Remote working – spatial implications in Wales

Report commissioned by the Welsh Parliament

Dr Darja Reuschke
Associate Professor
School of Geography and Environmental Science,
University of Southampton
University Road
Southampton SO17 1BJ
Email: d.reuschke@soton.ac.uk

Prof Nick Clifton
Cardiff Metropolitan University
Cardiff School of Management
Western Avenue, Llandaff
Cardiff CF5 2YB
Email: nclifton@cardiffmet.ac.uk

Dr Jed Long
Western University
Department of Geography
1151 Richmond St
London, Ontario
N6A 3K7
Canada
Email: jed.long@uwo.ca

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Executive summary

The collated evidence in this report provides a basis for understanding the spatial implications of homeworking and the potential for local coworking (working in shared workspaces) and the promotion of community working hubs. Findings are drawn from a number of rapidly available data sources in January 2021. These suggest that Wales will be well-placed to respond to an increase in homeworking through the promotion of local coworking as a means to provide alternative flexible working spaces for workers who partly or mainly work from home if the pre-COVID-19 coworking infrastructure can be maintained in the current economic situation and further adapted for the use of employees (i.e. those who are not entrepreneurs and/or mobile professional workers who were previously targeted by coworking spaces).

- All local authorities in Wales, both in urban and rural areas, had lower homeworking rates pre-COVID-19 than in most English local authorities. Mainly working from home has substantially increased during the pandemic in Wales in both urban and rural areas. Proportionately more people who are new to mainly working from home in rural areas than urban areas in Wales wish to continue with this workstyle in post-COVID-19 times when distancing measures are not in place anymore.
- Wales had a good coworking infrastructure pre-COVID-19 including in rural areas thanks to small independent and member co-operative space providers. Bigger commercial coworking chains were less prevalent. Based on estimates of the spatial patterns of homeworking preferences and the suitability of jobs that can be done from home, an increased demand in coworking post-COVID-19 is predicted for Ceredigion and Denbighshire as well as for Swansea.
- Small independent coworking spaces have been particularly hard hit by COVID-19 mitigation measures. There is the risk that small providers in low density areas have to close for good. These businesses require support with their fixed costs in order to maintain their business activities. In return, through flexible user schemes coworking space providers can support flexible access to desk and meeting space and digital infrastructure for an increasingly diverse remote working workforce.
- Employees, including in administration and government, could be encouraged to work in coworking spaces when no mitigation measures are in place through voucher

schemes as part of organisational staff support packages of flexible working. The City of Milan has implemented such people-focused schemes successfully in the past.

- Building a community of local remote workers may also help to mitigate negative impact of working mainly from home for individual workers such as the feeling of social isolation. Informal coworking groups or 'pop-up' coworking in under-used communal spaces could be promoted for this purpose.

- Homeworking will decrease congestion and have transport benefits through people avoiding peak travel times and reduced commutes. However, people's overall travel may not significantly decrease if service infrastructure is not responding to spatial changes in daytime population. Equally, planning needs to provide attractive cycling and walking infrastructure in residential areas to exploit the increase of remote working for boosting active travel and to this end the health and wellbeing of people.

Background and introduction

This report has been prepared for the Senedd's Economy, Infrastructure and Skills (EIS) Committee which is undertaking an inquiry into remote working. Against the background that the Welsh Government has set out a long-term ambition for 30% of the workforce in Wales to work remotely on a regular basis, the EIS Committee has sought evidence on the potential economic and social impacts (both positive and negative) of increased remote working on town and city centres across Wales.

This report has been commissioned to specifically explore options for a network of remote working hubs in towns and communities across Wales. The report therefore focusses on the spatial patterns of homeworking and coworking (working in collaborative workspaces) in Wales pre-COVID-19 and on the potential patterns in the future.

Data were rapidly compiled for this report in January 2021 based on data that were readily available to the researchers. This report covers homeworking and coworking trends for local authorities and small areas in Wales. Previous trends are investigated and the extent of the ability of jobs that can be done from home estimated at the level of local authorities. A detailed database is used to locate coworking spaces across Wales. The homeworking and coworking trends are compared and small areas with a possible increase in demand in coworking spaces or work hubs identified.

Ability to work from home

Occupation-based measures have been developed to estimate the ability to work from home for local areas and national economies (Dingel and Neiman, 2020). Importantly, these measures have been developed to estimate how local, regional and national economies can absorb an economic shock caused by a pandemic. The Office for National Statistics (ONS) have adapted newly derived US-based measures for the UK to estimate the suitability of jobs to be done from home on the basis of the Standard Occupational Classification (SOC) 2010. The ONS ability to work from home index is a compound measure that considers the extent to which jobs require to be done in certain physical locations, face-to-face, with the use of physical activity, tools and protective equipment as well as the exposure to occupational hazards.[1] The values of the ONS index range from 0.04 (actuaries, economists and statisticians) to 4.3 for fire service officers. The first jobs have the highest likelihood to be done from home. The latter have the lowest.

For the purpose of this report, Census of Population 2011 microdata are used in order to derive scores of the ability to work from home for the resident population by Grouped Local Authorities across the whole of England and Wales for 2-digit SOC categories. We apply the ONS ability to work from home index which is based on 4-digit SOC categories to 2-digit SOC groups using average values to aggregate 4-digit SOC categories. Notably, within these aggregated occupational groups, the ability to work from home varies. For example, financial managers and directors have one of the highest likelihoods to do their work from home on the ONS ability to homework score (0.51) but production managers and directors in manufacturing have a significantly lower chance to work from home on this score (2.27). The derived values for local authorities are therefore estimates.

On average, jobs are slightly less amendable for homeworking in Wales than in England (Table 1). **Within Wales, the picture that emerges is that cities have residents with jobs most amendable to homeworking, followed by rural areas and the former coalmining valleys and industrial localities having residents with jobs that are least amendable for homeworking.** The relatively high score for Wrexham (i.e. relatively low potential for

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[1]

https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichjobscanbedonefromhome/2020-07-21

homeworking), although a large market town with good accessibility to jobs/firms of a wider area, reflects its industrial past.

The homeworking score of Cardiff, indicating the greatest potential for homeworking jobs in Wales, is similar to the English local authorities Bath, Ealing and Cheltenham. Its score is, however, lower than in Warwick, Reading or Basingstoke. To provide some more context, the lowest scores, i.e. greatest ability to work from home, can be found in London boroughs. Caerphilly, Blaenau Gwent and Merthyr Tydfil combined have one of the lowest suitability of jobs for homeworking in the whole of England and Wales, lower than in some other formerly industrialised local authorities in England.[2]

Table 1. Ability to work from home scores by Welsh Grouped Local Authorities, resident population

Grouped Local Authorities, Wales	Ability to work from home scores
Cardiff	1.752
The Vale of Glamorgan	1.794
Newport	1.874
Swansea	1.878
Conwy and Denbighshire	1.918
Torfaen and Monmouthshire	1.931
Flintshire	1.937
Ceredigion and Pembrokeshire	1.952
Bridgend	1.960
Isle of Anglesey and Gwynedd	1.965
Powys	1.992
Carmarthenshire	1.993
Wrexham	2.000
Rhondda Cynon Taff	2.014
Neath Port Talbot	2.020
Caerphilly, Blaenau Gwent, Merthyr Tydfil	2.024
Wales (average)	**1.932**
England (average)	**1.841**

Note: Ordered by values for Welsh Grouped Local Authorities. The lower the value, the higher the ability to work from home.
Data Source: Authors own calculation based on SOC 2-digit data taken from the Census 2011 for Grouped Local Authorities and the ONS work from home scores:
https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichjobscanbedonefromhome/2020-07-21

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[2] Kensington with 1.512 has the lowest score of all Local Authorities in England and Wales.

While the ONS occupational-based measure of the ability to work from home is a useful measure of labour supply in the COVID-19 pandemic and hence a predictor of resilience, it has to be noted, however, that the measure does not consider other factors of workers' ability to work from home, for example whether people have a spare room to be used as 'home office'.

Homeworking patterns pre-COVID-19

While the ability to work from home of the residential working population based on the ONS occupational measure is highest in cities and the Cardiff local authority in particular, the rate of mainly working from home in the working population before the outbreak of the Coronavirus pandemic was *lowest* in cities and urban areas. Figure 1 shows for small areas (MSOAs)[3] the proportion of the resident working population who mainly worked from home. Data are taken from the Census of Population 2011. With the exception of some small areas in the West of London, urban areas had relatively low homeworking rates, overwhelmingly between 5% to below 10% of their resident working population. Homeworking rates of the residential working population were highest in rural areas (ca. 20% and above of the resident working population).

Figure 1 further shows that within metropolitan/urban areas, homeworking rates were still lower in central parts (up to 10% of the resident working population) and higher in outer areas (between 10-20% of the resident working population) – the extended commuter belt. More than half of the variation in homeworking rates in Britain pre-COVID-19 was due to the settlement structure (see Appendix 1). In the UK on average, just above 10% of employees were mainly working from home in rural villages but only less than 5% of employees were mainly working from home in urban conurbations, cities and towns in England and Wales.

The Welsh urban-rural pattern is overall in line with the British pre-COVID-19 homeworking patterns of higher homeworking rates in rural areas and lower rates in urban areas. In urban areas, however, the proportion of homeworkers who were employees was higher than in rural areas while homeworking in rural areas was disproportionately a workstyle of the self-employed (Table 2). In counts, still, Cardiff had one of the highest numbers of homeworkers across Welsh local authorities (Table 2).

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[3] MSOAs capture between 5,000 to 15,000 people and 2,000 to 6,000 households.

Figure 1. Mainly homeworking in Great Britain 2011, 16-74 years old excluding full-time students, MSOAs
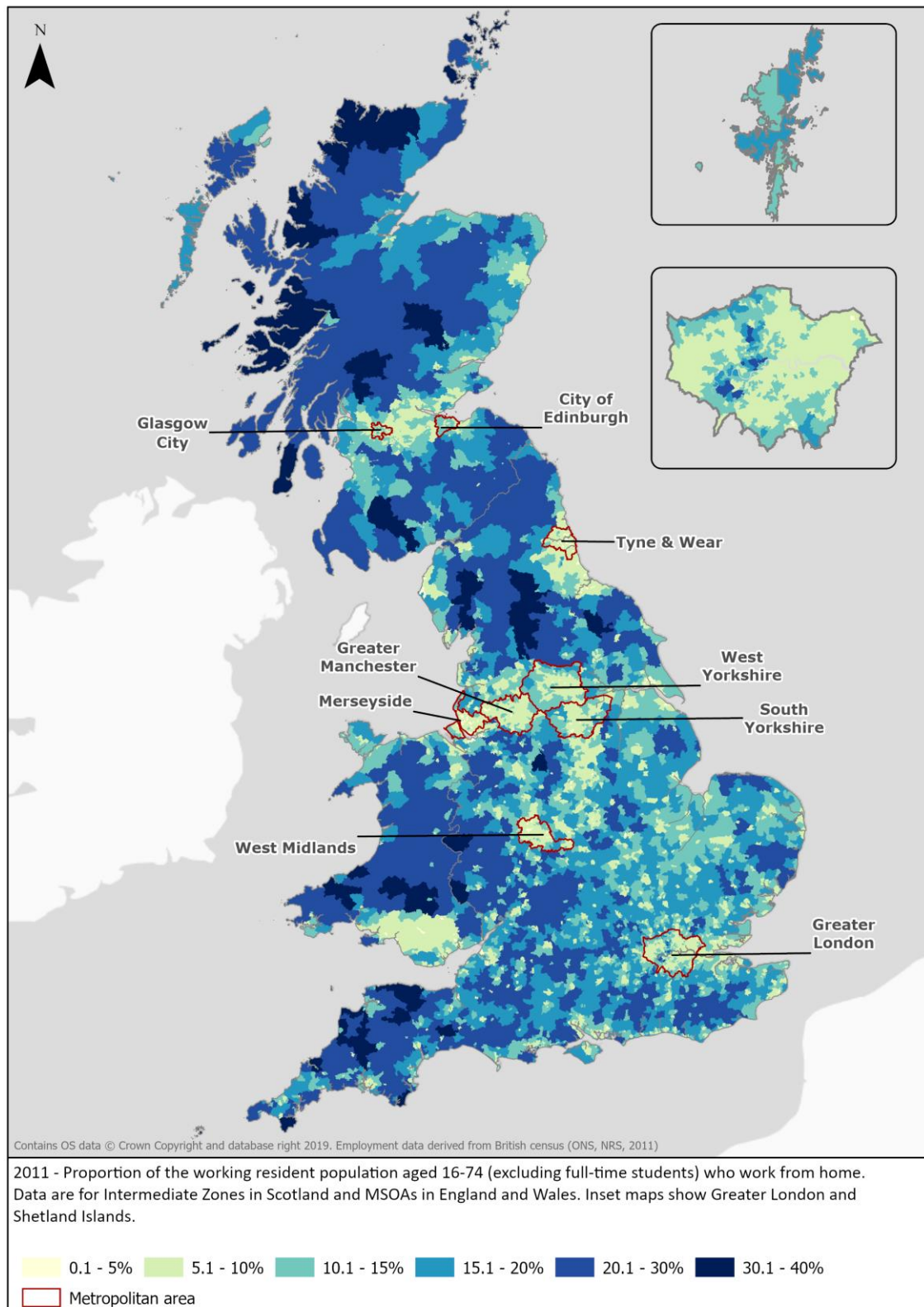
Source: ERC WORKANDHOME project, map produced by Andrew Sutton (Geodata, University of Southampton)

Table 2. Mainly working from home by employment status 2011, 16-74-years old excluding full-time students, absolute numbers and percentage share of employees

	Employees	Self-employed	Total homeworkers	% Employees
Blaenau Gwent	758	893	1,651	45.9%
Bridgend	2,334	2,483	4,817	48.5%
Caerphilly	2,494	2,816	5,310	47.0%
Cardiff	5,400	6,300	11,700	46.2%
Carmarthenshire	3,772	8,068	11,840	31.9%
Ceredigion	1,808	5,015	6,823	26.5%
Conwy	2,458	4,389	6,847	35.9%
Denbighshire	1,914	3,272	5,186	36.9%
Flintshire	2,766	3,793	6,559	42.2%
Gwynedd	2,981	5,681	8,662	34.4%
Isle of Anglesey	1,393	2,695	4,088	34.1%
Merthyr Tydfil	840	829	1,669	50.3%
Monmouthshire	2,593	4,162	6,755	38.4%
Neath Port Talbot	1,833	2,263	4,096	44.8%
Newport	2,199	2,467	4,666	47.1%
Pembrokeshire	3,105	6,486	9,591	32.4%
Powys	3,956	10,145	14,101	28.1%
Rhondda Cynon Taff	3,111	3,586	6,697	46.5%
Swansea	3,601	4,580	8,181	44.0%
Torfaen	2,509	3,374	5,883	42.6%
Vale of Glamorgan	1,223	1,354	2,577	47.5%
Wrexham	2,181	3,146	5,327	40.9%
TOTAL Wales	55,229	87,797	143,026	38.6%

Source: Census of Population, Table CT0672_2011, MSOA data were aggregated for local authorities, own compilation

In total in 2011, ca. 10% or ca. 143,000 workers in Wales worked mainly from home.[4] However, the homeworking rate in Wales was disproportionately low pre-COVID-19 relative to its settlement structure. Wales was in this respect similar to the North East of England (see Appendix 1). In 2011, 4.87% of employees worked mainly from home in Wales. This proportion was similar to London (4.88%) but substantially lower than in South East and West England (6.52% and 6.36% respectively).

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[4] Census Table CT0672_2011:
https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemploye
etypes/adhocs/007562ct06722011censusagebyplaceofworkbyeconomicactivitybysexmsoasin
englandandwales

At the level of MSOAs, the highest homeworking rates, as proportion of the working resident population who worked mainly from home, in Wales pre-COVID-19 were in rural Carmarthenshire. Pre-COVID-19 in Wales, high homeworking rates were therefore positively associated with older age groups (proportions of resident working population 50-59 and 60-64-years-old). Within cities and towns, homeworking rates among the resident working population in Wales were lowest in some parts of Wrexham and Newport. The highest homeworking rates in urban areas (cities and towns) were in some small areas in Conwy, Monmouthshire, Denbighshire and Swansea – notably these are all small areas that are not located in the Capital City of Cardiff and the Vale of Glamorgan whose working population works on average in jobs that are more suited for homeworking than in other local areas (Table 1).

Overall, the analysis suggests that particularly **in residential areas in Cardiff and the adjacent Vale of Glamorgan locality the gap between potential and actual homeworking was highest in Wales.**

Estimated trends in homeworking

We can investigate further the spatial patterns during the COVID-19 pandemic using the Understanding Society COVID-19 Study (Institute for Social and Economic Research, 2020). This dataset allows us to estimate the rise in homeworking for urban versus rural areas although we cannot further disaggregate the data by local authorities due to its sample size. We use the June 2020 survey round of this Study, when the first national lockdown was still in place. This survey captures whether people wanted to continue working from home post-COVID-19 and how often. This allows further exploration of possible spatial differences in future homeworking preferences. Importantly, workers may be able to do all or most of their job tasks from home (as measured by occupational-based indices of the suitability of jobs to be done from home) but people might not want to work from home for various reasons.

We identify as homeworkers, in conjunction with our previous analysis, those who work mainly from home (always or often). These are also the workers who may have the greatest need for local social interactions because of their work routine or the social isolation often associated with working often or always from home. Figures presented in Table 3 have a population weight applied in order to make inferences from the sample to the population. However, the number of respondents who live in Wales is relatively small in the dataset and

therefore findings need to be interpreted with caution. In Table 3, those who are new to mainly homeworking could be identified through using information on their homeworking status (always, often, sometimes, never) in January/February 2020, i.e. before the Coronavirus outbreak, and during the first national lockdown in June 2020.

Two types of new homeworkers who did not work at all from home before the pandemic but always or often during the pandemic are derived by whether they want to continue working mainly from home in a post-COVID-19 world. Adding up rows 1 and 2 in Table 3 gives the proportion of new homeworkers (always or often) in June 2020. These are compared with 'established' homeworkers who worked always or often before and during the pandemic. The 'others' category in Table 3 collapses all workers who worked only sometimes or not at all from home in June 2020.

Table 3. Homeworker types by urban versus rural residential location in Wales, England and UK, column percentages, rounded

Homeworker types	Wales		England		UK	
	urban	rural	urban	rural	urban	rural
New to working mainly from home & wants to continue working mainly from home	11%	15%	15%	12%	15%	12%
New to working mainly from home & wants to work from home less often or not at all	14%	12%	14%	12%	15%	12%
Established in working mainly from home	6%	13%	9%	11%	8%	11%
Others	69%	61%	62%	65%	62%	65%

Note: Understanding Society COVID-19 Study, June survey. Weighted data. N=6,341 (UK), thereof n=359 respondents living in Wales and 5,004 in England.
Source: Own compilation.

Overall in the UK, the increase in working mainly from home (in June 2020) has been higher in urban areas than in rural areas (Table 3) as could have been expected from the spatial patterns of mainly homeworking pre-COVID-19 and of jobs that can be done from home outlined earlier. However, **it is noticeable that in contrast to the UK trend in Wales the rise in mainly working from home was slightly higher in rural areas**. Table 3 further suggests that workers who were new to mainly working from home in urban areas in Wales tend to have a greater preference for less or no homeworking than in urban areas on average elsewhere in the UK. Instead, **proportionately more people who are new to mainly working from home in rural areas in Wales wish to continue with this workstyle in post-COVID-19 times when distancing measures are not in place anymore**.

The Understanding Society COVID-19 data further confirm the relatively low prevalence of mainly working from home pre-COVID-19 in urban areas in Wales. Based on our results, mainly working from home could rise in Wales in urban areas from 5-6% pre-COVID-19 to an estimated level of ca. 15-17% post-COVID-19 if workers can enact on their homeworking preferences. This potential increase is further supported by the finding that jobs of urban residents are on average more suitable for working from home (Table 1).

Homeworking was on a high level in rural Wales pre-COVID-19 and here those who started mainly working from home during the pandemic are also more likely than those in urban areas to wanting to continue working in this way. We may therefore see a rise of homeworking in rural Wales to an estimated level of ca. 26-28% post-COVID-19. The homeworking rate may therefore remain lower than the UK average in urban areas but may increase to a higher level than in some other rural areas in England and elsewhere.

Coworking futures

Coworking is a broad term for a phenomenon that has been rapidly expanding in the years before the Coronavirus outbreak ─ that of independent professionals working in shared, collaborative workspaces (Clifton et al., 2019). Underlying the coworking trend is that professionals, who otherwise work from home, seek shared working spaces and environments as a means to meet 'like-minded' people in order to learn from them and to get help with their work and to combat social isolation. This rise in commercial coworking spaces before the Coronavirus pandemic is partly due to their emphasis on community, productivity, collaboration and creativity but also the influence of cost and convenience.

The increasing popularity of coworking has been reinforced by large numbers of professionals leaving the regular workforce (either by choice or otherwise) in the wake of the financial crisis, and by the increased prevalence of location-independent knowledge-work and the mobile digital technologies which facilitate it. The broader context for these developments is the growth of the knowledge/creative economy that requires high levels of face-to-face interaction in order to maintain effective exchange relationships including, for example, being in the right networks, knowing the right people and so on.

Access to coworking spaces has become more relevant for an increasing part of the workforce with the rise in freelancing, remote working and entrepreneurship. One of the earliest types of

coworking were informal groups that organised work sessions in their own homes in New York City ─ so-called Jellies (Waters-Lynch et al., 2016). Increasingly, coworking has become more commercialised through for-profit space providers including coworking chains such as *WeWork*. Self-organised groups and the Jellies still exit (Reuschke, Clifton and Fisher, 2021). Jelly coworking groups meet in a variety of places including in cafés or community centres (Reuschke and Domecka, 2016). With the commercialisation of coworking, remote working employees have also been attracted to coworking facilities (Clifton et al., 2019). **With now more people working from home than ever before and possibly also in the future when distancing measures are relaxed (Felstead and Reuschke, 2020), coworking facilities may become more important as a means to connect with people – socially and professionally – and as a temporary workplace besides the home office and the employer-based workplace**.

Large employers in central city locations that now have large proportions of their employees working from home, may also adapt their office space and location in response to the Coronavirus pandemic as anecdotal evidence suggests. Organisations may locate their offices out of high-rent-areas into areas closer to where their employees live. Alternatively, they may also downside *in situ* and 'buy-in' meeting and workspaces through coworking facilities close to where their employees live.

Coworking trends in Wales before the COVID-19 pandemic

In this section, we provide insights into coworking patterns in Wales before the Coronavirus outbreak. We draw on a database of coworking spaces in Great Britain identified using web search in 2018/2019. A total of 856 coworking spaces are in this database. We included chains, independent coworking spaces and not-for-profit/member co-operative coworking spaces. In addition, we identified self-organised coworking groups using the Jelly coworking network[5]. We identified 182 informal 'Jelly' coworking groups in Britain.

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[5] http://www.uk-jelly.org.uk/

Figure 2. Coworking types in Britain, 2018/2019
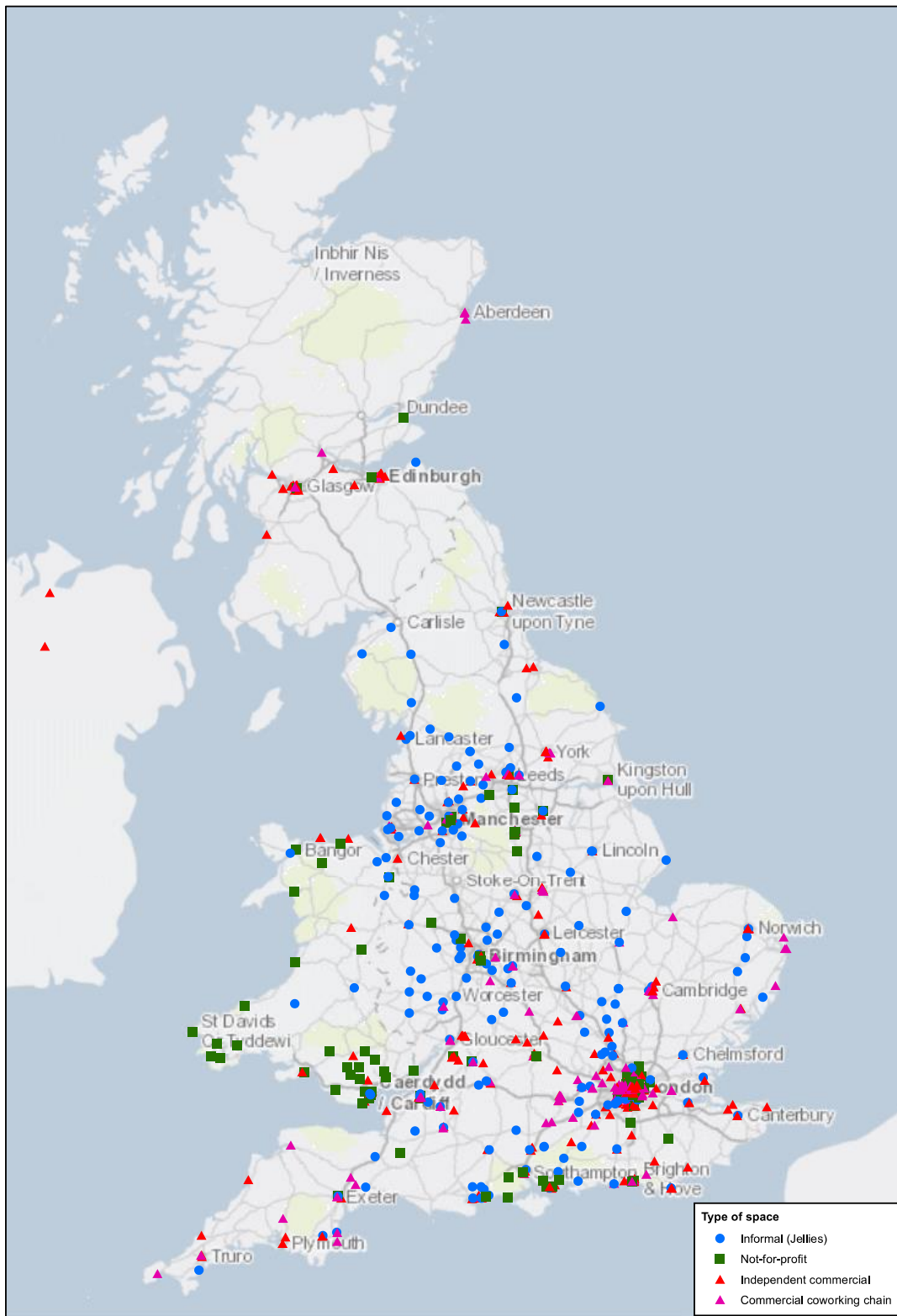
Service Layer Credits: Contains OS data © Crown Copyright and database right 2018   G:\LiveData\UC1473_WorkAndHome\MapDocs\CoworkerLocations\CoworkerLocations_Britain_Class.mxd

Source: ERC WORKANDHOME project, map produced by Julia Branson (GeoData, University of Southampton)

Figure 2 shows the location of different types of coworking facilities including informal 'Jelly' coworking groups in Britain. **The spatial concentration of coworking spaces was high in major conurbations and urban cities and towns outside of conurbations**. Further, a very high proportion was concentrated in London. Informal coworking groups (Jellies) were also concentrated in major conurbations and cities and towns outside of conurbations, however, their concentration was highest in cities and towns and second highest in major conurbations.

Wales had a relative high count of coworking spaces per capita compared to English regions in 2018/19. Based on our coworking space database, Wales had approximately 0.31 coworking spaces per 1,000 residents. This is similar to Yorkshire and the Humber (0.32) but substantially higher than the North East and North West of England (0.06 and 0.17 respectively). London had by far the highest count of coworking spaces per 1,000 residents (1.29).

Within Wales, coworking facilities were concentrated in Cardiff and in other urban areas – that are areas were workers with jobs suitable for homeworking are most likely to live in Wales. The highest count per 1,000 residents is in Cardiff (ca. 1.2) followed by Pembrokeshire (0.89) and the Vale of Glamorgan (ca. 0.71). Wales had only very few chain coworking spaces (which may be more resilient to the COVID-19 crisis). Barclays Eagle Labs (Cardiff)[6] is one coworking chain present in Cardiff. However, it specialises in the support of entrepreneurs and not for the wider homeworking public.

What is further distinct in Wales is the role not-for-profit/co-operative coworking spaces play for the supply in coworking facilities including in rural areas and the valleys in spatial proximity to Cardiff. The database contains n=65 not-for-profit or co-operative coworking spaces across Great Britain. A large proportion of these were located in Wales (26% or n=17). The count was only higher in London with all other English regions having much lower counts in this coworking space category in our database. Particularly striking is Pembrokeshire which had one of the highest numbers of not-for-profit/co-operative spaces with locations concentrated along the coast. A small number of commercial coworking spaces exist in Wales that are independently run.

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[6] https://labs.uk.barclays

Table 4. Number of coworking facilities and informal networks 2018/19 by local authorities in Wales

Local authority	Coworking space facility	Jelly
Blaenau Gwent	2	0
Bridgend	1	0
Caerphilly	1	0
Cardiff	14	2
Carmarthenshire	1	0
Ceredigion	3	1
Conwy	4	0
Denbighshire	1	0
Flintshire	0	2
Gwynedd	2	1
Isle of Anglesey	0	0
Merthyr Tydfil	2	0
Monmouthshire	1	0
Neath Port Talbot	1	0
Newport	1	0
Pembrokeshire	6	0
Powys	2	1
Rhondda Cynon Taff	3	0
Swansea	3	0
Torfaen	1	0
Vale of Glamorgan	5	0
Wrexham	1	1

Source: Database of coworking spaces and networks of the ERC WORKANDHOME project compiled by GeoData (University of Southampton)

Table 4 displays the aggregate supply in coworking spaces (commercial chains, commercial independent providers and not-for-profit providers/member co-operatives) and additional self-organised coworking groups (Jellies) in Wales by local authorities pre-COVID-19 (in 2018/2019). There was only one local authority in Wales without any coworking facilities: Isle of Anglesey; a rural area with a residential working population whose jobs are less suitable for homeworking than in the more urban local authorities (Table 1).

We further explore the accessibility to coworking spaces of smaller areas (MSOAs) within local authorities. Specifically, we use the average car/road-based travel times of an MSOA (between 5,000 to 15,000 people and 2,000 to 6,000 households) to the nearest coworking space (chain, independent commercial or not-for-profit/co-operative together). We used Google to estimate drive times between the centroid (geometric centre) of the MSOA and the precise address (longitude/latitude) of coworking spaces. This is a more accurate measure of

distance than a straight-line. Roads are well captured by Google which is why we selected drive time (rather than walking or cycling) as a proxy of accessibility. Figure 3 shows the travel time to the nearest coworking space from all MSOAs in Wales and England pre-COVID-19. Table 5 shows more specifically the accessibility to coworking facilities for each local authority in Wales (minimum, maximum and mean drive times to the nearest coworking space). We report drive times instead of drive distance to make the accessibility of places within urban and rural areas better comparable (e.g. congestions in urban areas).

Figure 3. Drive time to nearest coworking space, 2018/19
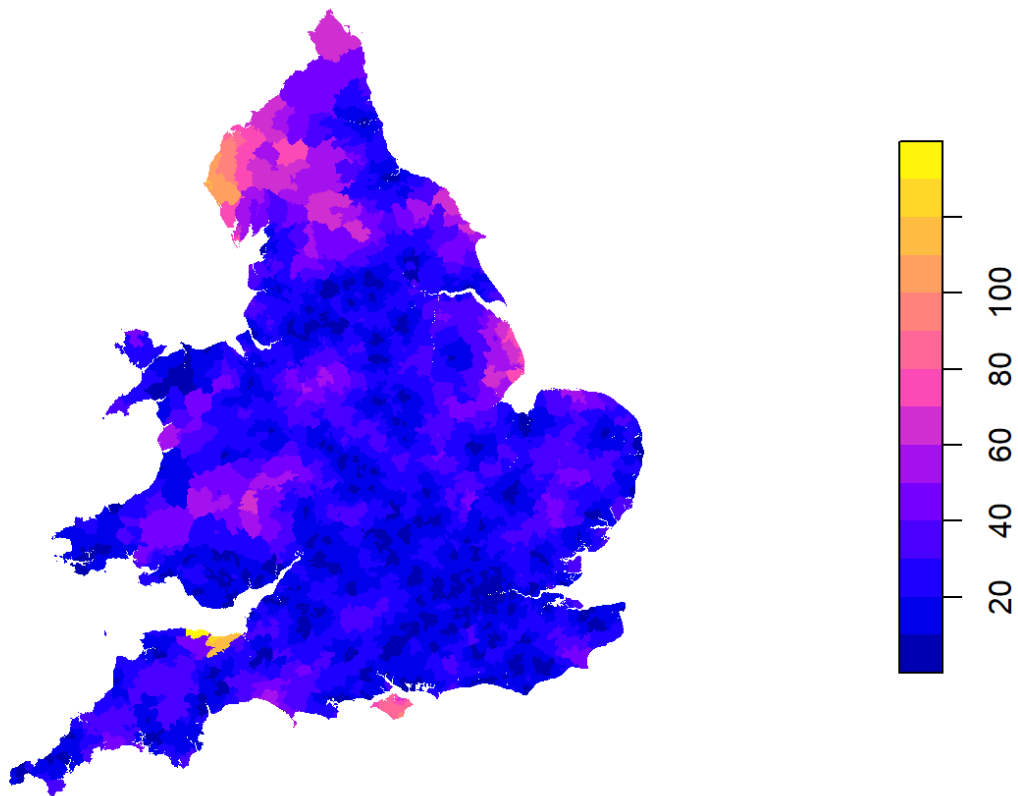
Source: ERC WORKANDHOME project database compiled by GeoData (University of Southampton), map produced by Jed Long (Western University, Canada)

The accessibility of coworking spaces was highest in some parts of Conwy thanks to not-for-profit/co-operative space providers. Pembrokeshire had an overall very good accessibility to coworking facilities particularly along the coast, here, also due to not-for-profit/co-operative space providers. Urban areas around Cardiff, The Vale of Glamorgan and Newport as well as adjacent areas including the valleys (Rhondda Cynon Taff, Merthyr Tydfil, Blaenau Gwent and Caerphilly) had a good to very good accessibility to coworking spaces due to a variety of

offers. The accessibility to coworking spaces was lowest in parts of Powys, Gwynedd, Carmarthenshire and Denbighshire.

Table 5. Accessibility of coworking facilities 2018/19 by local authorities in Wales, measured in drive time (min)

Local authority	Minimum drive time	Maximum drive time	Mean drive time
Blaenau Gwent	4	12	7
Bridgend	5	28	14
Caerphilly	4	23	13
Cardiff	2	16	8
Carmarthenshire	19	48	32
Ceredigion	2	38	18
Conwy	1	16	9
Denbighshire	3	40	17
Flintshire	10	32	20
Gwynedd	4	56	23
Isle of Anglesey	12	43	26
Merthyr Tydfil	3	10	7
Monmouthshire	6	32	19
Neath Port Talbot	10	29	18
Newport	3	15	8
Pembrokeshire	3	23	10
Powys	2	53	28
Rhondda Cynon Taff	3	21	11
Swansea	2	24	11
Torfaen	3	19	9
Vale of Glamorgan	2	18	8
Wrexham	3	16	10

Source: ERC WORKANDHOME project database compiled by GeoData (University of Southampton), own compilation

Despite some low accessibility in some rural areas in Wales, compared to other rural areas in England particularly in the North West, rural areas in Wales had still on average a better accessibility to coworking facilities. **The accessibility to coworking facilities in Wales was lowest in Tywyn and Llangelynnin in southern Gwynedd**. Within cities and towns across England and Wales, the accessibility to a coworking space was also better in Wales than England on average.

Everywhere in Merthyr Tydfil, Blaenau Gwent, Conwy, Cardiff and Newport was close to a coworking space (Table 5). **Swansea instead did not in all parts have a good accessibility to coworking facilities.** However, here we predict a concentration of residents with jobs that are suitable for homeworking (Table 1) and which had a relatively high count of homeworking employees compared to other local authorities in Wales in the past (Table 2).

Rural Carmarthenshire, Pembrokeshire and Powys had relatively high counts of homeworking employees compared to other rural areas in Wales in the past (Table 2). Pembrokeshire had a good coworking infrastructure in 2018/19. Carmarthenshire and Powys instead show a lack of coworking facilities – although here the ability of working residents to work from home is not predicted to be high and therefore the homeworking population may not substantially increase here. Instead, it seems more likely that **Ceredigion and Denbighshire may see an increase in their homeworking population** (Table 1) **and hence an increase in demand for coworking facilities** in parts that are currently under-served by existing coworking spaces.

What do Coworking Spaces offer?

What people often report as reasons for why they go to coworking spaces (shared working spaces) and for their choice of specific coworking spaces are: short commutes, technological infrastructure (e.g. printer), reliable internet access, affordable workspace and suitable (quiet, inspiring, social) working environment.[7]

It has to be noted that there are different types of shared working spaces and the reasons why people go to these differ. There are other types of shared workspaces to coworking spaces such as business incubation centres (e.g. Town Sq in Wales) and makerspaces or Fablabs. Makerspaces and FabLabs specialise on the sharing of digital or manufacturing production facilities and to this end on entrepreneurship and innovation.[8] People go to these primarily to learn about new technology or to produce something new. A European-wide report from 2017 showed that the number of makerspaces per capita was low in the UK compared to other EU countries. The report further suggests that within the UK, the number of makerspaces was low (in 2017) in Wales compared to South East England, East of England and the North East of England but similar per capita to the South West, parts of Scotland and the South West (Rosa et al., 2017, p. 20).[9]

There is also a variation among coworking spaces in terms of their offer and target groups. Many spaces offer a mix of meeting and office spaces with attached social spaces for informal networking (e.g. a café or bar). Some coworking spaces function more as start-up centres with

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[7] Based on our own research in Wales and England. See also: Weijs-Perrée et al., 2019; Brown, 2017; Beth, 2011.

[8] See, for example, the Makerspace and FabLap network in the Netherlands and Belgium: https://fablab.nl/european-cooperation-fablabs-and-makerspaces/

[9] In 2020, Fablabs in Wales are located at Bangor University and Cardiff Metropolitan University.

an associated emphasis on innovation and technical infrastructure such as the Barclays Eagle Lab (Cardiff), Welsh ICE in Caerphilly[10] or the TechHub in Swansea[11]. Other coworking spaces focus more on 'community' and therefore have a greater emphasis on the provision of networking facilities and events.

Depending on the business model and management strategy of the coworking space, additional features of the spaces may include training, mentoring schemes and talks (e.g. for business start-ups) or exercise and wellness classes (e.g. yoga). Some coworking spaces have childcare facilities or gyms attached. For example, *PlayPen* in London is a café with coworking facilities and an integrated Ofsted registered crèche.[12] Coworking combined with childcare has developed, for example in London, Bristol and Birmingham, from local projects and initiatives with the aim to combine work with family. While these coworking initiatives are innovative and highlight the different reasons for why people work in collaborative coworking spaces, further investigation is needed to assess the resilience of these projects particularly in the current economic situation.

Important for the wider use of coworking spaces as flexible workspaces and work hubs for an increasing homeworking workforce post-COVID-19, is to consider the openness, fees and terms & conditions of the providers alongside their location. Broadly speaking, commercial coworking space providers have implemented three models: pay as you go, contract and membership for the access to either a hot desk or a dedicated (fixed) desk. Meeting rooms are often available for members at member rates. Some spaces offer their members private offices. Some spaces are more specialised on team work and offer the booking of larger/team desks or rooms.

Contracts and membership conditions vary. Often contracts are monthly rolling but some spaces require a minimum number of contract months. Some spaces offer flexible pay-as-you-go schemes for desk uses. Depending on the provider and fee model, users have set hours for using a hot/fixed desk (e.g. 20 hours per week, 10 days a month) or larger providers also offer unlimited use of their spaces.

Indycube is an important member-owned co-operative with more than 30 spaces in Wales including in Cardiff, Newport, Bangor, Swansea, Pembroke, Aberystwyth, Wrexham and

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[10] https://welshice.org
[11] https://swansea.techhub.com
[12] http://www.playpencowork.com

Rhyl.[13] Users can become members for a small fee (£10) and then choose from three options whereby the prices are the same across Wales[14]:

- Membership with hot desk for 5 days a month (£72)
- Membership with hot desk across all locations, 10 days a month (£120)
- Membership with fixed desk across all locations, monthly (£216)

In addition, *Indycube* offers a flexible pay-as-you-go scheme for non-members for a hot desk, for a daily rate at £14.40. These options partly assume the mobile professional who travels around. While this workstyle has stopped during the pandemic, **the offer of using the same space for 5 days a month and the pay-as-you-go scheme are suitable for workers who want to work once or twice a week away from the office. They may also suit workers who mainly work from home and want to have access to shared working spaces, for example to escape the social isolation in the home or to use office facilities**.

Indycube's strategic focus has been on freelancers and entrepreneurs with special services like invoicing or legal services. To contrast, **there are coworking facilities in Wales that have targeted more broadly people working from home**. The Drum, for example, in Llandudno in Conwy[15], seeks to attract remote workers who work a few days a week away from the office and need a flexible workspace. The flexible use of their spaces is further supported through a pay-as-you-go fee scheme at £12 per day for a hot desk.

International coworking examples and financial support

While many large cities in Europe have provided financial support (e.g. grants) for the development of coworking spaces and makerspaces/FabLabs as a means to boost business start-ups and local economic development, the City of Milan stands out as it has supported the development and usage of coworking spaces in various innovative ways. First, the city has identified spaces across the locality that could potentially be used for coworking. Second, it has provided co-funding to develop spaces identified in a survey as suitable for coworking. These suitable coworking spaces are considered as 'accredited' co-

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[13] https://www.indycube.community
[14] Prices as of 2019.
[15] http://www.16trinity.co.uk/drum-coworking-hotdesking-16-trinity

working spaces. Third, it has provided individual workers with vouchers (of up to 1,500 Euros) to work in 'accredited' coworking spaces[16]. The city has also offered the coworking vouchers to civil servants.

There is the concern in the City Council of Milan that many coworking spaces may not survive the COVID-19 mitigation measures, and it is therefore considering special financial support for some existing 'accredited' spaces. The city is also scoping the availability of decentralised municipal premises that could be reused as shared working spaces for civil servants as a means to promote working close to the home. This may be particularly beneficial for women who have consistently internationally shorter commutes than men and which was found to hamper their employment careers (Reuschke and Houston, 2020).

We found examples such as Milan or Paris which financially supported investment in coworking spaces. Bristol is an example where the City Council set up its own coworking space in partnership with the University of Bristol and the West of England Local Enterprise Partnership.[17] Here, the coworking space is part of a wider project (Engine Shed) alongside event facilities and office space.

In locations where the density of potential coworkers/remote workers is low and therefore the distance to commercial coworking spaces longer, **'pop-up' coworking and informal coworking groups could be a means to support local coworking and the development of a community of professional coworkers.** The feeling of being part of a community of coworkers has often been reported as important reason for why people engage in coworking. In the future, this may help remote workers to overcome negative aspects of mainly working from home (e.g. social isolation). Informal or pop-up coworking could be supported by local authorities, for example, through the provision of space in **communal infrastructure such as libraries or community centres** (Reuschke and Domecka, 2018).

Homeworking and transportation

Remote working reduces commutes. It also gives people the flexibility to commute more flexibly over the course of the day, i.e. outside of peak hours. Importantly for transportation, therefore, an increase in remote working, even if people still work mostly in their offices and

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[16] http://workandhome.ac.uk/wp-content/uploads/sites/233/2017/10/Lucia-Scopelliti_presentation_OECD.pdf
[17] https://engine-shed.co.uk

only sometimes (e.g. one day per week) from home will ease traffic congestions (Hopkins, 2020).

With more people working from home, people may adopt more local lifestyles including taking up more active travel (e.g. walking and cycling). However, flexible remote working with going sometimes to the office also gives people the chance to live further away from their office-based workplace, i.e. in usually more congested places with higher house prices and less children-friendly environments. An increase in remote working is therefore also likely to increase out-migration of urban/dense environments and lead to longer (but fewer) commutes between cities/employment centres and their hinterland (Reuschke, 2021).

While **urban transport systems will benefit from fewer commutes and the temporal changes of commutes, people may not be able to reduce their overall travel if planning does not adapt to the shift of daytime population from city/employment centres to residential areas and to the increase in demand for food and other retail, leisure and other personal services in residential areas**. Pre-COVID-19, homeworkers tended to compensate the travel time saved on commutes with other travel (Long and Reuschke, 2020). **An increase in remote working may also not lead to higher level of active travel if a local walking/cycling infrastructure is not available**.

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Appendix

Appendix 1. Proportion of working residents who mainly worked from home 2011 excluding full-time students, employees and self-employed, MSOAs

Co-variates	Beta	Std Err.
Region (Ref.: East Midlands)		
East of England	0.024*	0.001
London	0.112***	0.001
North East	-0.065***	0.002
North West	0.005	0.001
South East	0.168***	0.001
South West	0.120***	0.001
Wales	-0.064***	0.002
West Midlands	0.008	0.001
Yorkshire and the Humber	-0.006	0.001
Settlement type (Ref. Urban major conurbation)		
Ur ban minor conurbation	-0.010	0.002
Urban city and town	0.053***	0.001
Urban city and town in sparse setting	0.066***	0.006
Rural town and fringe	0.275***	0.001
Rural town and fringe in sparse setting	0.124***	0.005
Rural village and dispersed	0.601***	0.001
Rural village and dispersed in a sparse setting	0.405***	0.003
N observations	7,182	
Adjusted R^2	0.577	

Source: Census of Population 2011, homeworking data taken from Table CT0672_2011