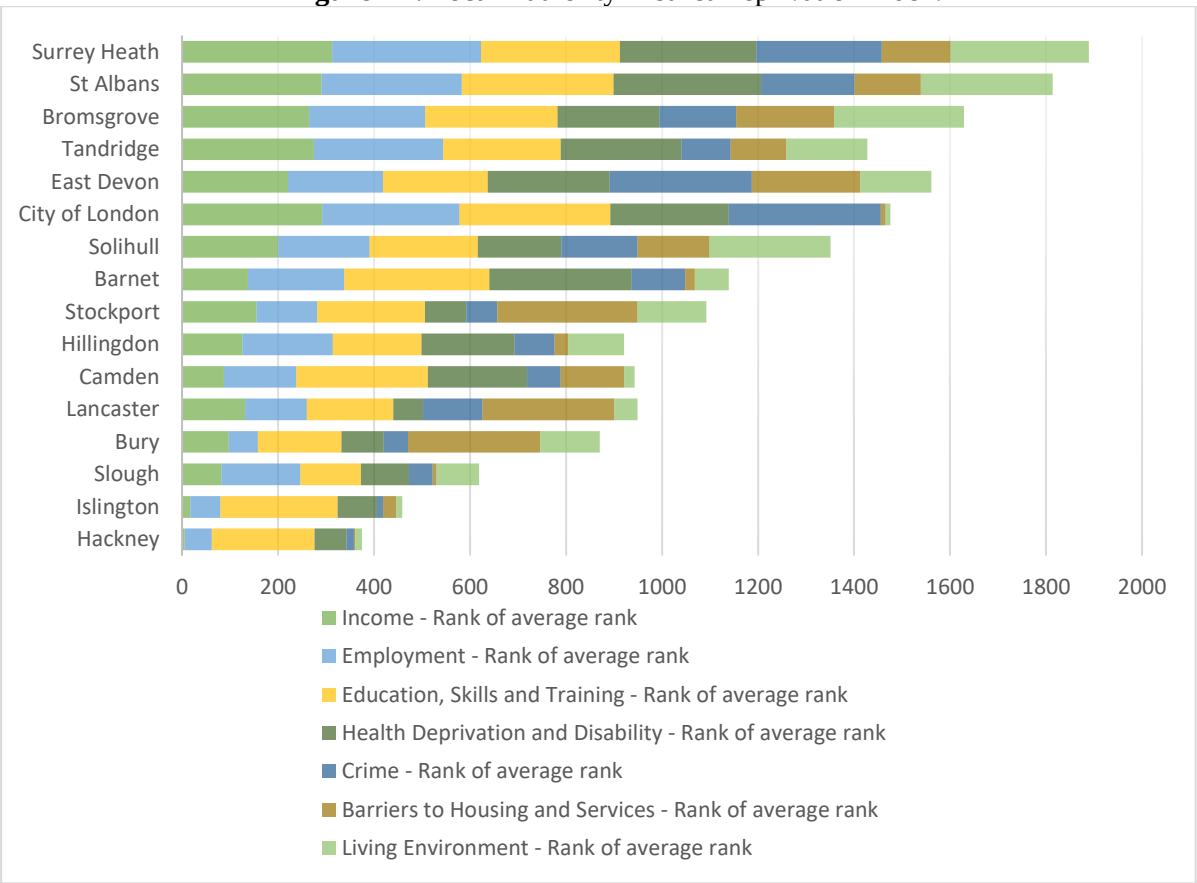
Table 3F. Scotland: The effects of private and public organisations turnover on venture density.

Venture Density	***SEP19***	***OCT19***	***NOV19***	***DEC19***	***JAN20***	***FEB20***	***MAR20T***	***APR20***
Public_organisation_dummy	1.087***	1.038***	1.054***	1.008***	0.891***	0.989***	1.053***	1.076***
ln_privatate_organisation	0.493***	0.492***	0.498***	0.492***	0.495***	0.494***	0.575***	0.545***
Public#Private	0.759***	0.739***	0.720***	0.722***	0.722***	0.733***	0.719***	0.715***
ln_women	-0.788***	-0.620***	-0.802***	-0.837***	-0.810***	-0.861***	-0.490***	-0.595***
ln_ratio_0-9	-0.014	-0.017	-0.003	-0.024	-0.028*	-0.018	0.057***	0.068***
ln_ratio_10-14	0.063***	0.058***	0.057***	0.049***	0.041**	0.041***	0.063***	0.074***
ln_ratio_15-24	-0.030*	-0.009	-0.034**	-0.039**	-0.032*	-0.038**	-0.02	-0.023
ln_ratio_25-29	-0.027*	-0.074***	-0.039**	-0.026*	-0.034**	-0.031*	-0.047***	-0.044***
ln_ratio_30-44	-0.025	0.002	-0.003	-0.02	-0.027	-0.026	0.023	0.001
ln_ratio_45-64	-0.151***	-0.146***	-0.159***	-0.131***	-0.094***	-0.119***	-0.190***	-0.176***
(Baseline: 65-over)								
Urban-Rural continuum								
Accessible Rural Areas	-0.703***	-0.664***	-0.700***	-0.692***	-0.724***	-0.686***	-0.683***	-0.666***
Accessible Small Towns	-0.553***	-0.522***	-0.518***	-0.536***	-0.573***	-0.536***	-0.510***	-0.525***
Other Urban Areas	-0.105***	-0.078***	-0.075***	-0.062**	-0.071**	-0.043*	-0.027	-0.028
Remote Rural Areas	-1.007***	-0.992***	-1.032***	-1.047***	-1.073***	-1.014***	-0.980***	-0.993***
Remote Small Towns	-0.357***	-0.357***	-0.334***	-0.344***	-0.351***	-0.309***	-0.334***	-0.306***
Very Remote Rural Areas	-0.704***	-0.706***	-0.760***	-0.754***	-0.746***	-0.716***	-0.737***	-0.752***
Very Remote Small Towns	-0.355***	-0.288**	-0.289***	-0.298***	-0.396***	-0.331***	-0.339***	-0.417***
(Baseline: Large Urban Areas)								
Constant	1.205***	1.269***	1.145***	1.134***	1.250***	1.150***	1.521***	1.438***
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Statistics								
F	86.28	70.57	89.05	84.28	76.6	86.6	90.69	87.16
r2	0.1989	0.2034	0.2038	0.2021	0.1955	0.2045	0.2196	0.2122
Adj.r2dj.	0.1966	0.2005	0.2016	0.1997	0.1929	0.2021	0.2172	0.2098
Observations	31017	24691	31046	29707	28150	30077	28779	28556

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

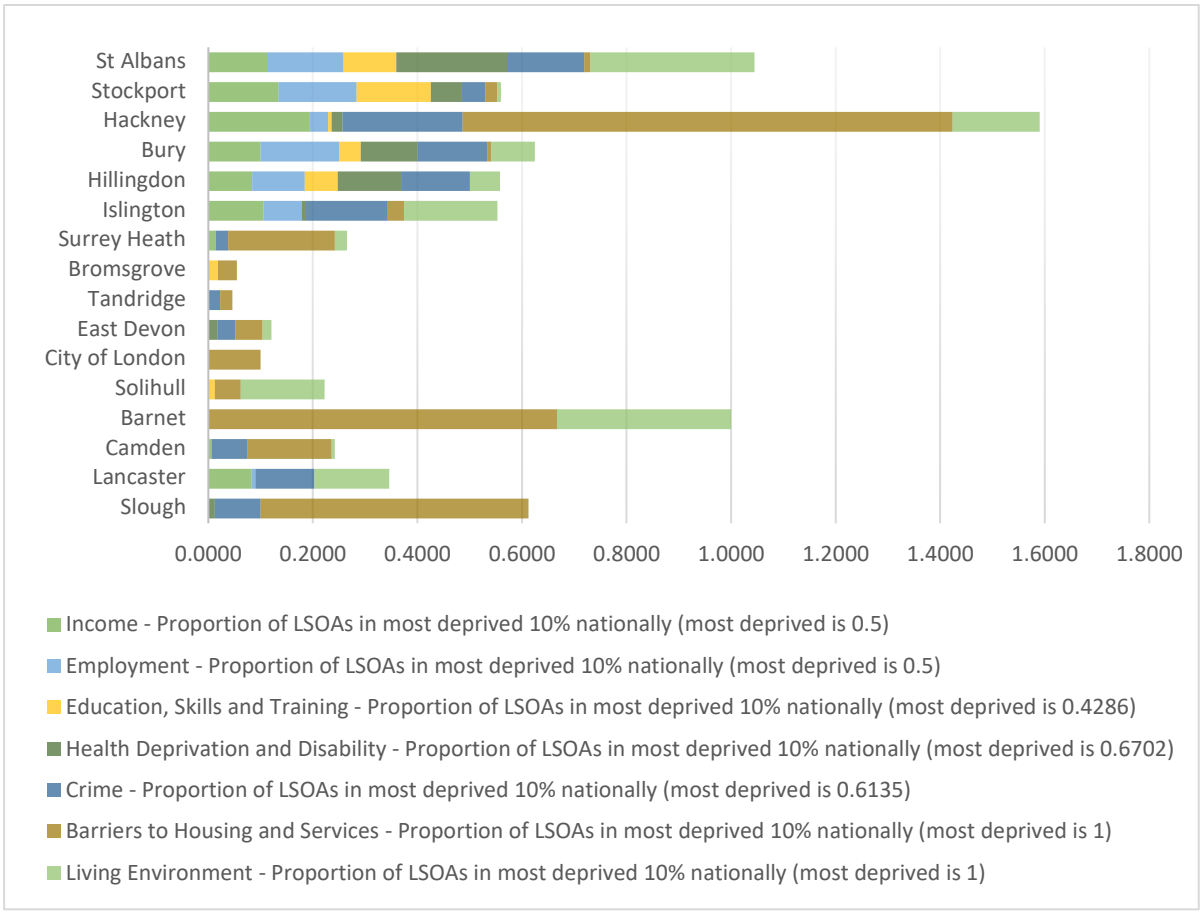
Appendix 4

Figure A1. Local Authority District Deprivation Index.



Note: The local authority districts are sorted using the overall weighted Index of Multiple Deprivation.

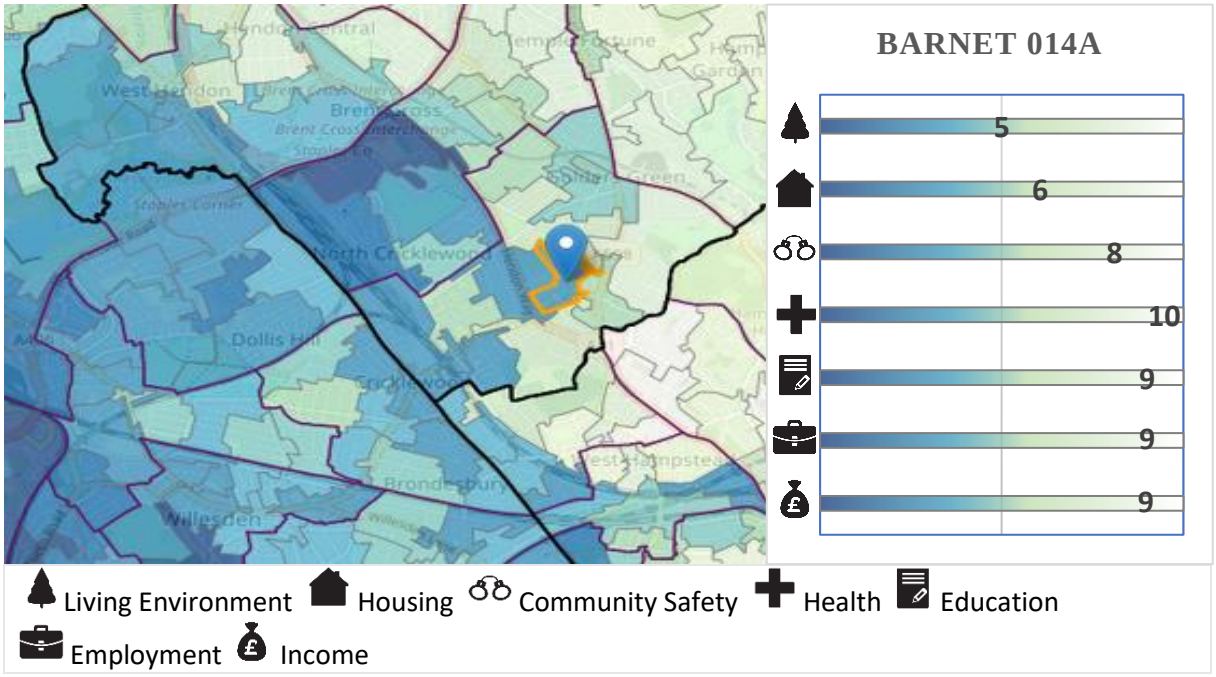
Figure A2. Proportion of neighbourhoods in Local Authority Districts among most deprived 10% nationally.

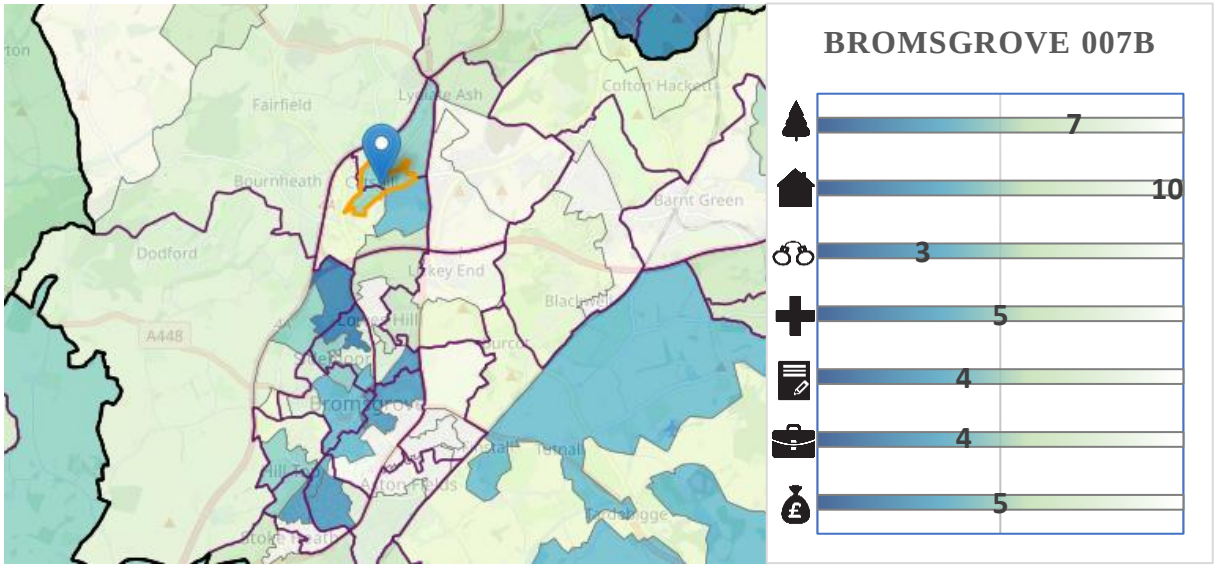


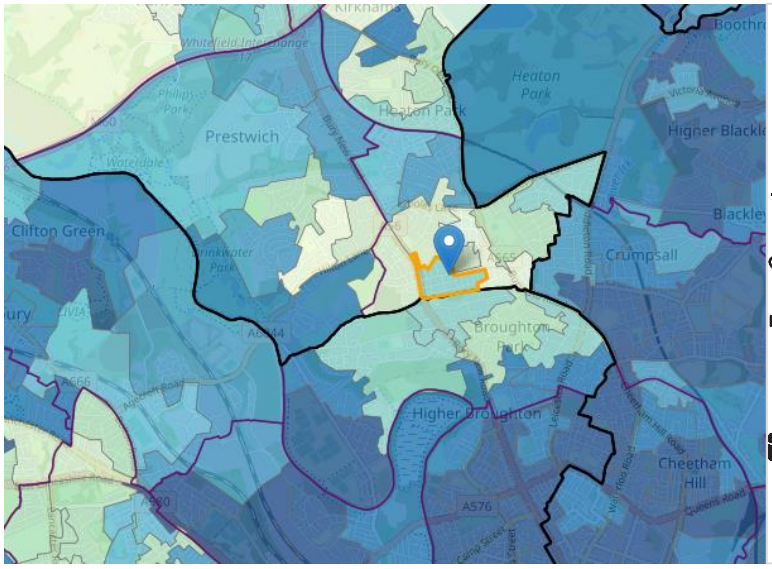
Note: The local authority districts are sorted using the overall weighted Index of Multiple Deprivation.

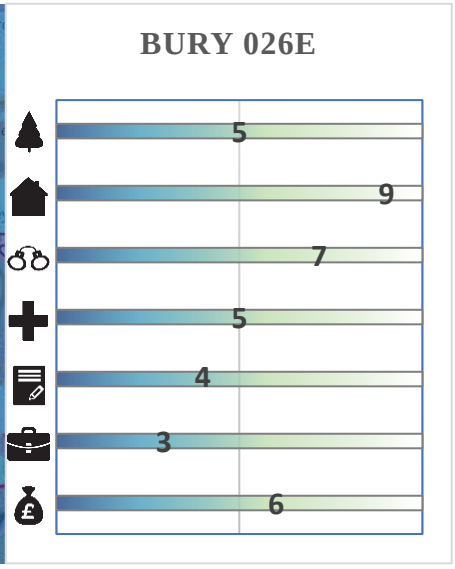
Appendix 5

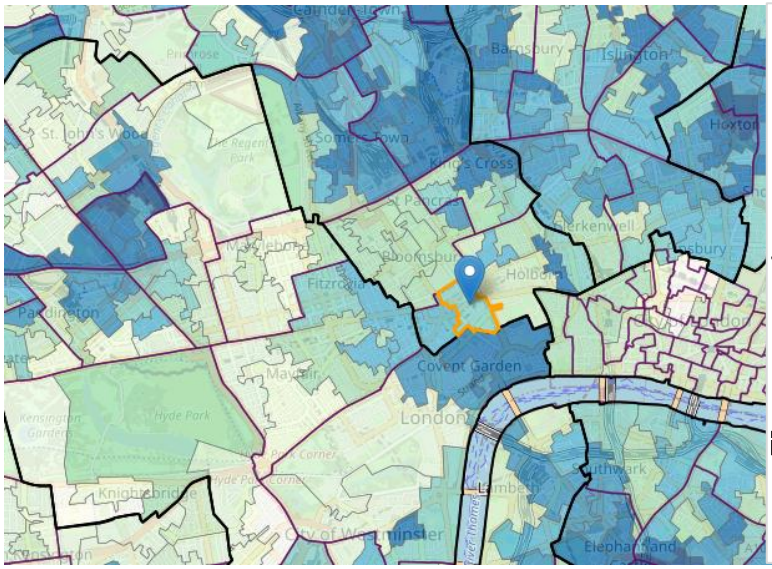
Deprivation Maps 1-16. Indices of deprivation for top venture density locations.
From 10% most deprived, to 10% least deprived.

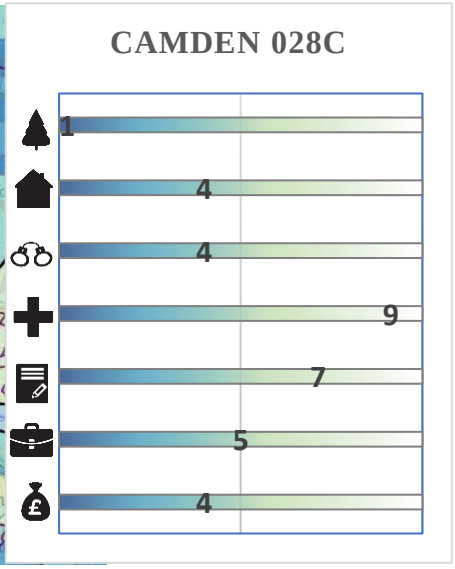


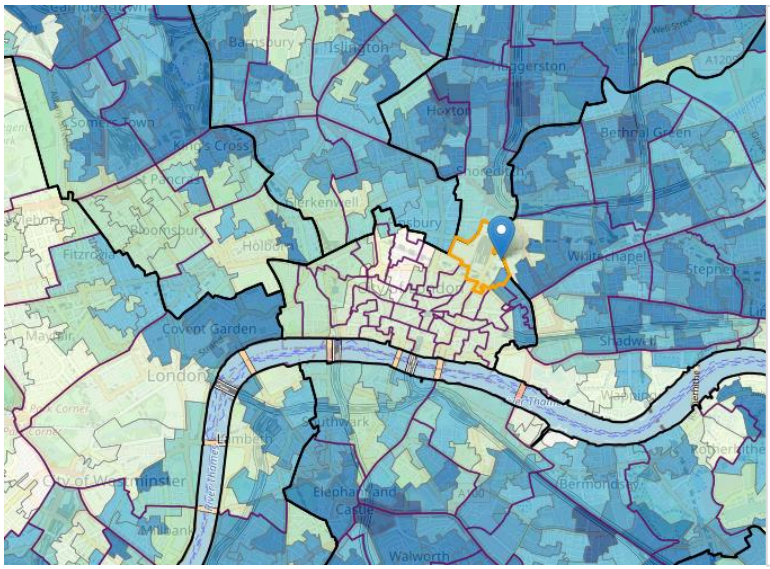


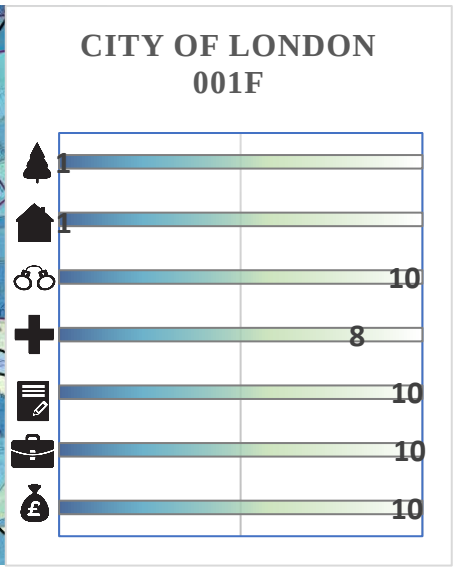

Prestwich
Clifton Green
Crumpsall
Higher Broughton
Cheetham Hill
A576

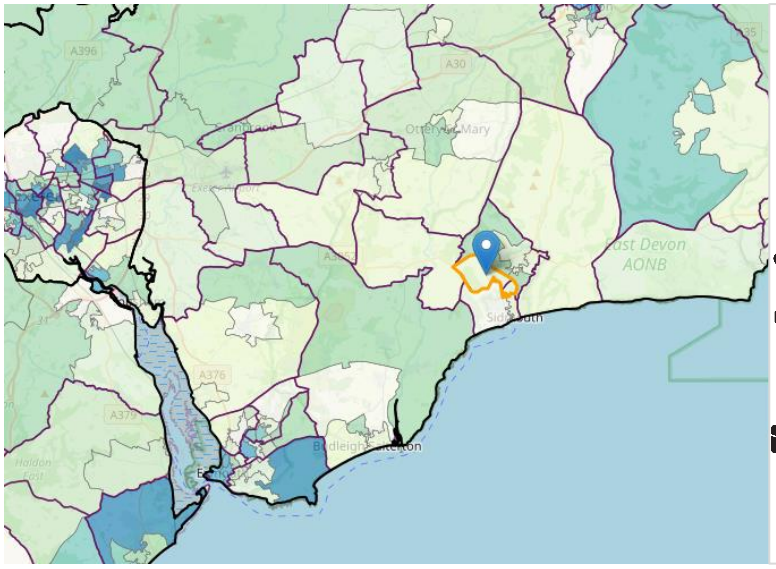

BURY 026E
5
9
7
5
4
3
6

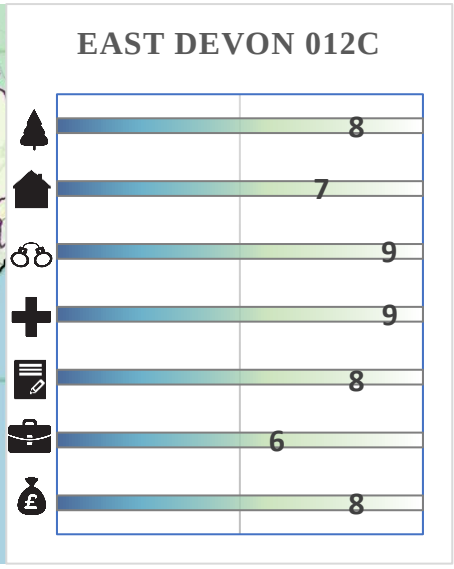

Covent Garden
London

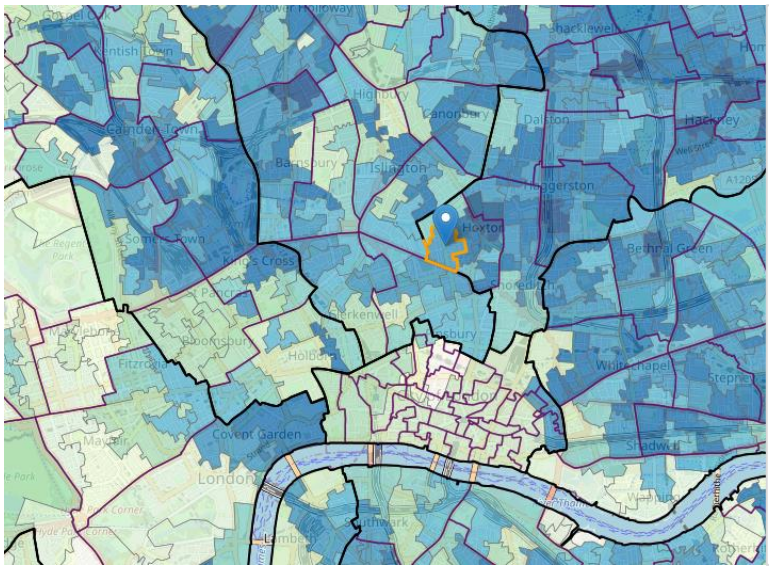

CAMDEN 028C
1
4
4
9
7
5
4

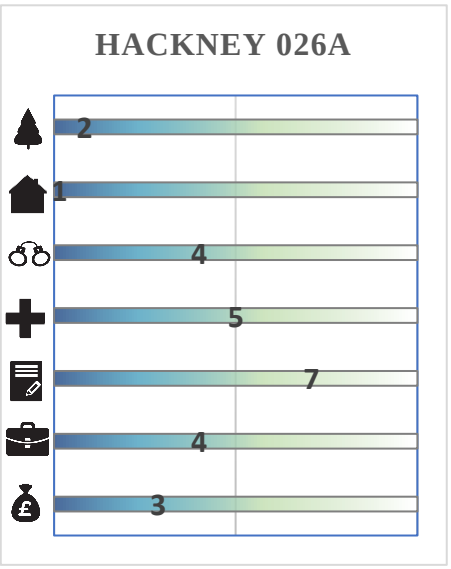

Covent Garden
London
Walworth

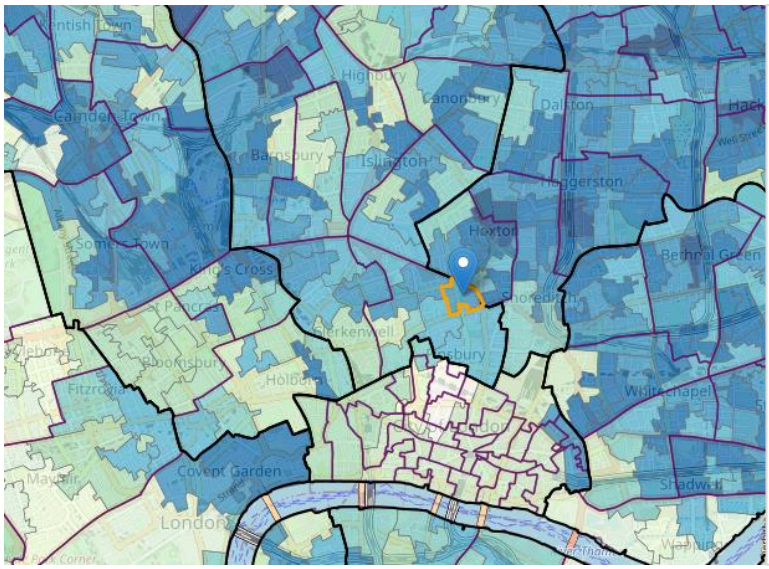

CITY OF LONDON
001F
1
1
10
8
10
10
10

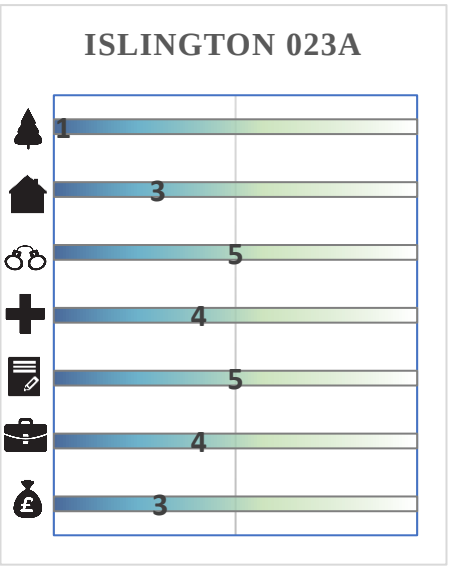


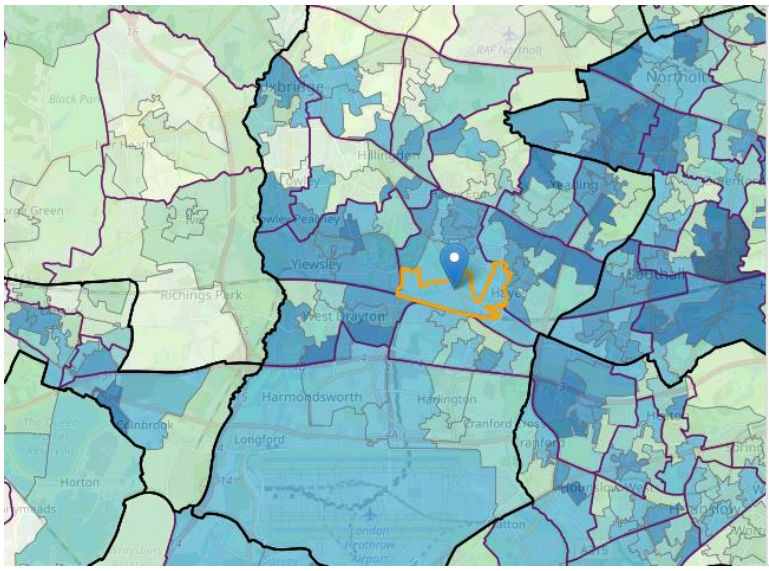

EAST DEVON 012C
8
7
9
9
8
6
8



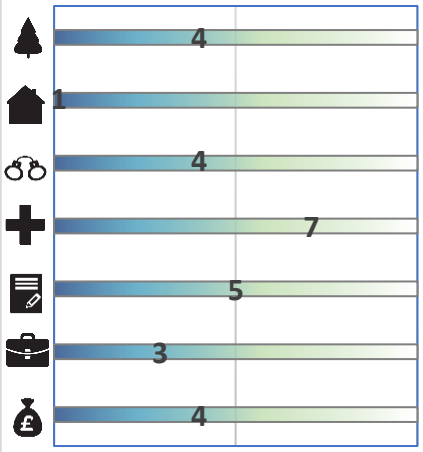

HACKNEY 026A
2
1
4
5
7
4
3

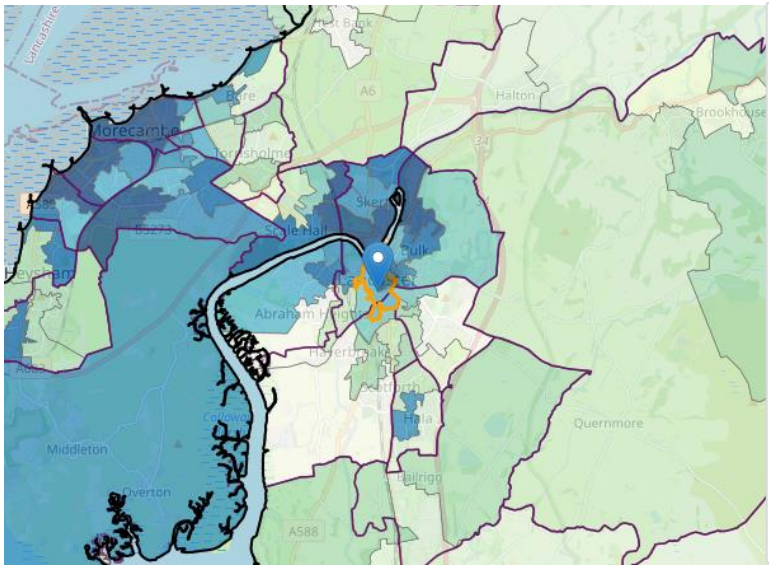



ISLINGTON 023A
1
3
5
4
5
4
3

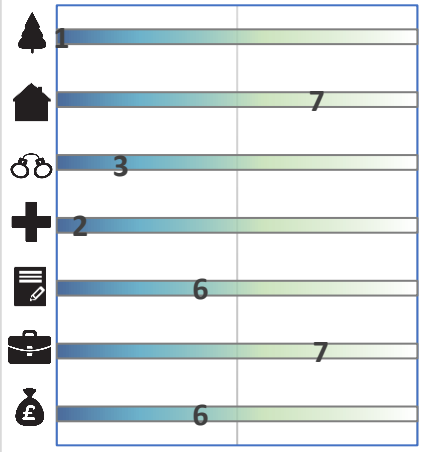


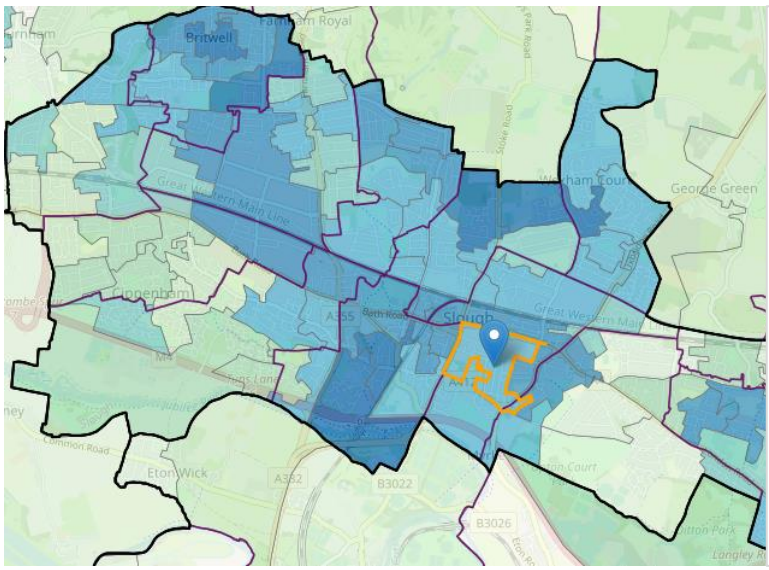
HILLINGDON 027B



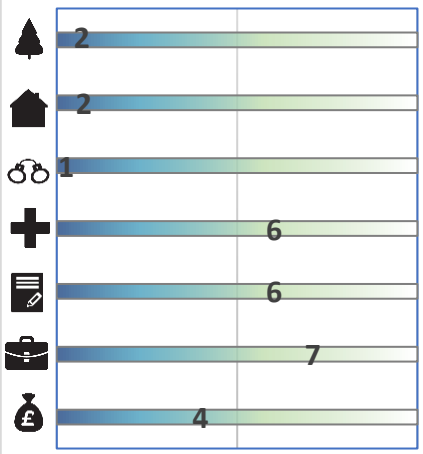


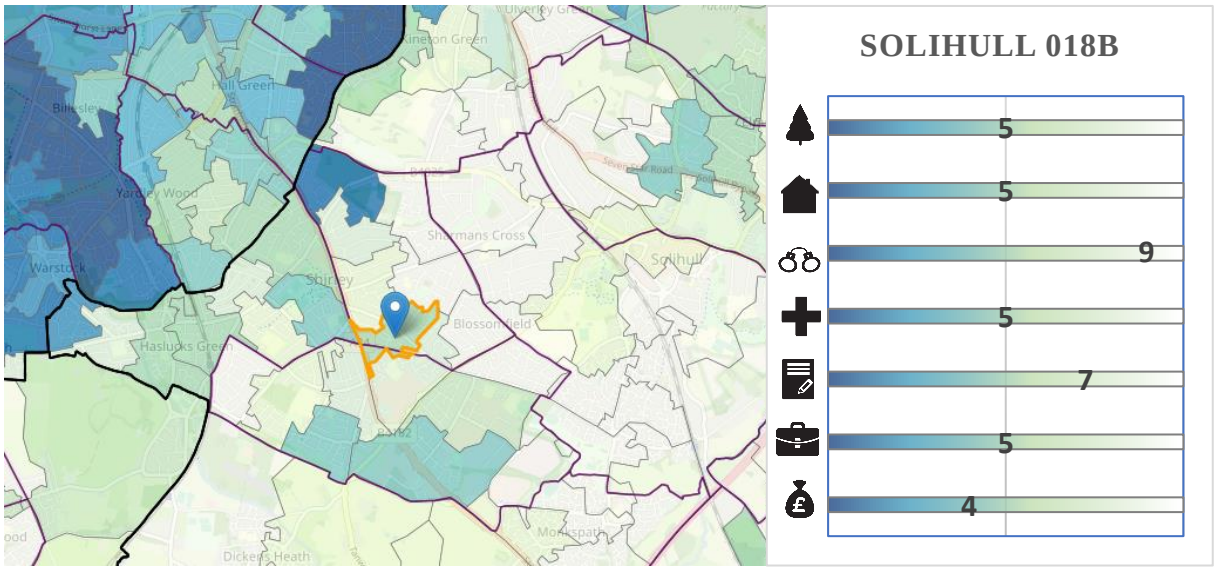
LANCASTER 014E

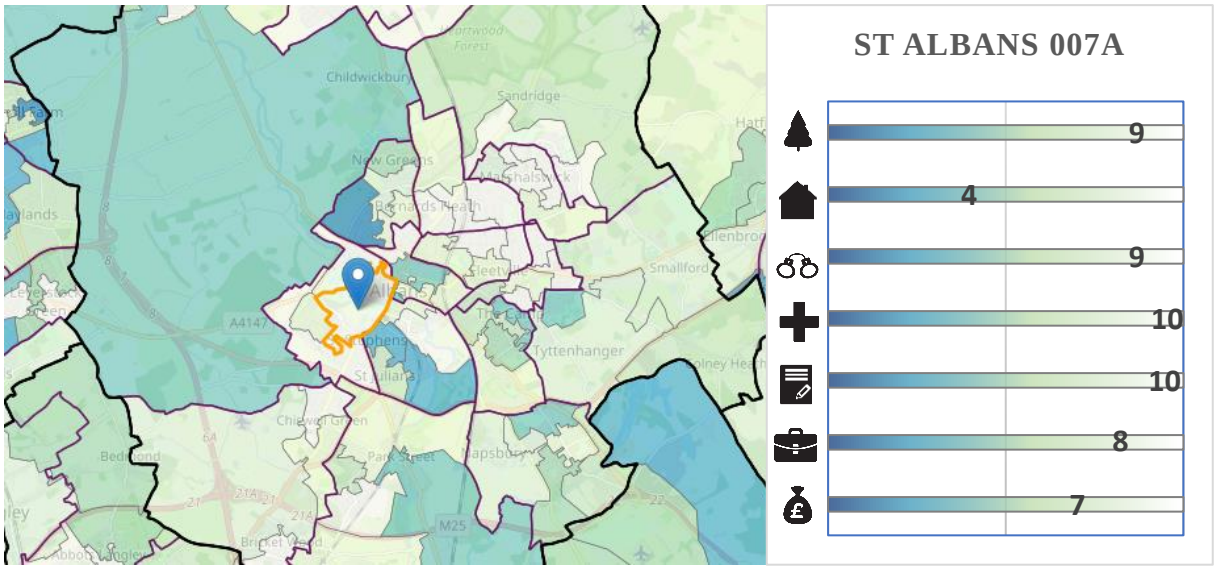


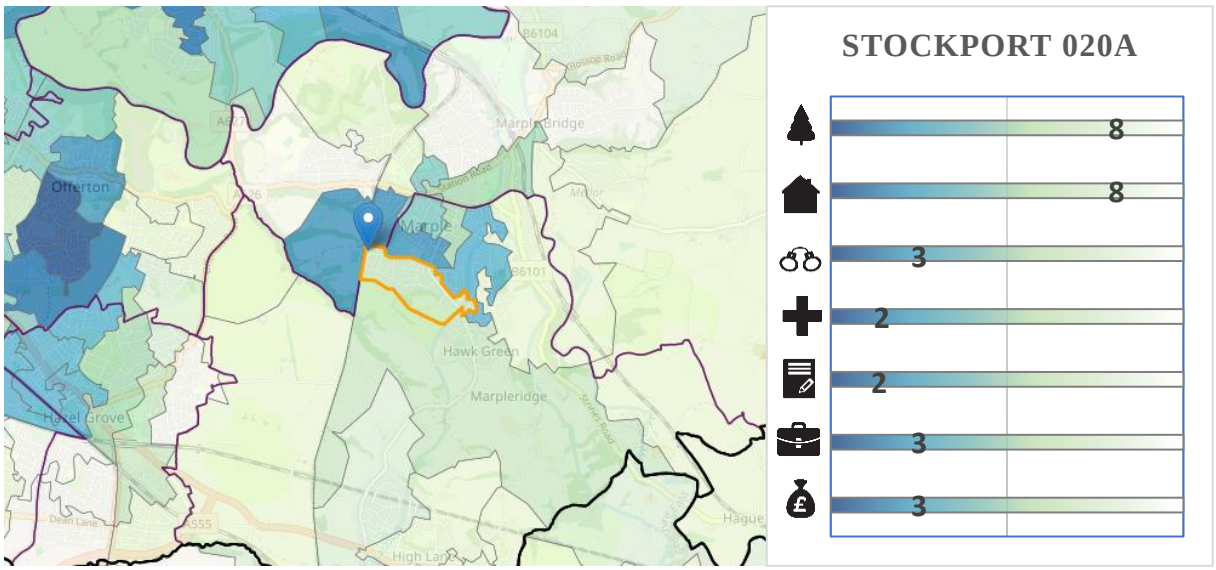


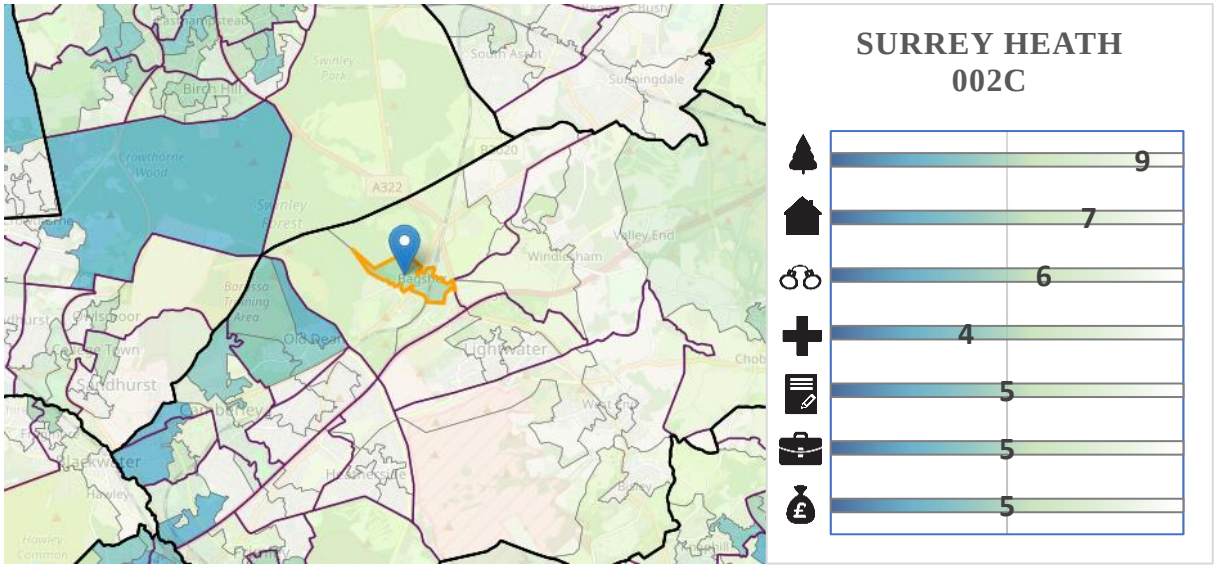
SLOUGH 011B

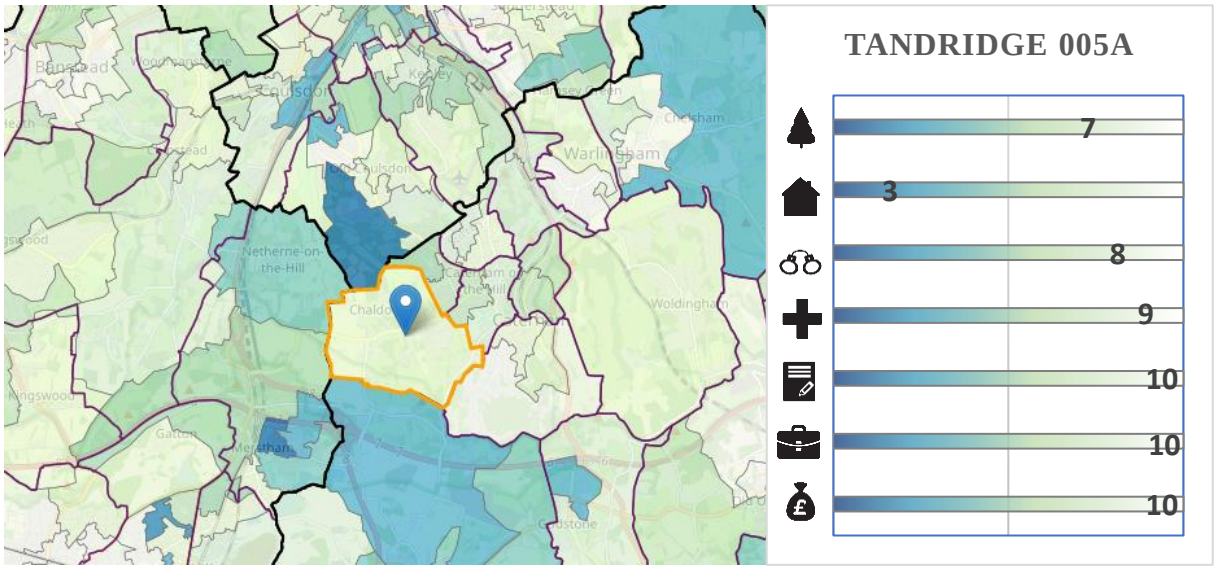



SOLIHULL 018B
5
5
9
5
7
5
4


ST ALBANS 007A
9
4
9
10
10
8
7


STOCKPORT 020A
8
8
3
2
2
3
3


SURREY HEATH
002C
9
7
6
4
5
5
5


TANDRIDGE 005A
7
3
8
9
10
10
10

Appendix 6

Table 6A. Herfindahl-Hirschman Index (HHI).

2011 super output area - lower layer	Barnet 014A	Bromsgrove 007B	Bury 026E	Camden 028C	City of London 001F	East Devon 012C	Hackney 026A	Islington 023A
Proportion of women: All websites	52.19%	49.80%	47.41%	28.91%	36.66%	53.69%	46.99%	36.56%
Proportion of women: Active websites	52.19%	**49.81%**	47.41%	**29.12%**	*36.55%*	**53.71%**	**47.03%**	*36.53%*
Indices of Multiple Deprivation	**10**	5	5	5	**7**	**9**	3	3
1: Agriculture, forestry & fishing (A)	0	0	0	0	0	0	0	0
2: Mining, quarrying & utilities (B,D and E)	0	0	0	14	0	0	0	0
3: Manufacturing (C)	0	0	0	4	0	1	9	4
4: Construction (F)	32	19	11	5	4	**1739**	25	53
5: Motor trades (Part G)	0	0	0	0	0	6	1	0
6: Wholesale (Part G)	8	0	8	7	1	11	6	10
7: Retail (Part G)	2	61	193	7	2	18	16	17
8: Transport & storage (inc postal) (H)	0	19	9	1	1	69	9	13
9: Accommodation & food services (I)	8	123	123	31	22	3	25	13
10: Information & communication (J)	32	16	8	279	119	6	400	331
11: Financial & insurance (K)	0	0	4	4	**1918**	0	2	3
12: Property (L)	32	0	123	5	3	0	4	3
13: Professional, scientific & technical (M)	204	5	69	342	306	1	*506*	331
14: Business administration & support services (N)	130	1	69	279	114	3	225	185
15: Public administration & defence (O)	0	0	0	1	1	0	36	0
16: Education (P)	***818***	**2500**	***773***	123	0	279	6	13
17: Health (Q)	166	31	69	3	1	156	9	331
18: Arts, entertainment, recreation & other services (R,S,T and U)	8	31	5	42	3	3	36	7

Note: Scores above **1000** in **bold**; scores between ***750*** but less than 1000 in ***bold italics***; scores above *500* but below 750 in *italics*.