



Economic  
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# **Demand for external finance by environmentally-motivated SMEs: an exploration of geographical disparities and potential in relation to Net Zero**

**ERC Research Paper 108**

**July 2023**

# **Demand for external finance by environmentally-motivated SMEs: an exploration of geographical disparities and potential in relation to Net Zero**

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The Enterprise Research Centre is an independent research centre which focusses on SME growth and productivity. ERC is a partnership between Warwick Business School, Aston Business School, Queen's University School of Management, Leeds University Business School and University College Cork. The Centre is funded by the Economic and Social Research Council (ESRC); Department for Business and Trade (DBT); Innovate UK, the British Business Bank and the Intellectual Property Office. The support of the funders is acknowledged. The views expressed in this report are those of the authors and do not necessarily represent those of the funders. The authors would like to thank Ian Drummond for help with the interviews conducted as part of this research.

## **EXECUTIVE SUMMARY**

### **Research Questions**

This study's main research question is:

- How do geographical disparities and different amounts and types (public supported schemes and grants, or private debt, equity) of external finance impact on the low carbon (energy efficiency), green growth of UK SMEs and social enterprises (SEs)? (referencing sections A, H, E and D of the UK Longitudinal Small Business Survey – 'LSBS')

Additionally, we investigate the following sub questions:

- How is SME/SE green external financing related to SME skills and capabilities, and future business intentions? (referencing also sections K, R and N)
- How is SME/SE green financing related to industrial sectors and other business environment characteristics (urban versus rural location, local deprivation index)? (referencing also section J)

### **Methodology**

The analysis of the 2021 Longitudinal Small Business Survey (LSBS) is centred on the (univariate) cross-sectional examination of environmental mission (section D) SMEs, and of social enterprises ('SOCENT' variable). The 2021 LSBS Wave provides 3 years of data on environmentally oriented SMEs and social enterprises, 2017, 2019, 2021, and three years of data on energy efficiency adoption (section E), 2019, 2020, 2021. Appropriate LSBS cross-sectional and cohort weightings to the descriptive data analysis were applied in order to gain an impression of the UK-wide representation of findings.

The cross-sectional analysis compared different groups of SMEs identified from the taxonomy constructed in Owen et al (2022a) for green SMEs, viz., green mission companies, and green laggards, and presented by CEEDR (2022) for the classification of SEs. The comparison looked at external financing requirements, financing needs, reasons for seeking finance and types of finance sought, in addition to a comparison of their business characteristics, such as industrial sector, employment size, age, location, management characteristics (e.g. management team size, family owned, gender and ethnicity), attitudes towards support (e.g. use of external financial advisors and use of strategic advice), recent growth (in the last 12 months), growth aims (e.g. future growth plans, exporting behaviour), and business capabilities (e.g. perceived abilities for accessing finance and developing a business plan). In addition, the study investigated the regional patterns that are present in green indicators

(energy efficient adoption, environmental mission, green loans) related to the use of renewable energy and potential influence on neighbouring regions.

This study constructs indicators of geographical and digital accessibility based on a gravity model. These indicators are used as explanatory variables in panel data probit regressions to assess the implications of peripheral location on the demand and obtention of external green finance by green SMEs and social enterprises (SEs).

## Keys findings

### ***Geography still matters for SMEs***

The descriptive (univariate) analysis and supporting regression models highlight key differences between the proactive green mission enterprises (major green mission), those that have some kind of green goals (minor green mission), social enterprises, and the non-green mission laggards. We found that

- the vast majority of green SMEs (i.e. SMEs with major and minor green objectives) are located in England, and in the South East region in particular.
- the high density of major green mission SMEs in Northern Ireland, and the North West of England is noticeable.
- Scotland has the lowest density of green mission SMEs, followed by Wales (northern and central regions). Most of the major green mission SMEs in Scotland are located in the Glasgow-Edinburgh axis.
- The vast majority of SMEs without any green concern are located in South East England.
- social enterprises (SEs) tend to agglomerate around large urban centres, e.g., London, Manchester-Liverpool, Glasgow, Cardiff-Newport, Belfast, and are much sparser in the rest of the UK.
- Both social enterprise and green mission SMEs are less represented in the UK's 20% most deprived areas (8% and 12%, respectively.) In the 20% least deprived areas about the same proportion of SEs and green mission SMEs are located (27% and 28%, respectively).
- Geographical peripherality (i.e. low geo-accessibility) is a hurdle for the use of -and applications for- bank-based external finance (loans, overdrafts and credit cards). It increases the likelihood that SMEs will use government and local authority grants. "Major" green mission SMEs are significantly ( $<.05$ ) much less likely to use bank overdraft and credit cards than other types of green mission companies
- SMEs that prioritise environmental aims rely more on government grants and less on financial services than those that prioritise profit-making.

### ***Digital accessibility is altering the way SMEs approach their finances***

In 2017 the Competition and Markets Authority (CMA) initiated Open Banking, a scheme that enables SMEs to share their bank and credit card transaction data electronically with trusted third parties, including providers of external funding. The regression analysis shows statistical evidence that this initiative has had some impact on the type of external finance SMEs use and apply for.

- Higher digital accessibility reduces the likelihood that all SMEs will use -and apply for- government grants. Social enterprises differ from other SMEs in that digital accessibility has no statistical impact on applications for any type of external funding.
- Higher digital accessibility has a significant positive impact on the demand for bank-based external finance.
- Access to a bank is still important for green SMEs and for SEs. Broadband access has a significant role to play in diversifying their sources of external finance, but so far it has not replaced the need for physical access to financial services.

### ***Improved UK SME Going Green Awareness***

- More SMEs have become green between 2017-2021. Only 10% of all SMEs have no environmental objective in 2021, against 30% in 2017.
- The proportion of SMEs that prioritise financial goals over environmental ones (i.e., SMEs with minor green mission) has increased significantly between 2017 and 2021 (56.3% in 2017 and 72% in 2021). This suggests that higher environmental awareness did not translate into a higher proportion of SMEs having mainly green objectives. However, the responses to the questions on demand for external finance indicate that Covid-19 had a major impact on all SMEs. For example, in 2021 22% of Covid-19-related against 5% of non-Covid-19-related government and local authority grants were used by major green SMEs. Similar discrepancies were found for minor green SMEs (24% against 4%) SEs (24% against 7%) and SMEs without green objectives (21% against 0.7%). An analogous pattern was evidenced in relation to the use of Covid-19-related and non-Covid-19-related bank loans.
- About 60% of UK SMEs with environmental objectives know about UK SME energy efficiency related programmes. However, most are only aware of two schemes, the Renewable Heat Scheme and Workplace Charging Scheme for electric vehicle charge points.
- The energy saving schemes that matter for social enterprises are different from those of green SMEs. About 39% of SEs are aware of the Energy Savings Opportunity Scheme, but only 1.2% are aware of The Renewable Heat Incentive. Around a third of SEs and SMEs are aware of the Private Rented Sector Energy Efficiency Regulations. Overall, however, only 3.6% of all UK SMEs that rent their premises are aware of this scheme.
- More than half of the SMEs without any green objective have no awareness of energy saving schemes. As Owen et al (2022b) suggest, this underscores the need for public policy to raise awareness and access to finance to encourage green change.

### ***Skills and capabilities/sectors:***

- The vast majority of UK SMEs, are not led by a woman or an ethnic minority manager (MEG). When a business is woman or MEG-led, it is more likely to be an SE than an SME. Around 22% of SMEs that are led by women have green objectives, and this percentage is significantly different from that of women-led SMEs without green objectives.
- SEs employ relatively more people than SMEs. 6.2% of SEs employ 10 to 49 people, against 3.8% of SMEs. In both categories, roughly the same percentage employ between 1 to 9 people.
- Around 80% of major/minor green mission SMEs expect to have about the same number of employees in the next 12 months, significantly more SEs intend to increase employment than SMEs (21% against 16 %, 5% significance).
- Significantly more SMEs with some green mission than SMEs without green mission had an increase in turnover in the past 12 months. More SEs expect a growth (21% against 16%), and more SMEs expect a decline (88% against 76%).
- Most SMEs that prioritise green objectives and SEs are in Other Services (4% in 2021). Those that consider green objectives as equal or secondary to financial aims are in mostly Business Services (31%).

### ***Implications***

- **Implication 1:** The UK government needs to extend -and develop- schemes that increase the availability of external finance for green SMEs and social enterprises, irrespective of their geographical location. This study suggests that policies such as the government's "nationwide gigabit-broadband by 2030" target presented in the Levelling Up White Paper in February 2022, and the 2017 Open Banking scheme could have major impacts on SMEs' access to external finance.
- **Implication 2:** There is a need for increased awareness of existing energy saving schemes, and accompanying incentives to taking up greener forms of energy use, e.g., an improved, coherent, national programme of SME Net Zero awareness, with support and advice for SMEs to becoming Net Zero. The latest 2021 LSBS Wave provides clear evidence that the number of SMEs without any form of environmental goal has gone down since 2017, but also that the number of SMEs that prioritise profit-making over environmental objectives has increased. As mentioned above, these apparently contradictory findings may be a consequence of the Covid-19 pandemic, and future LSBS surveys may evidence a more coherent picture. Nonetheless, it is clear that further government support mechanisms to encourage going green could increase the number of SMEs with major green aims. This may come in the form of grants, soft loans with low interest and repayment holidays, or other forms of inducement such as improved energy feeder tariffs, green R&D tax credits.
- **Implication 3:** There is a need for further research on the implications of geographical peripherality -and specifically on the closure of bank branches- on the demand for banking services by SMEs. This study presents strong evidence that despite the increase in broadband coverage in all regions of the UK, being located close to a bank branch still matters for accessing bank loans. Is this a fundamental aspect of financial services, i.e., does a business loan always requires in-person relationships between a banker and a business manager? Or is it a remnant of a traditional way of banking that will disappear when digital finance becomes the default way of banking in the UK? As was mentioned above, the UK government Open Banking initiative, and the nationwide broadband coverage targets were initiated very recently (2017), and their impacts may become clearer in future LSBS Waves.

**Keywords:** Covid-19 financial crisis, SME performance, innovation, networking, regions.

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## 1. INTRODUCTION

Building a low carbon, ‘green growth’ economy is part of the UK Government’s policy agenda to ‘level up’ the economy (HM Government Levelling Up the United Kingdom, 2022, UK Government; Net Zero Strategy: Build Back Greener 2021). The Net Zero Emissions Law, June 2019, aims to kick-start a new green industrial revolution which could have profound and pervasive beneficial impacts on the UK economy. In particular, the Net Zero (NZ) transition creates huge opportunities for many of the UK’s peripheral regions that lie outside the South East, and where the largest emitting industrial sectors are often based. UK SMEs are crucial to delivering NZ and a Just Transition that addresses place-based socio-economic inequalities, given that they contribute 99% of private business, 60% of jobs, 50% of GVA and also 50% greenhouse gas emissions (LSE, 2021).

Most SMEs, however, lack awareness of the potential advantages of climate ‘future-proofing’ their business activities (Owen et al, 2022, 2020, 2020a; Cowling and Lui 2021). Owen et al (2022) use recent UK Longitudinal Small Business Survey (LSBS) data to examine the relationship between external finance and environmentally-motivated, private-sector (“green”) SMEs, and identify two key groups: green mission SMEs that are actively making changes for Net Zero impact; and “green laggards” – the majority of SMEs that require more encouragement and support to address the NZ agenda. A further category - social enterprises (SE) – have particular potential to play a more proactive role in a just transition to NZ and a more sustainable form of prosperity. SE take diverse forms and legal structures but are generally understood as mixed purpose organisations that trade in order to support a primary social and/or environmental mission. One in five explicitly address the climate emergency as part of their core social/environmental mission, while the vast majority of SEs take into consideration NZ and the environmental impact of their supply chains (SEUK, 2021).

Previous LSBS research on access to external finance found that government grants and loans have a significant positive impact on SMEs investment decisions to ‘go green’ (Owen et al, 2022), whilst Cowling and Lui (2021) found that cleantech innovative SMEs experience increased demand levels for external financing which were not fully met by traditional (bank) finance providers. Owen et al (2022) point to the need for targeted government support to smaller, younger, less resourced SMEs that have potential to contribute to a just transition to NZ. There is further evidence that SE and green mission/social oriented for-profit B Corps have key roles to play in helping local economies “build back better” by delivering services that are crucial to the wellbeing of individuals and communities across the UK (CEEDR 2022; Vickers et al 2022). This includes in terms of employment creation, work integration and



volunteering opportunities through waste and resource recovery/management, nature conservation, renewable energy, sustainable housing, transport, local food, and environmental education and awareness raising. SEs in NZ sectors achieve these outcomes by combining their environmental/ecological activities with a social purpose based on their close understanding of community needs.

This study builds on and extends this research by investigating the impact of geographical disparities and agglomeration effects on the demand for external finance by environmentally-motivated SMEs (including SEs). As pointed out in HMG (2022) and Lee and Brown (2017), many SMEs lack access to funding due to investors not being close enough to form the relationships and collect the information necessary to make investment decisions. As a result, SMEs outside London and the South East rely on more costly options, such as overdrafts, lines of credit and bank loans. Considering the recent tightening of monetary policy and associated higher interest rates, it is essential for green SMEs to diversify their source of external finance. SME resource-based issues around management, skills, training and business support, and requirements for locational levelling up, will also be considered. Whilst the most recent British Business Bank small business finance tracker (BBB, December, 2022) reveals increasing equity finance available in UK regions, particularly seed finance, London continues to disproportionately dominate UK equity investment (66%).

The contribution of this study to the literature is construction of geographical accessibility and digital accessibility indices, which are used to assess the implications of peripheral location on the demand and obtention of external green finance by green SMEs and social enterprises. Geo-accessibility indicators have been constructed in the past by the European Spatial Development Perspective (ESPON), and used in the empirical geography literature (e.g. Lee and Brown 2017 for the UK). We extend this methodology to the construction of a digital accessibility index based on Ofcom data on regional broadband coverage.

Following this Introduction, Section 2 presents the methodology, and Section 3 the cross-sectional analysis for Green mission SMEs and social enterprises (SEs). The cross-sectional analysis of geographical characteristics of Green Mission SMEs and SEs is developed in Section 3. The econometrics analysis, which includes the construction of accessibility/peripherality indicators, is shown in Section 4. Section 5 concludes and precedes the Appendix.

## 2. METHODOLOGY

The analysis of the 2021 Longitudinal Small Business Survey (LSBS) is centred on the (univariate) cross-sectional examination of environmental mission (Section D) SMEs, and of social enterprises (SOCENT). The 2021 LSBS data set provides 3 years of (annual wave) data containing environmentally oriented SMEs and social enterprises (SEs), 2017, 2019, 2021, and three years of data on energy efficiency adoption (Section E), 2019, 2020, 2021. Appropriate LSBS cross-sectional and cohort weightings<sup>1</sup> to the descriptive data analysis are applied in order to gain an impression of the UK-wide representation of findings. This study will therefore provide a more thorough picture of the recent characteristics of green enterprise in the UK and will clarify trends that were identified in previous LSBS Waves (see CEEDR 2022; Vickers et al 2022; Owen et al, 2022a,b,2020, 2020a).

The cross-sectional analysis compares different groups of SMEs identified from the taxonomy constructed in Owen et al (2022b) for green SMEs, viz., green mission companies, and green laggards, and by DCMS (2022) for the classification of SEs. The comparison also examines external financing requirements, financing needs, reasons for seeking finance and types of finance sought, in addition to a comparison of business characteristics, such as industrial sector, employment size, age, location, management characteristics (e.g. management team size, family owned, gender and ethnicity), attitudes towards support (e.g. use of external financial advisors and use of strategic advice), recent growth (in the last 12 months), growth aims (e.g. future growth plans, exporting behaviour), and business capabilities (e.g. perceived abilities for accessing finance and developing a business plan). This study also extends to the comparison of social enterprises (SEs) and other SMEs, and will highlight the specificity of SEs.

In addition, the study will investigate any regional patterns that may be present in green indicators (energy efficient adoption, environmental mission, green loans). It examines the key differences between SMEs - and specifically green SMEs - and mainstream SMEs located in peripheral and non-peripheral locations and will highlight the challenges to SME external<sup>2</sup>

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<sup>1</sup>Weightings are provided in the LSBS 2021 technical report page 18 Small Business Survey 2021 Methodology ([publishing.service.gov.uk](https://publishing.service.gov.uk))

<sup>2</sup> External finance is funding that which is sought from outside the internal financing resources (e.g. founders and revenue surplus investment) of the business (see Owen et al, 2022)

finance and growth posed by geographical disparities between businesses in terms of capabilities and performance, the long-term impact of Covid-19, productivity and location.

In order to investigate the implications of peripheral location on the demand and obtention of external green finance, we construct measures of accessibility using the methodology developed by the European Spatial Planning and Observation Network (ESPON). The methodology is adapted to the LSBS Wave data, which are based on postcode. Gravity model indicators are constructed using data on regional economic output from the UK's Office for National Statistics (ONS).

We performed a series of panel binary regression analyses on different SME groups including green mission companies, social enterprises, and green laggards (Section E, 2021 LSBS), environmental mission (Section D, 2021 LSBS), to test the relationships between external finance – the amount, success rate and different types thereof – and the independent variables of peripherality, industrial sector, and other characteristics such as SMEs' employment size, gender and ethnicity of directors, management skills, use of external training and business support, degree of innovation, and changes in employment, turnover and profit and forecast performance expectations (Henley and Song 2018; Owen et al. 2020, 2019, 2017). The exact definition of the dependent variable has been informed by descriptive analyses described above and based on a combination of responses to questions about adoption of energy efficient measures.

The sample for the regressions is made of the 2017-2019-2021 LSBS data pooled into a panel (Baltagi 2021, Hsiao 2014). To address the specificity of survey data in econometric analysis, this report draws on Lumley and Scott (2017), and Magee (1998). All regressions are estimated in R. The contribution of this study to the literature is construction of geographical accessibility and digital accessibility indices, which are the main independent variables capturing the impact of geographical and digital peripheral locations on demand for external finance by green SMEs and by SEs. Geo-accessibility indicators have been constructed in the past by the European Spatial Development Perspective (ESPON), and used in the empirical geography literature (e.g. Lee and Brown 2017 for the UK). However, ESPON's indicator is based on EU regional classifications, and which are not adequate for the postcode-based LSBS data. This study has involved constructing postcode-based peripherality indicators which are more granular than the NUTS-based indices and a better fit of the LSBS data.

### 3. DESCRIPTIVE ANALYSIS

#### 3.1 Green Mission SMEs and social enterprises (SEs)

**Table 3.1.1a: Classification of Green Mission by year (D3 weighted 2017/2019/2021)**

Year Row %	Major (only concern or major priority)	Minor (Equal or lesser goal)	None (not a concern)	Refused (don't know/refused to answer)	Unweighted Base (UB n=)
2017	10.7	56.3	29.3	3.8	5618
2019	11.7	63.1	21.7	3.4	9490
2021	15.4	72	10	2.6	6102

**Table 3.1.1b: Classification of social enterprises (SOCENT) - weighted**

	Year (Row %)			Unweighted base (n=)		
	2017	2019	2021	2017	2019	2021
Traditional non-profit	2.5	4.2	3.3	332	522	445
Social Enterprise	8.0	8.1	6.6	774	1135	838
Socially orientated SME	15.7	19.4	16.7	1049	2094	1628
SME	73.8	67.1	73.4	4464	7132	6407

**Table 3.1.1c: Social Enterprise – DCMS(2021) classification (weighted)**

Year (row%)	SE	Non-SE	Unweighted base
2017	8.2	91.8	6287
2019	8.5	91.5	10361
2021	6.8	93.2	8873

The identification of green SMEs is made in question D3<sup>3</sup> in waves 2017 to 2021. Table 3.1.1a shows the percentage of SMEs that have strong environmental goals (*Major*), and the fraction of SMEs that consider environmental concerns as secondary or equal to financial goals (*Minor*). In addition, we include the percentage of companies that have no social or environmental goals, and those that refused to answer the question or do not know. There is a clear upward trend in the number of SMEs that have a green mission, and a clear declining

<sup>3</sup> D3: do you have social or environmental goals?

trend in the number of SMEs that have no environmental concern, or cannot/refuse to answer the question. This is a positive trend as far as Net Zero is concerned, because it shows at least an increase in the awareness of environmental business goals. It is less positive to note that the decrease in the fraction of SMEs without an environmental goal does not necessary translate into a strong commitment to green objectives. In fact, the growth of the number of SMEs that consider green goals as equal or less important than financial objectives (column *Minor*) is greater than that of those considering green goals as major objectives of their businesses.

Table 3.1.1b shows that in 2021, according to the LSBS classification, 6.6% of UK SME are social enterprises (SE), 3.3% are traditional non-profit organisations, 16.7% socially oriented private enterprises, and 73.4% are more purely commercial SMEs. The percentage of SEs has decreased in 2021 relative to 2019 and 2017, when it was about 8% of all -socially oriented SMEs. The percentage of socially oriented SMEs and traditional non-profit rose in 2019 to 19.4% and 4.2%, respectively, but declined in 2021.

For this study we follow the taxonomy described in DCMS (2021). An SME is defined as a social enterprise if it has charitable status, has a “social” legal status and obtains more than 50% of its income from trading (as opposed to government grants, for example). However, SMEs that do not have charitable status may also be classified as social enterprises. If in addition an SME has a “for profit” or “other” legal status, it will be classified as an SE if it has declared social and environmental goals, and at least 50% of surplus or profits are invested in those social and environmental goals. In the light of these definitions, in the remainder of this study we group all SMEs that do not satisfy these conditions in the category “non-SE”, and those that do in the category “SE”. In particular, the mainly charitable SMEs as defined by the LSBS Wave are excluded from the category SE. The summary statistics for both categories can be found in Table 3.1.1c. the percentage of SEs has declined in 2021, after staying stable between 2017 and 2019 at around 8.5 % of all SMEs. The definition of green mission enterprise suggests that SEs are a subset of green mission SMEs, the correlation between these two categories is only 30% ( $<0.01$ ).

Table 3.1.2 compares the **sectoral, geographical and management characteristics** of green mission (major, minor, none) SMEs, of SEs, and “non-SEs” businesses. It provides a more detailed picture of the intersection of environmentally-inclined SMEs and their characteristics in 2021.

The statistics for SEs/non-SEs were added to this -and all subsequent -tables for presentational convenience. Green SMEs and SEs are not directly comparable. In all tables of this section, SEs are compared to non-SEs, and different categories of green mission SMEs are compared with each other.

Most SMEs with an environmental objective (column *Major*) are in Other Services **sector** (48% in 2021), whilst those that consider green objectives as equal or secondary to financial aims (column *Minor*) are in Business Services (31%). The highest proportion of SEs can be found in the Other Services industrial sector (38%), whereas a quarter of SMEs are in the Production and Construction sector, and around 20 per cent in Transport, Retail and Food/Accommodation Services. The highest percentage can be found in the Business Services category.

There are significant differences ( $<0.05$  significance level) in the proportions in the *Major* and *Minor* categories in Production and Construction, Transport, retail, food service, accommodation, and in Other Services. For Business Services, there are no significant differences between major and minor green mission SMEs, but between the latter and SMEs without green mission ( $<0.05$  significance level). The difference between the proportions of SEs and non-SEs is significant ( $<0.05$  level) in all sectors, bar Production and Construction.

Regarding the **age** of the SMEs with a major green objective, Table 3.1.2 shows that most had been established between 6 and 10 years or by more than 20 years. The percentage of SMEs in each age group for the *Minor* category is highest in the 20+ years, then in the 11-19 years. A higher percentage of SMEs with no environmental mission are more than 20 years (59%) than in any other age group. Regarding the statistical significance of these percentages, it is clear in Table 3.1.2 that two or more proportions in all age groups bar 0-5 years differ from each other ( $<0.05$  level). For SEs, there is no significant difference between their relative number and that of non-SEs.

Overall, Table 3.1.2 shows that **environmentally conscious SMEs tend to be younger** than those with little or no environmental concern, but that the number of younger start-ups (under 5 years trading) in each category of the green mission SMEs does differ from each other. It is not clear whether this is due to the fact that environmental concerns are relatively recent, which would imply that older companies would not be concerned with green issues, or whether having a green mission as opposed to a profit orientation is not conducive to the survival of start-ups.

**Regional disparities** can be seen in Table 3.1.2. The vast majority of UK SMEs are located in England, with the percentage ranging from 86% (*Minor*) to 91% (*None*). The lowest percentages of major green mission SMEs are in Northern Ireland and Wales (around 3%, respectively), followed by Scotland (5%). None of the percentage differences between SEs and SMEs are statistically significant.

In all UK nations -bar Scotland and Northern Ireland- the differences between the relative numbers of distinct types of green mission SMEs are significant ( $<0.05$  level). Although there is no statistically significant difference between the *Major* and *Minor* categories, there is a difference between *Minor* and *None*. This suggests that **the geographical location of SMEs having some kind of green mission is different from that of SMEs without environmental objectives**. Section 3.4 will examine geographical disparities in more detail.

Environmentally-oriented SMEs and SEs tend to be located in **urban rather than rural areas**. More SEs than non-SEs are urban businesses (72.1% and 67.6%, respectively), and there are more rural non-SEs than SEs (around 31% and 27%, resp.). These differences are statistically significant at 5%. In relation to green SMEs, the statistically significant differences can be found between *Major* and *Minor* ( $<0.05$ ), but not between SMEs with and without some green mission (*None*). 76% of *Major* are located in urban areas against 67% of *Minor* and 69% of *None*. This suggests that urban settings are more favourable to green mission SMEs than to those that have no environmental concerns.



**Table 3.1.2: SME characteristics by Green Mission 2021 (weighted column %, except UB)**

	Major	Minor	None	SE	Non-SE	UB
<b>Broad Sector</b>						
Production and construction	12.7a	24.6b	28.3b	23.5a	25.0a	2092
Transport, retail and food service/ accommodation	13.1a,b	18.7c	18.2b,c	14.7a	19.9b	2714
Business services	26.6a,b,c	30.7c	22.8b	23.7a	35.7b	2949
Other services	47.6a	25.9b	30.7b	38.2a	19.4b	1570
<b>Age established</b>						
0 - 5 years	11.0a	10.9a	8.4a	13.2a	11.1a	926
6 - 10 years	18.2a	14.1b	9.0c	16.2a	14.9a	1394
11 - 20 years	26.9a	34.3b	23.4a	30.1a	32.6a	2458
More than 20 years	43.6a	40.6a	59.3b	40.2a	41.3a	4516
<b>Location</b>						
England	88.5a,b	86.0b	90.6a	87.2a	89.2a	7065
Scotland	5.4a	7.7a	6.2a	7.4a	5.5a	826
Wales	3.1a,b	3.9b	1.5a	3.1a	3.5a	701
Northern Ireland	2.9a	2.4a	1.7a	2.3a	1.8a	733
Urban	75.7a	66.5b	69.3a,b	72.1a	67.6b	5993
Rural	21.4a	31.1b	29.0b,c	25.7a	30.5b	2598
<b>Management</b>						
Woman-led Yes	23.6a	21.6a	15.0b	21.1a	19.4a	1764
Woman-led No	67.2a	75.9b	82.6c	70.8a	78.9b	7207
MEG-led Yes	6.1a	6.7a	3.9a	5.9a	5.2a	499
MEG-led No	92.6a	92.0a	94.9a	90.2a	93.7b	8750
Family-owned: Yes	72.5a	87.1b	87.6b	70.9a	90.7b	7072
Family-owned: No	27.5a	12.9b	12.4b	29.1a	9.2b	2227
<b>Employment</b>						
Zero	69.9a	66.3a	77.0b	67.6a	71.0a	1958
1 to 9	24.8a,b	26.8b	19.3a	23.9a	24.3a	3465
10 to 49	3.8a	5.6a	2.6a	6.2a	3.8b	2744
50 to 249	0.6a	1.0a	0.4a	23.5a	25.0a	1022

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level. Green SMEs and SEs are not directly comparable. SEs are compared to non-SEs, and different categories of green mission SMEs are compared with each other. "Don't know/refused" answers were omitted, so percentages may not add up to 100.

**Table 3.1.3: SME Turnover growth by Green Mission 2021 (column % - weighted)**

	Major	Minor	None	SE	Non-SE	UB
<b>Summary of growth in last year</b>						
Turnover growth	38.4a	36.6a	23.2b	38.2a	35.6a	3741
Stable	30.7a	30.9a	44.3b	34.1a	32.4a	2636
Turnover decline	30.8a	32.5a	32.4a	27.6a	32.0b	2679
<b>Summary of expected growth in next year</b>						
Turnover growth	43.9a	43.5a	31.5b	20.6a	15.6b	4541
Turnover decline	11.3a	9.9a	17.4b	75.7a	81.7b	754
Stable	41.6a,b	42.2b	47.4b	2.1a	2.1a	3729
<b>Whether will have more employees in 12 months' time</b>						
More than currently	17.8a	20.4a	12.0a	1.6a	0.5b	3210
About the same	79.8a	77.3a	86.1b	20.6a	15.6b	5562
Fewer	1.9a	1.8a	1.5a	75.7a	81.7b	482

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level. Green SMEs and SEs are not directly comparable. SEs are compared to non-SEs, and different categories of green mission SMEs are compared with each other. "Don't know/refused" answers were omitted, so percentages may not add up to 100.

**Table 3.1.4: SME Innovation level by Green Mission 2021 (Cohort C) (column% - weighted)**

	Major	Minor	None	SE	Non-SE	UB
<b>Has your business introduced any new or significantly improved processes for producing or supplying goods or services in the last three years?</b>						
Yes	17.7a, b	18.0b	9.4a	19.5a	13.7b	708
No	81.5a, b	80.9b	90.6a	80.5a	85.4b	2407
<b>Has your business invested in R&amp;D in the last three years?</b>						
Yes	15.9a	18.1a	3.9b	16.4a	12.5a	655
No	83.6a	80.4a	96.1b	83.6a	86.8a	2462
<b>Have you applied for or received R&amp;D tax credits in the last 3 years?</b>						
Applied for, not received	3.0a	0.5b	0	1.4a	0.5a	47
Received	1.3a	2.9a	1.1a	1.8a	2.1a	277
Neither applied for nor received	95.3a	94.4a	98.9a	96.3a	96.1a	2696

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level. Green SMEs and SEs are not directly comparable. SEs are compared to non-SEs, and different categories of green mission SMEs are compared with each other. "Don't know/refused" answers were omitted, so percentages may not add up to 100.

The **management** characteristics of green mission SMEs indicate that gender does not impact on the type of environmental priorities. Around 22% of SMEs that are led by women have minor green objectives, and this percentage is significantly different from that of women-led SMEs without green objectives (Table 3.1.2). It is not possible to distinguish the number of major and minor green mission SMEs led by women at  $<.05$  significance level. Regarding the numbers of green mission SMEs **not led** by a woman, all numbers differ at  $<.05$  significance level. More minor green mission SMEs are *not* Woman-led than any other category.

Irrespective of the green mission category, the numbers of **MEG-led** and -not MEG-led- SMEs are not significant. Slightly less SEs than non-SEs are not women-led (70.8% and 78.9%, resp.) or MEG-led (90.2% and 93.7%, resp.). For both variables, the difference is significant ( $<.05$  level).

Of the percentage of SMEs that are **family owned**, 87% have low green priorities, and 73% had major environmental objectives. Of those that were not family owned, more than a quarter had major green objectives, and around one eighth has either minor or no environmental objectives. These proportions are significant ( $<.05$  level). Differences in ownership are also significant for SEs. Around 71% and 91% of SE and non-SE businesses, respectively, are family-owned. There are no large (250+ employees) SEs or non-SEs, but the former employ relatively more people than non-SEs. Around 68% of SEs have zero employees, against 71% of non-SEs. In addition, 6.2% of SEs employ 10 to 49 people, against 3.8% of non-SEs. In both categories, roughly the same percentage employs between 1 to 9 people.

Table 3.1.3 shows that **turnover growth** in the previous 12 months and expectations of turnover growth in the next 12 months are stable or positive for all green mission SMEs. Between around 30% and 38% of SMEs with some kind of environmental objective have reported stable turnover growth. The proportions are similar and this is confirmed by the lack of significance of the z-test. The only differences between categories of green mission are between *Minor* and *None*, and *Major* and *None*. ( $<0.05$ ). There are no significant differences between any category of green mission SMEs in relation to turnover decline. Around 30% in each group reported a decline. The opposite situation can be seen in Table 3.1.3 for SEs and non-SEs. A significant ( $<.05$  level) percentage of non-SEs than SEs reported a decline in turnover (28% against 32%).

In terms of **growth expectations**, the outlook is very similar. Between 42% and 44% of *Major* and *Minor* green mission SMEs expect stable or positive turnover growth, respectively. The similarity in the percentages is upheld by the lack of significance of the z-test. As in the case

of the actual past turnover the significant differences are found between the *None* and the *Major/Minor* groups. The differences between growth or decline expectations of SEs and non-SEs are significant at 5%. More SEs expect a growth (21 against 16 %), and more non-SEs expect a decline (88% against 76 %). **Overall it appears that SEs are performing better than non-SEs, as was noted in DCMS (2021).**

This positive outlook does not translate into increased **employment** opportunities. Around 80 per cent of *Major/Minor* green mission SMEs expect to have about the same number of employees in the next 12 months, rising to 86 per cent in the case of SMEs with no green mission. As in the case of growth expectations, the significant differences are between SMEs with some sort of environmental aim and those that have none. Table 3.1.3 shows that significantly more SEs intend to increase employment than SMEs (21 against 16 %, <0.05), and that less would maintain the same level of employment (76 against 82 %, <0.05).

Table 3.1.4 evidences that the vast majority of SMEs, irrespective of their environmental or social goals did not **innovate, invest in R&D or apply for R&D tax credits** in the past 3 years (81 to 96 per cent in all categories of green mission SMEs, and 81% to 85 % for SE/non-SEs).

**Table 3.1.5: Whether used information or advice – UK 2021 (column % - weighted)**

	Major	Minor	None	SE	Non-SE	UB
Information relating to the day to day running of your business	26.5a	27.2a	39.3a	23.6a	32.4b	694
Strategic advice to help introduce a stepped change to grow your business in terms of profitability or numbers employees	34.4a	23.2b	23.2a,b	29.9a	23.1a	455
Both of these	21.2a	36.9b	25.0a, b	35.7a	26.8b	720
Neither of these	17.9a	12.7a	12.5a	10.8a	17.4b	245

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**Table 3.1.6 Reason for using information/advice - UK 2021 (row % - weighted)**

	Major	Minor	None	SE	Non-SE	UB
Business growth	15.4a	24.1a	22.2a	20.5a	19.7a	521
E-commerce/technology	13.5a	10.5a	9.5a	12.3a	8.7a	166
Employment law/redundancies	6.4a	6.7a	4.8a	5.3a	5.6a	427
Exporting	0.6a	2.6a	3.2a	1.2a	2.1a	84
Financial advice e.g. how and where to get finance	17.3a	9.6b	4.8a, b	12.4a	9.1a	216
Financial advice e.g. accounting, for general running of business	21.7a	21.3a	9.4a	15.2a	20.8a	542
Health and Safety	6.4a	7.8a	1.6a	8.8a	6.4a	213
Importing		0.9a		1.8a	0.6a	49
Improving business efficiency/productivity	17.3a	16.6a	1.6b	19.9a	12.7b	349
Innovation	1.9a	8.7b	6.3a,b	7.0a	6.9a	125
Legal issues	17.8a	18.6a	30.2a	19.9a	19.1a	524
Management/leadership development	1.9a	4.6a	1.6a	7.6a	2.9b	98
Marketing	3.2a	12.4b	20.6b	11.8a	10.2a	178
Regulations	7.6a	8.2a	4.7a	2.4a	10.1b	185
Relocation		0.2a			0.2a	13
Tax/national insurance law and payments	1.3a	10.2b	20.6b	1.2a	15.5b	297
Trade mission attendance		0.2a			0.1a	6
Training/skills needs	5.1a, b	8.2a,b	0	7.6a	5.8a	120
Workplace pension		0.5a	1.6a	0.6a	0.6a	39
Business survival or operation through Coronavirus COVID-19 pandemic and beyond	12.1a,b	12.7a,b	1.6b	17.0a	11.9a	273

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level. Green SMEs and SEs are not directly comparable. SEs are compared to non-SEs, and different categories of green mission SMEs are compared with each other. "Don't know/refused" answers were omitted, so percentages may not add up to 100.

As in the case of growth and employment expectations, the significant differences at 5% are between SMEs with no and some green goals, but not between *Major* and *Minor* green mission SMEs. In the case of R&D tax credits, between 94 and 99 per cent of SMEs did not apply or receive any in the past three years. Nonetheless, among the SMEs that did introduce new processes or services, around 18% had some kind of green objective, and 18 (16) per cent of those with minor (major) environmental aims invested in R&D. Overall, Table 3.1.4 shows that UK SMEs do not engage in R&D or innovation, irrespective of their environmental goals.

Table 3.1.5 shows that green mission SMEs are interested in developing their businesses and increase employment. Of those with major green aims, around 34 per cent have **sought advice** to help them grow, while 23% of those with minor or no environmental aims did so. Only the difference between the percentages in the *Major* and *Minor* categories is significant

at 5%. Around 21% (*Major*) and 37% (*Minor*) of green mission SMEs have sought advice to increase both the daily running of their businesses and to improve the profitability of their businesses. This difference is significant at 5 %. For SEs, the significant differences, at 5 %, are for advice to improve daily running of business.

These results shed some light the responses in Table 3.1.6 on the **reasons to seek advice**. An average of 23 per cent of SMEs with *Minor* (24 per cent) or no green mission (22 per cent) have sought advice in order to grow their business. However, the differences within the green mission categories are not significant. The next three highest reasons minor green mission SMEs seek advice are related day-to- day financial advice (21%), legal issues (19%), and improving productivity (17%).

**Table 3.1.7: Which of the following would you say are major obstacles to the success of your business in general? 2021 (column %- weighted)**

	Major	Minor	None	SE	Non-SE	UB
Obtaining finance	22.8a	12.9b	18.0a,b	22.1a	11.0b	463
Taxation, VAT, PAYE, National Insurance, business rates	21.1a	27.3a	24.6a	15.2a	28.0b	1083
Staff recruitment and skills	14.2a	28.0b	19.8a,b	22.0a	21.7a	1510
Regulations/red tape	32.5a	32.9a	29.5a	30.0a	33.3a	1289
Availability/cost of suitable premises	24.7a	15.9b	16.2a,b	25.6a	12.1b	500
Competition in the market	31.7a	44.9b	41.9a,b	36.8a	40.0a	1342
Workplace pensions	7.3a	5.3a	5.4a	3.2a	4.6a	305
Late payment	25.1a,b	24.7a,b	19.2b	33.6a	24.3b	804
UK exit from the EU	27.6a	27.4a	25.1a	25.1a	25.0a	1046
National Living Wage	12.1a	12.4a	19.2a	12.2a	9.8a	676

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The differences between major and minor green mission SMEs are significant at 5% for Financial advice, Innovation, Marketing, Tax/national insurance law and payments. The significant difference between the categories *None* and *Minor* only applies to Improving business, efficiency/productivity. Regarding the differences between SEs and non-SEs, the only significant differences are for the advice on Improving business efficiency/productivity Management/leadership development, Regulations, and Tax/national insurance law and payments.

Table 3.1.7 shows that one quarter of green mission SMEs believe that obtaining finance is a **major obstacle to their success**. The difference between the category *Major* and *Minor* is significant at 5%, but insignificant in relation to *None*. Competition in the market is the main obstacle to the development of the business for *Minor* SMEs and those without green objectives (45% and 42%, respectively, 5% significance). Around a quarter of all SMEs with some kind of green mission consider the lack of available premises, late payment, and Brexit to be major obstacles, although only the availability of premises is significant ( $<0.05$ ).

Table 3.1.7 also shows that **competition in the market is the single major significant obstacle to the success of both major and minor green mission SMEs** (32% and 45 %,  $<0.05$ ), and also for SEs and non-SEs (36.8 per cent and 40.0 per cent, resp.). However, the difference between percentages for SEs and non-SEs is not significant. Regulations and red tape are the second largest hurdle declared by both SEs, and non-SEs (30 and 33 per cent, resp.). Around a quarter of both SEs and non-SEs consider the exit from the EU a major obstacle. Some obstacles affect SEs more than they do non-SEs. For instance, obtaining finance is an obstacle for around 21 per cent of SEs, but only 11 per cent of non-SEs ( $<0.05$ ). The lack of available premises is a hurdle for SEs (25.6%), more than it is for non-SEs (12.1 per cent), and the difference is significant.

Traditional financial services dominate the range of **external finance** green mission SMEs and SEs use and apply for (Table 3.1.8). Around a quarter of *Minor* green mission and SMEs without green aims use credit card as source of funds, and around a quarter of the latter also use bank overdraft facilities. Leasing is significant at 5 % for green mission SMEs and for SEs. *Major* green mission SMEs are significantly ( $<0.05$ ) less likely to use bank overdraft and credit cards than other types of green mission companies. This finding is in line with Owen et al (2022a,b)- and constitutes a pattern emerging for *Major* green mission. As they face more external finance obstacles, they tend to reduce their reliance on traditional bank finance, and apply instead to government grants, rather than bank loans.

In 2021, the single largest source of funds are government or local authority grants related to Coronavirus, 22% (*Major*), 24% (*Minor*), 21% (*None*), 24% (SEs), 21% (non-SEs). All differences are significant at 5%. Although unsurprising, the importance of this source of funds is bound to be short-term. The Job Retention Scheme ended in September 2021, while the Recovery Loan Scheme, which was aimed at SMEs, ended on 30 June 2022. Bank loans directly related to Coronavirus also represented an important source of funding for socially oriented SMEs (14.5% for SEs and 18.4% for non-SEs (5% significance), but not for green SMEs.



Government or local authority grants unrelated to Covid-19 represent a very small proportion of current finance for non-SEs (1.9%), but a significantly larger fraction for SEs (7%). Other differences between the two groups can be found in relation to the use of bank loans unrelated to Covid, which account for 5.4% of SEs external finance but 6.3% of non-SEs' funds. Another difference between SEs and non-SEs is the use of commercial mortgage, which around 7% of SEs use against around 3% of non-SEs. Loans from business partners or owners constituted around 11% to 13% of the source of funding for all SMEs. Differences of percentages between categories of green mission finance are significant at 5%.

Finally, and worryingly, around 46% (36%) of *Major (Minor)* green mission SMEs, and 39% of SMEs without any green aim do not use any of the listed sources of finance. However, this sheds a light to the fact that more than 90% of all green mission SMEs have not applied to any source of external finance in the previous 12 months. The small percentage of major green mission SMEs that apply more than once for external finance is significantly higher than that of minor green finance (4% against 2 %, <0.05).

The types of **finance applied for** mirror the type of finance used, with the exception of the Covid-19 relief schemes and bank loans. Government or local authority grants are applied to by 36% of *Major* green mission SMEs, against 6% of *Minor* green mission SMEs and a quarter of SMEs without green mission (<0.05). Loans from banks are the second highest source of funding for green mission SMEs with some kind of green mission (24 and 29 per cent), and account for an even higher percentage than government grants for SMEs without green aims (39%). However, there is no statistically significant difference between these percentages. Interestingly, **SMEs that prioritise environmental aims rely more on government grants and less on financial services than SMEs that prioritise profit-making**. Credit cards applications account for relatively less than their use in SMEs access to finance.

Table 3.1.9 presents the percentage of SEs, non-SEs and green mission SMEs with **awareness of UK government SME energy efficiency schemes**. The Renewable Heat Incentive and the Workplace Charging Scheme for electric cars are the two most familiar schemes, although only the latter is significant at 5 %. Around 33 per cent of green SEs are aware of the Renewable Heat Incentive, against 27.3 per cent of non-SEs, but this is not a statistically significant difference. All UK SMEs are also aware of the Energy Savings Opportunity Scheme but to a lesser extent than the previous two. Differences in the percentage of major and minor green mission SMEs and for SEs/non-SEs are significant at 5%.

The Resource Efficient Scotland SME Loan Scheme is significant for SEs but not green mission SMEs. For the Energy Technology List significant differences between the percentages of minor green mission and no green mission, and between the latter and major green mission. However, there are no statistically differences between the number of SMEs with major and minor green mission.

Overall, the majority of all UK SMEs surveyed by LSBS have an awareness of at least one scheme and this is slightly better for major green mission- but improving on previous years (Owen et al 2022). Nonetheless, Table 3.1.9 shows that more than half of the SMEs without any green objective have no awareness of energy saving schemes. There is a notable dichotomy of increasing awareness and greenness, but decreasing relationship between prioritising environmental goals over profit. This suggests that the tightening of finance for SMEs during the Covid lockdown and survival needs have potentially deterring green action.

**Table 3.1.8: SME External Finance Application and Use by Green Mission and SE 2021**  
(row % - weighted)

Types of finance currently being used	Major	Minor	None	SE	Non-SE	UB
Bank overdraft facility	10.8a	18.9b	24.3c	15.5a	18.6a	2273
Commercial mortgage	2.4a	3.7a, b	2.8a, b	5.6a	2.8b	655
Credit cards	17.9a	24.1b	25.1b	22.4a	23.2a	3251
Equity Finance, e.g. where a share of the business is sold to investors or other people	0.8a	0.6a	0.2a	0.7a	0.8a	158
Factoring/invoice discounting	0.8a	2.5b	0.4a	1.8a	1.5a	494
Government or local authority grants or schemes <b>not including</b> any directly <b>related to Coronavirus</b>	5.0a	3.6a	0.7b	7.0a	1.9b	607
Government or local authority grants or schemes <b>directly related to Coronavirus</b>	21.7a	24.4a	21.1a	24.0a	21.4a	2653
Leasing or hire purchase	6.5a	12.5b	9.9a, b	8.5a	11.7b	2423
Loan from a bank, building society or other financial institution <b>not directly related to Coronavirus</b>	2.7a	6.5b	3.2a	5.4a	6.3a	1246
Loan from a bank, building society or other financial institution <b>directly related to Coronavirus</b>	11.1a	18.9b	18.4b	14.5a	18.4b	2401
Loan from family/friend	7.6a	5.6a	6.9a	5.9a	4.9a	352
Loan from business partner/directors/owner	12.7a	11.5a	11.0a	8.5a	12.1b	1286
Loan from a peer to peer platform	0.8a	0.8a	0.4a	0.3a	0.6a	119
Other finance	2.1a	1.1a	1.3a	0.7a	1.1a	106
None of these	46.2a	36.1b	38.9b	42.6a	39.1a	2200
<b>Types of finance applied for</b>						
Bank overdraft facility	14.8a	38.1b	7.1a	36.2a	36.0a	265
Commercial mortgage		2.8a		4.3a	4.3a	48
Credit cards	4.9a	17.0a	3.6a	2.1a	19.8b	101
Equity Finance,					0.7a	16
Factoring/invoice discounting		2.3a			2.1a	35
Leasing or hire purchase	16.1a	22.5a	14.3a	27.7a	19.6a	35
Other government or local authority finance grants or schemes	36.1a	5.5b	25.0a	57.4a	30.1b	83
Loan from a bank, building society or other financial institution	24.2a	29.4a	39.3a	25.5a	15.0a	279
Loan from family/friend	8.1a	21.7a	3.6a	19.1a	11.5a	53
Loan from a Peer to peer platform		3.7a			2.6a	22
Loan from business partner/directors/owner	8.2a	13.8a		10.6a	13.1a	59
Other finance	13.1a	7.8a	3.6a	4.3a	4.3a	71
Coronavirus COVID-19 Government-backed accredited loans or finance agreements such as Coronavirus Business Interruption.	3.3a	11.0a		23.4a	3.6b	82
Coronavirus COVID-19 business grants funded by government or local authority	3.2a	3.7a	3.6a	10.6a	5.7a	46
<b>Have you tried to obtain external finance for your business in the past 12 months?</b>						
Yes - once	3.8a	3.7a	3.2a	4.1a	3.3a	530
Yes - more than once	3.6a	1.9b	2.1a, b	3.6a	1.7b	284
No	92.4a	93.8a	94.6a	92.2a	94.5a	8311

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**Table 3.1.9: Awareness of UK Government SME Energy Efficiency Schemes by Green Mission, 2021 (column % - Cohort A, weighted)**

	Major	Minor	None	SE	Non-SE	UB
The Energy Technology List	8.6a	9.4a	16.6b	14.3a	6.1b	166
Enhanced Capital Allowances	10.2a	16.2b	6.4a	10.7a	13.1a	494
The Private Rented Sector Energy Efficiency Regulations	17.8a	11.9b	4.3c	11.9a	10.7a	283
The Renewable Heat Incentive	30.5a	36.1a	29.9a	33.3a	27.3a	677
Resource Efficient Scotland	0.6a	1.4a	2.7a	1.2a	0.4a	48
The Resource Efficient Scotland SME Loan Scheme	0.6a	0.7a		1.2a	0.3a	29
Energy Savings Opportunity Scheme	18.8a	10.5b	20.3a	17.9a	9.4b	257
Workplace Charging Scheme for electric vehicle charge points	29.0a	26.7a,b	8.0c	14.3a	2.5b	759
None of these	39.4a	45.2a	42.2a	36.9a	52.6b	1383

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level. Green SMEs and SEs are not directly comparable. SEs are compared to non-SEs, and different categories of green mission SMEs are compared with each other. "Don't know/refused" answers were omitted, so percentages may not add up to 100.

### 3.2 Core-periphery distribution of social enterprises and green mission SMEs

Figure 3.2.1a-c and Tables 3.2.1 to 3.2.2 present the regional distribution of SEs and green mission SMEs in 2021. The figures are based on absolute counts, whereas Table 3.2.2 shows the same data in terms of proportions of overall SME population. Figure 3.2.2 highlights the interaction of economic deprivation and the location of green mission SMEs and SEs.

Figure 3.2.1a shows the location of green SMEs with a *Major* environmental objective, namely those that have only green objectives (purple dots on the graph) and those that consider green aims their primary concern (orange dots). Clearly, **the vast majority of both types are located in England, and in the South East in particular. However, the high density of SMEs with primary green concerns in Northern Ireland, and the North West of England is noticeable.** The nation with the lowest density of green mission SMEs is Scotland, followed by Wales (northern and central regions). Most of the major green mission SMEs in Scotland are located in the axis Glasgow-Edinburgh.

The density of SMEs with some kind of green objective is also highest in England as can be seen in Figure 3.2.1b. Northern Ireland also holds a large number of SMEs with secondary green objectives. It is worth noting that the number of SMEs without any green concern is relatively low, and the vast majority are located in South East England.

The regional distribution of social enterprises is shown in Figure 3.2.1c. This distribution differs from that of green mission SMEs. SEs tend to agglomerate around large urban centres, e.g., London, Manchester-Liverpool, Glasgow, Cardiff-Newport, Belfast, and be much sparser in the rest of the country.

Figure 3.2.2 shows that in 2021 both social enterprises and green mission SMEs are **less represented in the most deprived areas** compared to more affluent ones. Only 8% of SEs and 12% of *Major* green mission SMEs are located in the 20% most deprived areas. In the second and third most deprived quintiles, SEs have much higher levels of representation with 20.9% found in the 2nd quintile and around a quarter in the 3rd. The presence of *Major* green mission SMEs is comparatively lower in those quintiles, with only 14% in the 2nd and 22 per cent in the 3rd. In the least deprived 4th quintile, SEs are underrepresented compared to *Major* green mission SMEs. Only 19.1% of social enterprises are in the 4th quintile, against 24% of *Major* SMEs. About the same proportion of SEs and *Major* green mission SMEs are located in the most affluent areas in the UK, viz., around 27% and 28%, respectively.

Table 3.3.1 shows the **regional distribution of SEs** between 2017 and 2021. In 2017, only in the South West region did the proportions of SE and non-SEs significantly differ at 5% significance level. In all other regions, there is no statistically significant difference between the relative number of SEs and non-SEs. In 2019, only in the East of England, South West, and Northern Ireland did the proportions of SEs differ significantly from those of non-SEs in the same region. In 2021, the only significant changes were found in the North East and in Yorkshire and the Humber, i.e., the relative numbers of SEs were statistically different from those of non-SEs at the 5% level.

The second highest percentage of SEs can be found in London, with 11.4 % in 2017 and 15% in 2021, with a significant drop in 2019. The percentage of SEs in other regions tended to decline as well (East Midlands, North East, North West, West Midlands, South West). Interestingly, the relative number of SEs in the devolved nations increased between 2017 and 2021 (Northern Ireland, Scotland and Wales), and in two English regions, Yorkshire & the Humber and East of England.

**Figure 3.2.1. Location of SEs and SMEs by environmental mission by postcode in 2021**

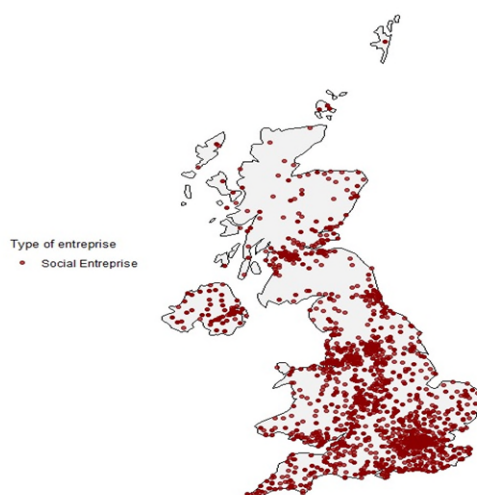
a. Major green mission



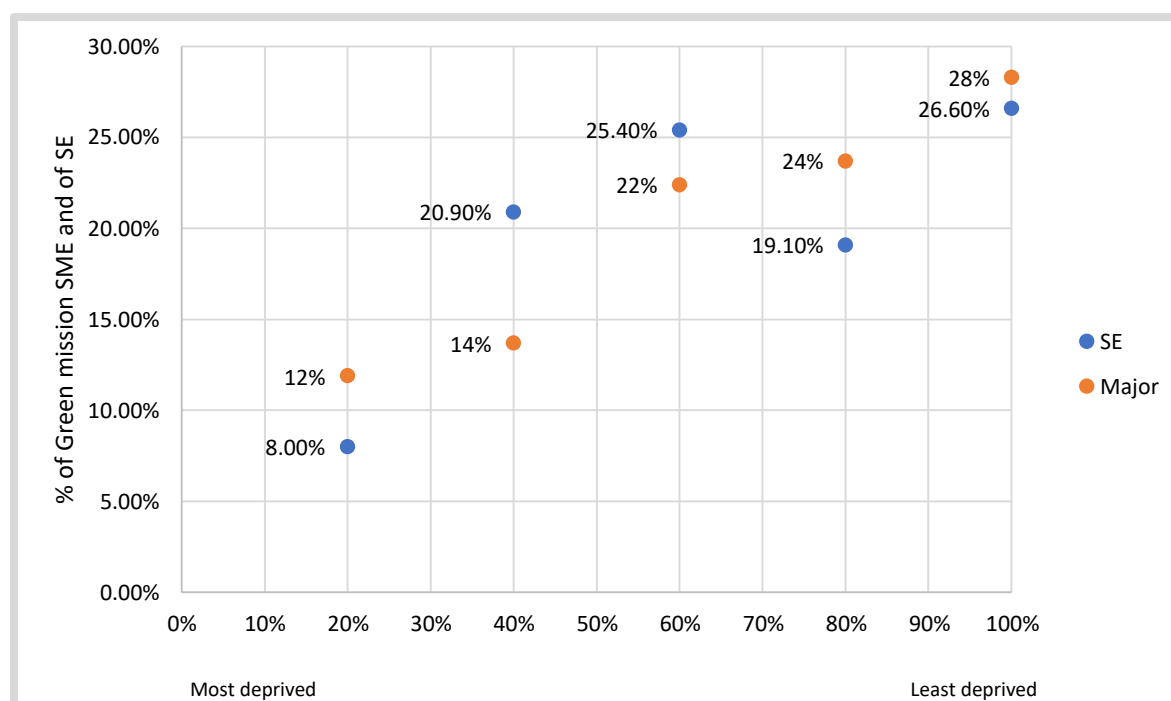
b. Minor and no green mission



c. Social Enterprises



**Figure 3.2.2. Prevalence of SE and SME employers in areas of deprivation - 2021**  
(Index of Multiple Deprivation quintiles)



In 2021, the z-test indicates that the relative number of *Major* SMEs in Scotland is a statistically different from that of *Minor* SMEs but neither is statistically different from the proportion of SMEs without mission. This is indicated in the table by the shared subscripts of the *None* column, whereas the subscripts of *Major* and *Minor* differ. In Wales and Northern Ireland, there are significant differences between the relative numbers of *Major*, *Minor* and *None* SMEs. In the former, the z-test is significant at 5 % in 2019 for *Major* and *None*, and for *Minor* and *None* in 2021. These results suggest that it is not possible to conclude that there are differences in the proportions of *Minor* and *Major* green mission SMEs in Wales in 2019, but that these proportions differ from that of SMEs without environmental objectives.

Within England, Table 3.2.2 shows that the relative numbers of green mission -and no green mission- SMEs can be considered statistically identical in all years in the South West, South East, and West Midlands. All relative numbers differ significantly at 5% in London in 2019 and 2021. In 2017, the proportion of major and minor was significantly different ( $<0.05$ ), but not the proportion of *Minor* and SMEs without green mission. In the East of England, the difference between the *Major* and *Minor* categories -and *None* and *Major*- was significant at 5% in 2019, but it is not possible to statistically differentiate between the relative number of *Minor* and *None* in 2019. A positive development can be seen in 2021 in this region, where the difference between the numbers in the *Major* and *Minor* categories is insignificant, but differ statistically from the number in the *None* category. Analogously, in the North West, the *Minor* and *None*



categories are significantly different at 5% but not the proportions in the *None* and *Major* columns. The overall picture that emerges from Table 3.2.2 is that the percentages of different types of green mission SMEs in the UK started to diverge in 2019, whereas there seemed to be no noticeable differences between the relative number of the different types in 2017. The exception in 2017 was London, where one could say that there were more major green mission SME than minor green mission located in this region. Not all regions have seen a variation in the relative number of different types of SMEs, but in 2021 there has been a wider diversity of types of green mission SMEs outside the South East/West of England, noticeably in the North West, Yorkshire & the Humber, and Wales.

**Table 3.3.1. Regional distribution of SEs and non-SEs (% column- weighted)**

		2017			2019			2021		
		SE	Non-SE	Total	SE	Non-SE	Total	SE	Non-SE	Total
East Midlands	Count	42a	482a	524	81a	703a	784	50a	599a	649
	% row	8	92	100	10.30	89.70	100	7.70	92.30	100
	% col.	7.90	8.20	8.10	9.10	7.40	7.60	8.20	7.10	7.20
East of England	Count	60a	588a	648	63a	971b	1034	51a	904a	955
	% row	9.30	90.70	100	6.10	93.90b	100	5.30	94.70	100
	% col.	11.30	10	10.10	7.10	10.20	10	8.30	10.80	10.60
London	Count	63a	660a	723	74a	845a	919	86a	916b	1002
	% row	8.70	91.30	100	8.10	91.90	100	8.60	91.40	100
	% col.	11.90	11.20	11.20	8.30	8.90	8.90	14.10	10.90	11.10
North East	Count	17a	120a	137	26a	221a	247	26a	164b	190
	% row	12.40	87.60	100	10.50	89.50	100	13.70	86.30	100
	% col.	3.20	2	2.10	2.90	2.30	2.40	4.20	2	2.10
North West	Count	43a	562a	605	65a	958b	1023	51a	742a	793
	% row	7.10	92.90	100	6.40	93.60	100	6.40	93.60	100
	% col.	8.10	9.50	9.40	7.30	10.10	9.90	8.30	8.80	8.80
South East	Count	91a	1048a	1139	157a	1826a	1983	109a	1619a	1728
	% row	8	92	100	7.90	92.10	100	6.30	93.70	100
	% col.	17.20	17.70	17.70	17.70	19.20	19.10	17.80	19.30	19.20
South West	Count	58a	860b	918	164a	1362b	1526	98a	1221a	1319
	% row	6.30	93.70	100	10.70	89.30	100	7.40	92.60	100
	% col.	11	14.60	14.30	18.50	14.30	14.70	16	14.60	14.70
West Midlands	Count	40a	468a	508	82a	857a	939	40a	668a	708
	% row	7.90	92.10	100	8.70	91.30	100	5.60	94.40	100
	% col.	7.60	7.90	7.90	9.20	9	9	6.50	8	7.90
Yorkshire & the Humber	Count	38a	424a	462	80a	651b	731	23a	647b	670
	% row	8.20	91.80	100	10.90	89.10	100	3.40	96.60	100
	% col.	7.20	7.20	7.20	9	6.90	7	3.80	7.70	7.40
Scotland	Count	40a	354a	394	43a	538a	581	45a	462a	507
	% row	10.20	89.80	100	7.40	92.60	100	8.90	91.10	100
	% col.	7.60	6	6.10	4.80	5.70	5.60	7.40	5.50	5.60
Wales	Count	25a	208a	233	22a	362b	384	19a	293a	312
	% row	10.70	89.30	100	5.70	94.30	100	6.10	93.90	100
	% col.	4.70	3.50	3.60	2.50	3.80	3.70	3.10	3.50	3.50
Northern Ireland	Count	12a	132a	144	30a	200b	230	14a	155a	169
	% row	8.30	91.70	100	13	87	100	8.30	91.70	100
	% col.	2.30	2.20	2.20	3.40	2.10	2.20	2.30	1.80	1.90
All regions	Count	529	5906	6435	887	9494	10381	612	8390	9002
	% row	8.20	91.80	100	8.50	91.50	100	6.80	93.20	100

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level.

Finally, Table 3.2.3 provides an overview of the environmental engagement of all SMEs in the LSBS Waves between 2019 and 2021, and includes the two Covid-19 years, 2020- and 2021. The table shows the percentages of SMEs that installed some kind of energy efficiency during those years by region. Amongst the SMEs that installed any energy efficiency in 2017, the South of England predominates, and both regions retained the highest percentage in 2019, but not in 2021. In terms of significant differences between the SMEs that have installed some kind of energy efficiency measures and those that have not, it is only possible to make conclusions in the South West of England. The relative numbers of Yes and No are statistically different from each other ( $<0.05$ ) in all years. In other regions, the picture is less clear, and only the high relative number of “Don’t know” answers seem to be significant (e.g., in the East Midlands in 2019 and 2020). We should caveat note here that these data are tiny – one third cohort and small percentage take up across regions, whilst the percentage of “don’t know” is quite high.

In most regions, and including Wales, the year of the Covid lockdowns was characterised by significant increases in energy efficiency measures being taken, followed by a marked drop in 2021. The exceptions are the North East and the East of England, where the percentage of SMEs that took energy efficiency measures continued to increase year-on-year.

The fall in the number of SMEs that attempted to install more effective energy measures in 2021 is not surprising considering that gas prices started to increase by the end of that year, and most of the interviews were conducted between the fourth quarter of 2021 and the first of 2022. Indeed, The British Business Bank 2021 SME Finance Survey found that one in three SMEs (35%) feel things have got worse for their business now that the UK-EU transition period has ended, while 7% feel things have got better.<sup>4</sup>

**Overall, in terms of regional distribution of SMEs that are energy conscious, it is clear that the South of England is the region where most are located.** However, in 2021 the North West and the East of England have become the second and third regions where SMEs take energy efficiency measures. As mentioned above, this finding suggests that as far as environmental issues are concerned, some form of regional levelling up has started taking place in recent years.

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<sup>4</sup> <https://www.ipsos.com/en-uk/british-business-bank-2021-sme-finance-survey>

**Table 3.2.2 Regional distribution of SMEs by Green Mission (column %)**

UK	2017				2019				2021			
Region	Major	Minor	None	% of all SMEs in region	Major	Minor	None	% of all SMEs in region	Major	Minor	None	% of all SMEs in region
East Midlands	9.1a	8.2a	7.8a	8.1	7.2a	7.8a	7.9a	7.6	9.5a	6.0b, c	7.3a, c	6.60
East of England	9.3a	10.2a	9.9a	10.0	12.4a	9.3b	9.4b	9.8	8.6a	8.6a	12.9b	9.10
London	14.9a	11.5b	9.7b	11.3	7.1a	9.5b	8.0a, b	8.8	14.7a	12.0b	4.1c	11.40
North East	0.9a	1.9a	2.2a	2.2	2.0a	2.4a	2.7a	2.4	1.8a	2.6a	1.9a	2.40
North West	7.6a	9.1a	10.0a	9.1	9.1a, b, c	8.8c	11.1b	9.3	11.2a	8.1b	10.7a	8.70
South East	19.3a	17.0a	17.2a	17.4	19.1a	18.0a	19.2a	18.3	17.2a	18.3a, b	18.9a, b	18.30
South West	13.6a	16.8a	15.1a	16.0	14.2a, b	15.6b, c	12.9a	15.0	12.2a, b	14.5b	13.7b	13.90
West Midlands	6.7a	7.6a	7.1a	7.2	10.0a	9.1a	8.9a	9.1	9.0a	8.4a	7.7a	8.90
Yorkshire & the Humber	6.5a, b	5.6b	7.8a	6.4	5.9a	6.7a	9.7b	7.2	4.4a	7.5b	13.5c	7.70
Scotland	6.3a	6.1a	6.5a	6.3	5.2a	6.3a	5.7a	6.0	5.5a	7.7b	6.2a, b	7.10
Wales	3.3a	3.9a	3.9a	3.8	3.7a	4.2a, b	2.2c	3.8	3.2a, b, c	3.9c	1.5b	3.60
Northern Ireland	2.4a	2.2a	2.7a	2.3	4.1a	2.3b	2.2b	2.5	2.9a	2.4a	1.7a	2.40

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level.

**Table 3.2.3 UK regions. Has your business installed any energy efficiency measures in the last 12 months? Cohort A only. (2019-2021)**

		2019				2020				2021			
		Yes	No	d/k	TOT	Yes	No	d/k	Total	Yes	No	d/k	TOTAL
East Midlands	% within UK regions	19.4	69.4	11.1	100	19.4	69.4	11.1	100	13.7	83.6	1.4	100
	% within E6A.	26.4a, b	13.6b	44.4a	16.3	26.4a, b	13.6b	44.4a	16.3	4.6a	6.3a, b	2.6a	6.0
East of England	% within UK regions		92.3	7.7	100		92.3	7.7	100	29.6	62.4	8.0	100
	% within E6A.		6.5a	11.1a	5.9		6.5a	11.1a	5.9	17.1a	8.1b	25.6a	10.2
London	% within UK regions	12.5	87.5		100	12.5	87.5		100	8.7	85.2	6.0	100
	% within E6A.	13.2a	13.3a		12.7	13.2a	13.3a		12.7	6.0a	13.1b	23.1b	12.2
North East	% within UK regions		100.0		100		100		100	9.4	90.6		100
	% within E6A.		4.9a		4.1		4.9a		4.1	1.4a	3.0a		2.6
North West	% within UK regions		100.0		100		100		100	19.0	77.0	4.0	100
	% within E6A.		8.4a		7.0		8.4a		7.0	11.1a	10.0a	12.8a	10.3
South East	% within UK regions	4.7	95.3		100	4.7	95.3		100	20.7	74.0	5.0	100
	% within E6A.	5.7a	16.5a		14.5	5.7a	16.5a		14.5	23.1a	18.5a	30.8a	19.8
South West	% within UK regions	32.8	53.4	13.8	100	32.8	53.4	13.8	100	10.5	89.0	0.6	100
	% within E6A.	35.8a	8.4b	44.4a	13.2	35.8a	8.4b	44.4a	13.2	8.8a	16.7b	2.6a, b	14.8
West Midlands	% within UK regions	9.7	90.3		100	9.7	90.3		100	21.1	78.9		100
	% within E6A.	5.7a	7.6a		7.0	5.7a	7.6a		7.0	8.8a	7.3a		7.4
Yorkshire & the Humber	% within UK regions	9.7	90.3		100	9.7	90.3		100	11.9	88.1		100
	% within E6A.	5.7a	7.6a		7.0	5.7a	7.6a		7.0	3.7a	6.1a		5.5
Scotland	% within UK regions	7.0	90.7		100	7.0	90.7		100	23.8	75.2	1.0	100
	% within E6A.	5.7a	10.6a		9.8	5.7a	10.6a		9.8	11.1a	7.9a	2.6a	8.3
Wales	% within UK regions	9.1	90.9		100	9.1	90.9		100	24.3	75.7		100
	% within E6A.	1.9a	2.7a		2.5	1.9a	2.7a		2.5	4.2a	2.9a		3.0
	% within UK regions	12.0	83.7	4.1	100	12.0	83.7	4.1	100	17.7	79.0	3.2	100

Columns with shared subscript letters denote a subset of column categories whose proportions do not differ significantly from each other at the .05 level. d/k=Don't know

## 4. ECONOMETRIC ANALYSIS

### 4.1 Measuring peripherality

Peripherality is defined in the regional science literature as the inverse of accessibility, i.e., the higher the accessibility of a region, the less peripheral it is (see, amongst others, Copus 1999 and Schürmann and Talaat 2002). In contrast with the new economic geography literature (Fujita et al 1999), this definition suggests that the principal concept is that of accessibility, with peripherality being a derivative notion. Accessibility determines the locational advantage of a region relative to all regions, and a simple measure is based on inter- and intra- regional transport infrastructure, such as the total length of motorways, the number of railway stations, or travel time to the nearest nodes of interregional networks (see Biehl, 1986; 1991). However, more complex measures have been constructed in the past two decades, and these assume that accessibility is a combination of two functions, one representing the activities to be

reached and one representing the effort, time, distance or cost needed to reach them (ESPON 2015, Schürmann 1997, Spiekermann & Wegener 2007).

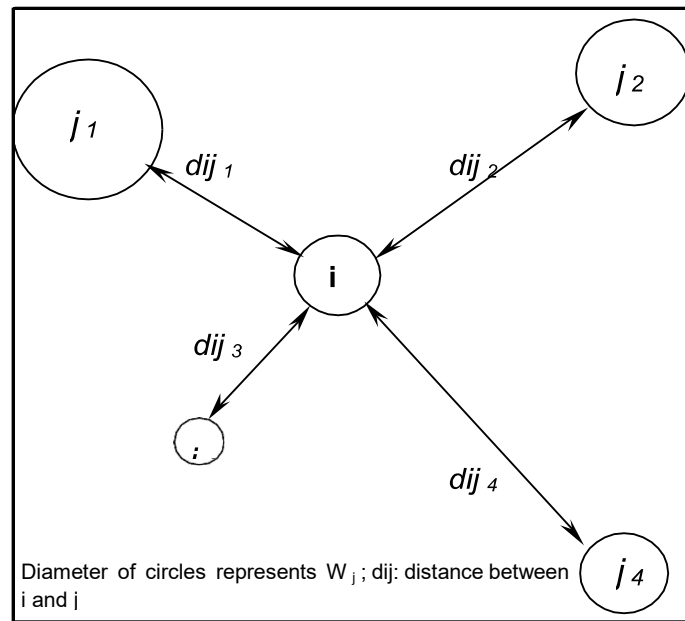
Equation (1) summarises the concept of potential accessibility used in this study:

$$A_i = \sum_{j=1}^n g(W_j)f(c_{ij}) \quad (1)$$

where  $A_i$  is the accessibility of region  $i$ ,  $W_j$  is the activity to be reached in region  $j$ , and  $c_{ij}$  is the generalised cost of reaching region  $j$  from region  $i$ . The functions  $g(W_j)$  and  $f(c_{ij})$  are called activity functions and impedance functions, respectively.  $A_i$  is the total of the activities reachable at  $j$  weighted by the ease of getting from  $i$  to  $j$ . The interpretation is that the greater the number of attractive destinations in regions  $j$  and the more accessible regions  $j$  are from region  $i$ , the greater is the accessibility of region  $i$ .

One of the applications of equation (1) is the gravity model, a concept introduced into regional science by Stewart (1947), and developed mostly in Keeble et al (1981, 1982). As in Newton's law of gravitation, the gravity model assumes that the accessibility of a region is a function both of its proximity to other regions and of their size or "mass". The influence of region  $j$  on the accessibility of region  $i$  is assumed to be directly proportional to the volume of activity at the former, and inversely proportional to the distance separating them. The accessibility indicator of region  $i$  is found by summing the influences on it of all other centres in the system. This is illustrated in Figure 4.1.1, which shows the accessibility indicator of the centre  $i$ . Each circle represents the size of the activity of the region to be accessed from  $i$ , and  $d_{ij}$  is the distance between each centre and  $i$ .

**Figure 4.1.1: Accessibility as a gravity model**



**Table 4.1.1: Typology of accessibility indices**

Types of accessibility	Activity function $g(W_j)$	Impedance function $f(c_{ij})$
Travel distance/cost	$W_j = \begin{cases} 1 & \text{if } W_j \geq W_{min} \\ 0 & \text{if } W_j < W_{min} \end{cases}$	$c_{ij}$
Daily accessibility	$c_{ij}$	$c_{ij} = \begin{cases} 0 & \text{if } c_{ij} \geq c_{max} \\ 1 & \text{if } c_{ij} < c_{max} \end{cases}$
Potential	$W_j^\alpha$	$\exp(-\beta c_j)$

Source: Schürmann et al. (1997).

The main applications of equation (1) are summarised in Table 4.1.1. The first application, “Travel distance/cost”, posits that a location is only included if the value of its activity function is above a minimum, whereas the cost function has no restrictions. A variation of this same definition, “daily activity”, considers all locations in terms of the activity function, but imposes a ceiling on the impedance function. The third type of accessibility function, the potential function, is a nonlinear version of the previous two. These definitions are not mutually exclusive and capture different aspects of the peripheral-central location dichotomy. The “Travel distance/cost” approach emphasizes the importance of the economic activity - or alternatively a large population- to be reached, whilst the “daily activity” approach focuses on physically accessing a location at a minimal cost. The type and size of the activity in the location is less important than its access. Essentially, the “daily activity” approach is concerned with measuring how many locations can be reached with a day trip (3-4 hours each way) from each point, or how many locations can be accessed for less than a target cost. The “Travel

distance/cost” approach looks at the total cost of travelling from each locality to all the major economic centres in a country, or the total cost of accessing a location of  $n$  people from each alternative location.

In this report, we construct an accessibility index over the time period 2017-2021 to measure SMEs’ access to financial services in the UK. Consequently, the activity  $W_j$  considered will be represented by the gross value added (GVA) of the financial services and insurance industry by local authority. The impedance function  $c_{ij}$  is the shortest driving distance between SME  $i$ ’s postcode and the postcode of the financial centre of a local authority  $i$ . The peripherality measure used in this report is thus:

$$A_{it} = \sum_{j=1}^n \frac{GVA_{jt}}{distance_{ij}} \quad (2)$$

for  $t=2017, 2019, 2021$ . Equation (2) defines the accessibility of a location  $i$  in relation to its proximity to a financial centre  $j$  that produces the output  $GVA_{jt}$  at time  $t$ . It is clear from this definition that the driving distance does not vary over time, but that the gross value added does. This implies that the accessibility of an SME depends on economic conditions and can vary over time, even though its geographical location does not. This can account for the changes in regions that were once economically thriving and “central” but have become economically peripheral over time, e.g., the manufacturing regions in the North-West of England. Table 2 present details of the variables used to construct the accessibility indicator (2).

**Table 4.1.1: Data and definitions**

Variables	Definition	Source	Reference
UK postcodes NUTS3 codes	Mapping of UK postcodes to EU NUTS3 regional codes	ESPON (footnote 1)	<a href="https://www.espon.eu/tools-maps/espon-database">https://www.espon.eu/tools-maps/espon-database</a>
GVA	Gross value added by local authority	Office for National Statistics	See footnote 2
UK postcodes geo coordinates	longitude and latitude of UK postcodes	Free Map Tools	See footnote 3
distances routes	driving distances between UK postcodes in km	Open Source Routing Machine (OSRM)	<a href="https://www.openstreetmap.org">https://www.openstreetmap.org</a> ; <a href="https://project-osrm.org/">https://project-osrm.org/</a>
distance matrices	driving distances between UK postcodes in km	Open Route Service	<a href="https://openrouteservice.org/">https://openrouteservice.org/</a>
SME UK postcodes	postcode of SMEs surveyed	LSBS Wave 2021	Department for Business, Energy & Industrial Strategy (BEIS)

1 European Observation Network for Territorial Development and Cohesion of the European Spatial Development Perspective (ESPON)-

2<https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/regionalgrossvalueaddedbalancedbyindustrylocalauthoritiesbyitl1region>

3 <https://www.freemaptools.com/download-uk-postcode-lat-lng.htm>



**Table 4.1.2: Gross Value Added -Financial and Insurance Activities- Summary statistics (2015-21)**

	Newcastle	Sunderland	Manchester	Cheshire	Liverpool	Leeds
Min.	439	651	2665	1569	1036	2693
1st Qu.	546	662	3310	1603	1071	2738
Median	689	716	3402	1811	1133	2800
Mean	647	698	3325	1725	1126	2867
3rd Qu.	746	718	3460	1815	1164	2977
Max.	819	760	3671	1858	1240	3146
	Calderdale	Leicester	West Northants	Birmingham	Coventry	Ipswich
Min.	1178	298	840	2733	656	407
1st Qu.	1360	341	1071	2888	869	461
Median	1455	346	1180	3267	940	493
Mean	1412	441	1117	3148	929	530
3rd Qu.	1476	527	1219	3362	1048	584
Max.	1583	706	1221	3536	1077	722
	Broadland	City of London	Tower Hamlets	Milton Keynes	Brighton and Hove	Bristol
Min.	828	36019	15474	1467	1045	1478
1st Qu.	1140	39366	16196	1529	1235	1575
Median	1407	40839	17970	1733	1395	1727
Mean	1331	41108	17624	1686	1409	1750
3rd Qu.	1458	43464	18692	1810	1614	1890
Max.	1885	45242	20146	1920	1727	2113
	Bournemouth	Swindon	Edinburgh	Glasgow	Belfast	Cardiff
Min.	1575	1026	5619	2539	1267	1614
1st Qu.	1605	1492	5760	2658	1300	1894
Median	1656	1650	6371	2777	1369	1961
Mean	1676	1539	6204	2746	1498	1915
3rd Qu.	1758	1684	6572	2779	1727	2012
Max.	1773	1743	6772	3034	1797	2023

Data source: Office for National Statistics. -K (64-66)- Values in 2019 Mn pounds

The postcodes of UK SMEs were provided in the LSBS 2017-2021 dataset, and were mapped to geographical coordinates using an open source library of geographical data and maps, FreeMapTools. The shortest driving distances between any two UK postcodes were obtained from Open Source Routing Machine (OSRM), a C++ API that calculates the shortest distance between two geographical coordinates by any mode of transportation (car, rail, bike, foot). The map data used by OSRM are provided by OpenStreetMap, a community-driven repository of maps and geographical data. Both OSRM and OpenStreetMap are open source and freely available. An alternative open source API service that was used to obtain shortest routes

between UK postcodes is Open Route Service, which is also based on OpenStreetMap. All data sources are listed in tables 4.1.1.

The Gross Value Added (GVA) data by industry and by local authority were obtained from the Office for National Statistics (ONS). The data are gathered into regional datasets. For each UK region, two local authorities with the highest GVA for industry K (Financial and Insurance Activities) were chosen as the financial centres to which any UK SME could go to apply for external finance. The choice to restrict the number of locations from which to access finance to two is compatible with equation (1) and its “travel distance/cost” version shown in Table 1. The activity function for this version of the gravity model,  $g(W_j)$ , stipulates that a location  $j$  is chosen if its activity  $W_j$  is greater or equal to a minimum value of  $W$ ,  $W_{min}$ , where  $W$  is a chosen economic activity. Here  $W_j$  represents the GVA of location  $j$ , and  $W_{min}$  is the second highest GVA of the region.

Table 4.1.2 shows the descriptive statistics of the GVA of the Financial and Insurance Services industry of each local authority considered in this study. The data are annual GVA in millions of 2019 pounds. Clearly, the two UK largest financial local authorities in Table 3 are the City of London and Tower Hamlets, which includes Canary Wharf. In fact, the postcode of Canary Wharf was used as the location of the financial centre of Tower Hamlets. Their average GVA between 2015 and 2020 is £41108 Mn. (City of London) and £17624 Mn (Tower Hamlets). The smallest financial local authority is Leicester, with an average GVA of £441 Mn.

Although the two largest local authorities in terms of financial services GVA in the UK can be found in South East England, the GVA of the financial industry of some local authorities in so-called “left-behind” regions, such as the North East, is significantly higher than that of some South-East England local authorities. For instance, the average GVA of Manchester over the period 2015-2021 is £3325 Mn, whilst that of Birmingham is £3148 Mn, against £1686 in Milton Keynes, and £1750 Mn in Bristol, the two largest local authorities in terms of financial services in Southern England.

Table 4.1.3 shows the summary statistics of the accessibility index for the period 2015-2016. In order to construct it, the GVA of 2015 was set as the base, i.e.,  $GVA_{2015} = 100$ . These summary statistics should be viewed with extreme caution because the SMEs are not the same every year, and it is not necessarily the case that a new SME added to the sample in any given year would be in the same postcode as an SME that was dropped that same year. Since the accessibility index depends on the distance between SMEs’ postcodes and the postcode of the centre of the local authority in Table 4.1.2, the summary statistics cannot be

directly compared over time. It should also be noted that GVA as defined by the Office for National Statistics include large insurance companies and pension funds which do not provide funding for SME green growth activities. However, GVA data provide the best indicator of financing centres that we can use, except for tracking UK bank branch use by each SME in the LSBS dataset, which is beyond the scope of this small pilot study.

**Table 4.1.3: Accessibility index – Summary statistics 2015-2021**

	2015	2016	2017	2018	2019	2020	2021
Min.	2	2	2	2	2	2	2
1st Qu.	12	12	11	13	12	11	11
Median	15	16	15	16	16	15	15
Mean	23	23	24	24	22	22	21
3rd Qu.	20	21	20	21	21	19	19
Max.	5047	5555	5475	5716	298	6322	6322

For the construction of the peripherality index,  $AI_t$ , each region  $j$ 's GVA was normalised by the GVA of each financial centre in 2015. Table 4.1.3 provides a snapshot of the range of the values of the range of values of this indicator. Given that index (2) is inversely related to distance, a low index value implies a location further away from any financial centre. The more the index increases, the higher the accessibility and the lower the peripherality. There is a marked drop in the maximum value of the index in 2019, which is due to a significant decline in the GVA of 15 out of the 24 financial centres considered in Table 4.3.1.

## 4.2 Digital accessibility

The accessibility index defined above is built using distance as impedance function, and thus assumes that transportation infrastructure has a crucial role in the accessibility of a region. However, recent technological developments have reduced the importance of transportation infrastructure. For instance, in the past decade telecommunications have reduced the need for in-person trips, and this trend was intensified since the 2020 Covid Lockdown. The development of financial technology has led to an increase in the closure of bank branches in the UK. There is evidence that the total number of bank and building society branches fell by 34% between 2012 and 2021 (Edmonds 2018, Brownings 2022, Booth 2022, BBB 2023<sup>5</sup>).

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<sup>5</sup> [Small Business Finance Markets Report 2023 - British Business Bank \(british-business-bank.co.uk\)](https://www.british-business-bank.co.uk/small-business-finance-markets-report-2023)

Consequently, this report also investigates the impact of digital accessibility on the demand for finance by green SMEs, we construct an indicator based on equation (1).

$$DA_{it} = GVA_t * BB_i \quad (3)$$

where  $DA_{it}$  is the digital accessibility of postcode  $i$  in year  $t$ ,  $GVA_t$  is the UK GVA<sup>6</sup> in year  $t$ , and  $BB_i$  is the percentage of premises in postcode  $i$  that has broadband. The Office for Communications (Ofcom) collects data for postcodes with superfast broadband (SFBB) and ultrafast broadband (UFBB) coverage. SFBB implies a broadband speed greater than 30 Mbit/s and less than 300Mbit/s, and UFBB broadband implies speeds greater than 300 Mbit/s. Two sets of digital accessibility indicators are built on (3), one where  $BB_i$  is replaced by SFBB $_i$ , and another where  $BB_i$  is replaced by UFBB $_i$ . Summary statistics of broadband coverage in the UK and for the digital accessibility indicator (3) -using SFBB and UFBB- are presented in Table 4.2.1.

The first striking point in Table 4.2.1 is the fact that some postcodes have no broadband coverage at all. This is indicated by the minimum of 0% of premises without broadband in all years. Apart from this negative point, all other summary statistics are positive. There is a significant increase in broadband coverage between 2017 and 2021. The average coverage for superfast broadband (SFBB) rose from 55.45 % in 2017 to 87.84 % in 2021. In addition, the coverage for ultrafast broadband (UFBB) increased from an average of 7.34 % in 2017 to 51.4% in 2021. However, the availability of ultrafast broadband is still markedly lower than that of superfast broadband. In 2021, just about half of UK premises have ultrafast broadband coverage.

The summary statistics also show that there are more premises without digital coverage than with it. In 2017 and 2021 the median of SFBB was higher than the mean, and in 2021, the median of UFBB was also significantly higher than its mean. This indicates a left-hand skew towards zero. In 2017, half of the postcodes had less than 58% of premises without superfast broadband, and in 2021, half of the postcodes had less than 92% of premises without superfast broadband.

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<sup>6</sup> The base time period for the GVA is 2015, and its value in 2015 is set at 100. The values of  $GVA_t$  to construct  $DA_{it}$  are: 2015=100; 2016=106.8599151; 2017=113.9102525; 2018=112.8646117; 2019= 110.0291353; 2020=110.3070308; 2021=116.023066.

**Table 4.2.1: Digital accessibility indicators 2017-2021**

	2017		2019		2021	
Availability of broadband (in % of premises by postcode)						
	SFBB	UFBB	SFBB	UFBB	SFBB	UFBB
Min.	0	0	0	0	0	0
1st Qu.	32.19	0.28	23.6	10	83.94	25.68
Median	57.86	12.28	41.77	45.08	92.32	56.88
Mean	55.45	27.34	44.83	41.85	87.84	51.4
3rd Qu.	77.77	55.17	66.38	69.72	96.04	76.49
Max.	99.66	99.2	99.02	98.09	99.94	98.75
Digital accessibility indicator						
Min.	0	0	0	0	0	0
1st Qu.	37	0	26	11	97	30
Median	66	14	46	50	107	66
Mean	63	31	49	46	102	60
3rd Qu.	89	63	73	77	111	89
Max.	14	113	109	108	116	150

Source: OFCOM - SFBB: Super-Fast Broadband (speed greater than 30 Mbit/s and less than 300Mbit/s); UFBB: Ultra-Fast Broadband (speed greater than 300 Mbit/s).

### 4.3 Econometrics results

Table A2.1 in Appendix A2 describes the four distinct groups of SMEs analysed. The classification is based on the LSBS Waves 2017-2021 categorisation<sup>7</sup> and on CEEDR (2022) taxonomy. The control and independent variables used in the regressions of this section are shown in Table A2.2 in Appendix A2. The dependent variables are introduced in the relevant subsections below and summarised in Tables A2.3 to A2.4.

The econometric methodology is based on panel data analysis (Baltagi 2021, Hsiao 2014). The model is a time fixed effects probit panel, and its equation is shown below each table. The choice of methodology derives firstly from the nature of the LSBS survey, which aims to interview the same businesses every year, and thus follow them over time. As such, the LSBS data are by definition panel data (Frees 2004). Although the resulting LSBS longitudinal data do not usually include the same SMEs over time due to attrition, the panel data analysis methodology accounts for this scenario by estimating the regressions as an unbalanced panel. All panels estimated in this study are unbalanced. In addition, corrective weights provided by

<sup>7</sup> The methodological notes can be found on <https://www.gov.uk/government/collections/small-business-survey-reports>;

the LSBS were applied to the regressions<sup>8</sup>. We estimated a time fixed-effects model to account for time-specific (but unit-invariant) confounding variables, which are extraneous variables related to independent and dependent variables, but are unobserved.

As this study includes three LSBS Waves, 2017-2019-2021, and covers the year following the 2020 Covid-19 pandemic year, differences in the dependent and independent variables may be due to events that happened during the years that are not explicitly captured in the data, and in particular the profound economic disruption caused by the 2020 Covid-19 lockdown. The results of the regressions show that the time fixed effects are often significant at the 1 % level.

### 4.3.1 Determinants of current use of external finance

The choice of the dependent variable was informed by the descriptive analysis of Section 3. In particular, we investigate the determinants of bank overdraft, bank loans, credit cards, and government grants for all types of SMEs. It was not possible to robustly estimate the impact of geographical or digital accessibility on the demand for non-traditional types of finance such as equity or peer-to-peer finance (P2P). The descriptive analysis in Section 3 also clearly indicated that this type of external finance is barely used by most SMEs, and not at all by SEs.

Only the bank loans and government grants unrelated to Covid-19 are included in the analysis. This variable only affects the use and demand of external finance in 2020-2021, but not in previous years. Given that this study looks at the determinants of external finance between 2017 and 2021, it could not be included in the sample.

Tables 4.3.2.1 to 4.3.2.4 show the regression results for green mission SMEs (*Major* and *Minor*), SMEs without green mission and SEs. **Geographical accessibility** has no significant impact on the type of external finance used by *Major* green mission SMEs (Table 4.3.2.1). It does impact on the use of bank overdrafts by *Minor* green Mission SMEs at 10 % significance, on bank loans at the 5% level, and on government grants at 1% (Table 4.3.2.2). The signs of the coefficients indicate that higher geographical accessibility decreases the use of government grants and of overdrafts, but that it increases the use of bank loans. Higher geographical accessibility also decreases the use of credit cards by *Minor* green mission SMEs (1 % significance). The negative sign suggests that closer proximity to major financial

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<sup>8</sup> See [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1105801/Small\\_Business\\_Survey\\_2021\\_Methodology.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1105801/Small_Business_Survey_2021_Methodology.pdf) for details.

centres tends to reduce the likelihood of business use of credit card finance. Geographical accessibility only affects SEs' use of grants from government (Table 4.3.2.3). The coefficient is negative and significant at 1% suggesting that the closer a social enterprise is to a major financial centre, the less likely it is to use government grants. Finally, for SMEs without any green objective, geographical accessibility does not affect their use of government grants and credit cards, but has a significant impact on the use of bank-related services, loans and overdrafts (5%, and 1% significance, resp.). The impact is negative in both cases as well (Table 4.3.2.4).

With respect to **digital accessibility**, results suggest that it has a significant negative impact on the use of bank overdrafts by *Major* green mission SMEs (at 5% (*techSF*) and 10% (*techUF*), resp.), and a positive impact on the use of credit cards (*techSF*) at 10 % significance (Table 4.3.2.1). Digital accessibility tends to reduce the use of government grants, and overdrafts by *Minor* SMEs (1% significance – Table 4.3.2.2). It has no statistically significant impact on credit card use. Analogous findings for SEs in terms of significance and the direction of impact of this variable are shown in Table 4.3.2.3. Finally, for SMEs without any green mission digital accessibility only affects the use of overdrafts (10% significance), and its impact is positive, i.e., higher digital access tends to imply higher use of credit card finance.

The negative significant impact of digital accessibility indicators on the use of government or local authority grants by green mission SMEs and SEs suggests that digital accessibility increases opportunities for funding and does not restrict the SME to use local sources of finance. However, it should be noted that the marginal effect of both digital accessibility indicators (*techUF* and *techSF*) is very low in all cases, suggesting that where these variables have a statistically significant impact, it does so marginally. For instance, an increase in 1 MB of ultrafast broadband will reduce the likelihood of the use of government grants by *Minor* green mission SMEs by less than 0.1 per cent (Table 4.3.2.2). Similar small marginal effects can be seen for SEs in Table 4.3.2.3.

In relation to the characteristics of SMEs such as age, type of management, employment, industrial sector, amongst other, we note that SEs differ from green mission SMEs and from SMEs without social or green objectives. For instance, being an **export-oriented** SE has a significant positive impact on the use of bank overdraft (Table 4.3.2.3), whereas this variable has no effect on the use of the same type of external finance by *Minor*, and no green mission SMEs (Tables 4.3.2.2 and 4.3.2.3). Export-orientation tends to increase the probability of using credit cards in all types of SMEs and SEs. The type of management, viz., whether the business is led by an **ethnic minority manager** (MLED) or a **woman** (WLED) has mixed impacts on



green SMEs and SEs. Being woman-led has no significant effect on the type of finance used by any SME or SE, with a couple of exceptions. Being woman-led tends to decrease the use of overdrafts and credit cards (10% and 5% significance, resp.) by *Major* green SMEs, and to increase the probability of using government grants (at 5% significance) by *Minor* green businesses. A green SME led by an ethnic-minority manager is unlikely to apply for any type of external finance (Table 4.3.2.1 and 4.3.2.2), but *MLED* SEs tend to decrease the use of government grants and credit cards (both at 5% significance, Table 4.3.2.3).

Businesses with **no employees** are less likely to use external finance. The coefficient of this variable is almost always negative and significant at 5 or 1 per cent (Tables 4.3.2.1 to 4.3.2.4). The **age** of the business has a positive but insignificant impact on the use of any type of external finance, for all types of SMEs excluding SEs (credit cards). The marginal effects of the business characteristics variables are generally stronger than those of the digital accessibility. For instance, Table 4.3.2.1 shows that a *Major* green mission SME aiming to grow sales (1% significance) is 2.5% more likely not to use bank overdraft than one that does not aim to export.

*Major* and *Minor* green missions SMEs, and SEs that operate in the **sectors** of *Production and construction*, *Transport, retail and food service/ accommodation* and *Business services* are more likely to use bank overdrafts and loans (Tables 4.3.2.1, 4.3.2.2, 4.3.2.3). Being in *Production and construction* and *Transport, retail and food service/ accommodation* increases the likelihood of an SME without green or social mission to use bank overdraft, credit cards, but not bank loans (Table 4.3.2.4). The analysis in Section 3 showed that green mission SMEs and SEs are more likely to be found in the least deprived postcodes of the UK. The regression analysis shows that the **index of deprivation** has no statistically significant impact on the use of bank loans by *Major* and *Minor* green SMEs. SEs in the 40 % least deprived areas are more likely to use bank loans and credit cards (1% significance). **SEs and Major green SMEs located in the 20% most deprived areas are significantly more likely to use government or local authority grants, rather than bank-based finance** (Tables 4.3.2.1, 4.3.2.3). The index of multiple deprivation has no impact on the demand for government grants by SMEs that prioritise profit-making (Table 4.3.2.2). Finally, SMEs without social or green objectives located in the 20%-40% most deprived areas tend to demand all types of external finance, whilst those in the 20%-40% least deprived locations do not demand any type of external finance (Table 4.3.2.4).

**Table 4.3.2.1: Determinants of current use of external finance (Major green mission SMEs)**

Variables	Govt grants			Bank loans			Overdraft			Credit cards		
	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME
Geographical access	-0.0117	0.3210	-0.0044	0.0001	0.991	0.0000	0.0125	0.4101	0.005	0.022	0.2137	0.008
Digital access ( <i>techUF</i> )	-0.0034	0.1411	-0.0013	0.0015	0.470	0.0006	-0.0052	0.0774 *	-0.002	0.002	0.6469	0.001
Digital access ( <i>techSF</i> )	-0.00004	0.9892	-0.00002	0.0004	0.882	0.0002	-0.0081	0.0348 **	-0.003	0.009	0.0397 *	0.003
No employee	-0.0740	0.000 ***	-0.0282	-0.1013	0.000 ***	-0.0393	-0.0923	0.000 ***	-0.035	-0.215	0.000 ***	-0.078
Age: 0 - 5 years	0.0501	0.7205	0.0191	0.0593	0.631	0.0230	0.0874	0.6274	0.033	-0.146	0.4803	-0.053
Age: 6 - 10 years	0.0327	0.8154	0.0124	0.0665	0.591	0.0258	0.1501	0.4044	0.057	-0.049	0.8115	-0.018
Age: 11 - 20 years	0.0631	0.6515	0.0240	0.0132	0.915	0.0051	0.1238	0.4910	0.047	-0.122	0.5541	-0.044
Age: 20+	0.0774	0.5791	0.0294	0.0232	0.851	0.0090	0.1451	0.4190	0.055	-0.047	0.8202	-0.017
Export goods	-0.0050	0.7685	-0.0019	-0.0076	0.615	-0.0029	0.0509	0.02 *	0.019	0.096	0.0001 ***	0.035
Aim to grow sales	-0.0204	0.0764 *	-0.0078	-0.0295	0.0034 ***	-0.0114	0.0656	0.000 ***	0.025	-0.025	0.1483	-0.009
Very likely to apply ext. finance	0.1957	0.000 ***	0.0745	0.1352	0.000 ***	0.0524	-0.0736	0.007 **	-0.028	0.049	0.1204	0.018
Fairly likely to apply ext. finance	0.0366	0.0666 *	0.0139	0.0488	0.0056 ***	0.0189	0.1604	0.000 ***	0.061	0.092	0.0019 ***	0.033
Ext. finance applied at least once	-0.0253	0.2546	-0.0096	0.0488	0.012991 **	0.0189	0.2354	0.000 ***	0.090	0.100	0.0025 ***	0.036
Woman-Led (WLED)	-0.0161	0.2566	-0.0061	0.0030	0.814	0.0011	-0.0459	0.0122 *	-0.017	-0.044	0.0373 **	-0.016
Ethnic minority-Led (MLED)	-0.0225	0.3325	-0.0086	-0.0022	0.913	-0.0009	-0.0308	0.3026	-0.012	-0.006	0.8607	-0.002
IMD_20 (20% most deprived)	0.0376	0.0324 **	0.0143	-0.0208	0.180	-0.0081	-0.0226	0.3192	-0.009	0.024	0.3567	0.009
IMD_40	0.0495	0.0032 ***	0.0188	0.0034	0.818	0.0013	0.0074	0.7330	0.003	-0.005	0.8541	-0.002
IMD_60	0.0013	0.9351	0.0005	-0.0069	0.610	-0.0027	0.0283	0.1530	0.011	0.046	0.0422 **	0.017
IMD_80 (40% least deprived)	0.0232	0.1467	0.0088	0.0325	0.0213 **	0.0126	0.0885	0.000 ***	0.034	0.126	0.000 ***	0.046
Turnover Growth	-0.0023	0.8719	-0.0009	-0.0056	0.661	-0.0022	-0.0328	0.077 *	-0.012	-0.046	0.03196 **	-0.017
Turnover stable	0.0145	0.3047	0.0055	0.0083	0.508	0.0032	-0.0409	0.0247 *	-0.016	-0.033	0.1155	-0.012
Family-owned	-0.1150	0.000 ***	-0.0438	0.0266	0.025 **	0.0103	0.0876	0.000 ***	0.033	0.076	0.0001 ***	0.028
East Midlands	-0.1242	0.0009 ***	-0.0472	-0.0552	0.095 **	-0.0214	-0.0160	0.7392	-0.006	-0.078	0.1602	-0.028
East of England	-0.1313	0.0003 ***	-0.0499	-0.0210	0.512	-0.0082	-0.0286	0.5415	-0.011	-0.093	0.0851 *	-0.034
London	-0.1297	0.0007 ***	-0.0493	-0.0949	0.0048 ***	-0.0368	0.0235	0.6315	0.009	-0.104	0.0650 *	-0.038
North East	-0.1588	0.002 **	-0.0604	-0.0407	0.372	-0.0158	0.0663	0.3179	0.025	-0.191	0.01254 **	-0.069
North West	-0.1620	0.000 ***	-0.0616	-0.0411	0.209	-0.0159	-0.0418	0.3797	-0.016	-0.115	0.0351 **	-0.042
South East	-0.1180	0.00074 ***	-0.0449	-0.0566	0.0678 *	-0.0219	-0.0526	0.2421	-0.020	-0.052	0.3110	-0.019
South West	-0.1442	0.000 ***	-0.0549	-0.0697	0.023 **	-0.0270	-0.0517	0.2483	-0.020	-0.174	0.001 ***	-0.063
West Midlands	-0.1031	0.005 ***	-0.0392	-0.0643	0.0471 **	-0.0250	-0.0516	0.2747	-0.020	-0.093	0.0879 *	-0.034
Yorkshire & the Humber	-0.0716	0.064 **	-0.0272	-0.0702	0.039 **	-0.0272	-0.0755	0.1291	-0.029	-0.116	0.0423 **	-0.042
Scotland	-0.0305	0.4264	-0.0116	-0.0403	0.234	-0.0156	-0.0632	0.2001	-0.024	-0.025	0.6544	-0.009
Wales	-0.1162	0.0062 ***	-0.0442	-0.0749	0.046 **	-0.0291	-0.0110	0.8404	-0.004	-0.064	0.3104	-0.023
Production and construction	-0.0596	0.0004 ***	-0.0227	0.0597	0.000 ***	0.0231	0.1055	0.000 ***	0.040	0.048	0.0548 *	0.017
Transport, retail and food service/ accommodation	-0.0272	0.1132	-0.0104	0.0436	0.0041 ***	0.0169	0.0656	0.003 ***	0.025	0.051	0.0471 **	0.018
Business services	-0.0402	0.0043 ***	-0.0153	0.0034	0.784	0.0013	0.0109	0.5469	0.004	0.049	0.0196 **	0.018
Number obs. (Unbalanced panel)	2198			2198			2198			2198		
Total Sum of Squares	311.48			232.34			334.65			472.33		
Residual Sum of Squares	127.49			99.474			211.07			279.45		
R-Squared	0.16729			0.057843			0.054028			0.038409		
Adj. R-Squared	0.15264			0.04126			0.037378			0.021484		
F(36,2159)	22.7052			11.5303			13.4367			16.8913		
p-value	0.0000			0.0000			0.0000			0.0000		
	Time fixed effects			Time fixed effects			Time fixed effects			Time fixed effects		
	Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )	
2017	0.3610	0.01246 **		0.146698	0.2500416		0.101408	0.5851126		0.290112	0.1747506	
2019	0.3158	0.0276 **		0.115692	0.3606865		0.063827	0.7291734		0.320914	0.1304111	
2021	0.3074	0.03523 **		0.097025	0.4516952		0.107326	0.567643		0.28481	0.1875447	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t} | x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$ , where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\* : < 5% and \*\*\* : <1%. ME: Marginal Effects

**Table 4.3.2.2: Determinants of current use of external finance (Minor green mission SMEs)**

Variables	Govt grants			Bank loans			Overdraft			Credit cards		
	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME
Geographical access	-0.0100	0.00172 ***	-0.0107	0.013545	0.0112 **	0.0052	-0.0142	0.0695643*	-0.005	-0.0303	0.0003 ***	-0.0039
Digital access (techUF)	-0.0036	0.0000 ***	-0.0001	0.000322	0.7423	-0.0017	-0.0046	0.00124***	-0.000	0.0003	0.817985	-0.0014
Digital access (techSF)	-0.0026	0.00034 ***	-0.0008	0.001444	0.2502	0.0000	0.0001	0.9652774	0.001	-0.0023	0.237558	-0.0010
No employee	-0.0476	0.000 ***	-0.0407	-0.08904	0.0000 ***	-0.0250	-0.0681	0.0000***	-0.034	-0.1153	0.0000***	-0.0187
Age: 0 - 5 years	-0.0320	0.4986698	-0.0473	0.021846	0.7839	-0.0607	-0.1654	0.1522217	0.008	-0.1341	0.277984	-0.0126
Age: 6 - 10 years	-0.0330	0.4848432	-0.0180	0.046077	0.5626	-0.0351	-0.0956	0.4073595	0.018	-0.0510	0.679249	-0.0130
Age: 11 - 20 years	-0.0319	0.4995022	-0.0081	0.058705	0.4603	-0.0150	-0.0407	0.7237521	0.022	-0.0230	0.851826	-0.0125
Age: 20+	-0.0130	0.7830015	0.0107	0.085128	0.2842	-0.0103	-0.0280	0.8079253	0.032	0.0302	0.806296	-0.0051
Export goods	-0.0004	0.9198616	0.0298	-0.01432	0.0369**	0.0069	0.0189	0.0573421	-0.005	0.0844	0.0000***	0.0002
Aim to grow sales	0.0073	0.0241361 **	0.0146	0.007918	0.1457	0.0131	0.0356	0.0000***	0.003	0.0415	0.0000***	0.0029
Very likely to apply ext. finance	0.0449	0.0000 ***	0.0382	0.219554	0.0000 ***	0.0463	0.1262	0.0000***	0.084	0.1085	0.0000***	0.0177
Fairly likely to apply ext. finance	0.0151	0.0016746 **	0.0448	0.098964	0.0000 ***	0.0514	0.1401	0.0000***	0.038	0.1270	0.0000***	0.0060
Ext. finance applied at least once	0.0060	0.3306964	0.0251	0.198851	0.0000 ***	0.0616	0.1679	0.0000***	0.076	0.0712	0.0000***	0.0024
Woman-led (WLED)	0.0097	0.01057 **	0.0039	-0.01111	0.0836	-0.0027	-0.0074	0.4289465	-0.004	0.0111	0.2665	0.0038
Ethnic minority-led (MLED)	-0.0008	0.9016857	-0.0058	-0.014	0.1979	0.0058	0.0158	0.3174018	-0.005	-0.0165	0.328841	-0.0003
IMD_20 (20% most deprived)	-0.0004	0.9363095	0.0036	0.000491	0.9556	0.0062	0.0170	0.1831024	0.000	0.0102	0.455581	-0.0002
IMD_40	0.0040	0.3652083	0.0017	-0.00697	0.3546	0.0099	0.0270	0.0136 *	-0.003	0.0048	0.678751	0.0016
IMD_60	0.0076	0.0684905	0.0033	-0.00609	0.3842	0.0094	0.0256	0.0116 *	-0.002	0.0092	0.394905	0.0030
IMD_80 (40% least deprived)	0.0058	0.1817811	0.0104	0.001664	0.8300	0.0128	0.0349	0.0011 **	0.001	0.0294	0.0100***	0.0023
Turnover Growth	0.0036	0.3466885	-0.0047	0.003309	0.6098	-0.0061	-0.0165	0.0789*	0.001	-0.0134	0.182867	0.0014
Turnover stable	0.0080	0.0306124 *	0.0046	0.010079	0.1045*	-0.0022	-0.0060	0.50762	0.004	0.0131	0.172549	0.0031
Family-owned	-0.0385	0.0000 ***	0.0265	0.030567	0.0000 ***	0.0442	0.1203	0.0000***	0.012	0.0752	0.0000***	-0.0151
East Midlands	0.0010	0.9337897	0.0233	-0.06567	0.0012 **	-0.0213	-0.0580	0.0487 *	-0.025	0.0660	0.036 **	0.0004
East of England	-0.0077	0.5163774	0.0062	-0.07619	0.0001 ***	-0.0294	-0.0801	0.0055 **	-0.029	0.0177	0.566737	-0.0030
London	0.0003	0.9830897	0.0107	-0.04589	0.02488 **	-0.0309	-0.0843	0.00447 **	-0.017	0.0303	0.33939	0.0001
North East	0.0106	0.4520592	0.0129	-0.09402	0.0000 ***	-0.0311	-0.0848	0.01375 *	-0.036	0.0367	0.318922	0.0042
North West	-0.0077	0.5160427	-0.0206	-0.04495	0.024599 **	-0.0339	-0.0923	0.00145**	-0.017	-0.0586	0.0589704	-0.0030
South East	-0.0071	0.5217706	0.0007	-0.05873	0.00178 ***	-0.0186	-0.0507	0.0628	-0.022	0.0019	0.948417	-0.0028
South West	-0.0114	0.3057868	0.0016	-0.0573	0.00223 ***	-0.0129	-0.0351	0.1959834	-0.022	0.0045	0.877733	-0.0045
West Midlands	0.0123	0.2964086	-0.0167	-0.03558	0.07421*	-0.0345	-0.0941	0.0011 ***	-0.014	-0.0473	0.126132	0.0049
Yorkshire & the Humber	0.0045	0.7064554	0.0007	-0.0432	0.0325 **	-0.0250	-0.0681	0.02001 **	-0.016	0.0020	0.948417	0.0018
Scotland	0.0321	0.0064 **	-0.0170	-0.0336	0.09037*	-0.0326	-0.0889	0.0020 ***	-0.013	-0.0482	0.117634	0.0126
Wales	0.0139	0.2756749	0.0203	-0.01673	0.4371183	0.0032	0.0087	0.7793339	-0.006	0.0575	0.0849667*	0.0055
Production and construction	0.0000	0.9996516	0.0307	0.05302	0.0000 ***	0.0322	0.0878	0.0000 ***	0.020	0.0870	0.0000 ***	0.0000
Transport, retail and food service/ accommodation	-0.0327	0.0000***	0.0219	0.037068	0.0000 ***	0.0271	0.0739	0.0000***	0.014	0.0622	0.0000***	-0.0128
Business services	-0.0174	0.0000***	0.0156	-0.00328	0.63073	0.0127	0.0347	0.0005 ***	-0.001	0.0442	0.0000 ***	-0.0068
Number obs. (Unbalanced panel)	1889			1889			1889			1889		
Total Sum of Squares	926.28			2061.8			2888.8			3288.6		
Residual Sum of Squares	320.65			910.51			1914.3			2190.1		
R-Squared	0.048255			0.1259			0.076198			0.043613		
Adj. R-Squared	0.045636			0.12349			0.073655			0.040981		
F(36, 13806)	40.7061			80.3554			39.7715			43.1111		
p-value	0.0000***			0.0000***			0.0000***			0.0000***		
Time Fixed effects				Time Fixed effects				Time Fixed effects				Time Fixed effects
	Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )	
2017	0.1947668	0.0000***		0.121108	0.147287		0.2761294	0.02269**		0.3135253	0.01557***	
2019	0.1673614	0.0000***		0.116553	0.161487		0.2702024	0.025197**		0.3251084	0.011806***	
2021	0.1970982	0.0000***		0.075693	0.367032		0.2288992	0.059947**		0.3018797	0.020371**	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t}|x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$  where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\* : < 5% and \*\*\* : <1%. ME: marginal effects



**Table 4.3.2.3: Determinants of current use of external finance (SEs)**

	Govt grants			Bank loans			Overdraft			Credit cards		
Variables	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME
Geographical access	-0.0435	0.0000***	-0.017	0.013	0.220	0.005	0.000	0.987	0.000	0.000	0.984	0.000
Digital access (techUF)	-0.0084	0.0000***	-0.003	-0.002	0.360	-0.001	-0.010	0.00093 ***	-0.004	0.001	0.807	0.000
Digital access (techSF)	-0.0097	0.0000 ***	-0.004	-0.001	0.519	-0.001	-0.004	0.300	-0.001	0.000	0.932	0.000
No employee	-0.1030	0.0000***	-0.039	-0.112	0.0000 ***	-0.043	-0.062	0.0000***	-0.023	-0.167	0.0000***	-0.059
Age: 0 - 5 years	0.0720	0.5297	0.028	0.090	0.414	0.034	-0.072	0.692	-0.027	0.226	0.258	0.080
Age: 6 - 10 years	0.0840	0.4622	0.032	0.089	0.417	0.034	0.059	0.745	0.022	0.363	0.068803 *	0.129
Age: 11 - 20 years	0.0613	0.5905	0.023	0.119	0.273	0.046	0.065	0.717	0.024	0.270	0.175	0.096
Age: 20+	0.0939	0.4097	0.036	0.137	0.207	0.053	0.073	0.684	0.027	0.375	0.059192 *	0.133
Export goods	-0.0228	0.1480	-0.009	-0.018	0.235	-0.007	0.072	0.00394 **	0.027	0.164	0.0000 ***	0.059
Aim to grow sales	-0.0384	0.0002597 ***	-0.015	0.006	0.569	0.002	0.094	0.0000 ***	0.035	0.036	0.047632 *	0.013
Very likely to apply ext. finance	0.1559	0.0000***	0.060	0.093	0.0000***	0.036	0.067	0.0299*	0.025	0.047	0.167	0.017
Fairly likely to apply ext. finance	0.0481	0.0054554 ***	0.018	0.088	0.0000***	0.034	0.188	0.0000 ***	0.070	0.080	0.007946 **	0.029
Ext. finance applied at least once	-0.0069	0.7753	-0.003	0.231	0.0000***	0.089	0.092	0.016889*	0.034	0.119	0.005074 **	0.042
Woman-led (WLED)	0.0022	0.8572	0.001	-0.001	0.924	0.000	-0.009	0.652	-0.003	0.015	0.474	0.005
Ethnic minority-led (MLED)	-0.0455	0.0176890 **	-0.017	-0.017	0.349	-0.007	-0.077	0.0107 *	-0.029	-0.109	0.001123 **	-0.039
IMD_20 (20% most deprived)	0.03810	0.0355746 **	0.015	0.0121345	0.484	0.005	-0.077	0.007 **	-0.029	-0.00649	0.837	-0.002
IMD_40	0.03150	0.0316602 **	0.012	0.0226981	0.105	0.009	-0.028	0.225	-0.010	-0.0084	0.742	-0.003
IMD_60	-0.01231	0.3898	-0.005	0.0354729	0.0096 ***	0.014	-0.002	0.914	-0.001	0.048	0.052806*	0.017
IMD_80 (40% least deprived)	0.0218	0.1437	0.008	0.0486866	0.0006 ***	0.019	0.011	0.639	0.004	0.133	0.0000 ***	0.047
Turnover Growth	-0.0205	0.1194	-0.008	-0.008	0.526	-0.003	-0.011	0.609	-0.004	-0.022	0.337	-0.008
Turnover stable	-0.0274	0.0313648 **	-0.011	-0.012	0.326	-0.005	-0.031	0.119	-0.012	0.007	0.750	0.003
Family-owned	-0.0675	0.0000***	-0.026	0.023	0.0391 **	0.009	0.148	0.0000***	0.055	0.130	0.0000 ***	0.046
East Midlands	-0.0524	0.1605	-0.020	-0.116	0.0012 **	-0.044	0.051	0.390	0.019	0.007	0.911	0.003
East of England	-0.0986	0.007997***	-0.038	-0.150	0.0000 ***	-0.058	-0.140	0.0175 *	-0.052	-0.115	0.0747 *	-0.041
London	-0.0171	0.6549	-0.007	-0.134	0.0003 ***	-0.051	-0.060	0.323	-0.022	-0.045	0.498	-0.016
North East	-0.0500	0.2282	-0.019	-0.118	0.0023 **	-0.045	-0.067	0.307	-0.025	0.097	0.181	0.034
North West	-0.0826	0.0280206 **	-0.032	-0.095	0.0084 **	-0.036	-0.133	0.0256 *	-0.049	-0.064	0.327	-0.023
South East	-0.0534	0.1242	-0.020	-0.132	0.0000 ***	-0.051	-0.057	0.299	-0.021	0.033	0.581	0.012
South West	-0.0741	0.0310 **	-0.028	-0.100	0.00245***	-0.038	-0.043	0.431	-0.016	-0.019	0.750	-0.007
West Midlands	-0.0199	0.5940	-0.008	-0.093	0.0088 **	-0.036	-0.146	0.01301**	-0.055	0.126	0.052915 *	0.045
Yorkshire & the Humber	-0.0422	0.2593	-0.016	-0.113	0.00167***	-0.043	-0.087	0.143	-0.032	-0.025	0.705	-0.009
Scotland	0.0193	0.6011	0.007	-0.083	0.0191**	-0.032	-0.162	0.0054 **	-0.060	-0.065	0.311	-0.023
Wales	-0.0625	0.1403	-0.024	-0.115	0.00457***	-0.044	-0.103	0.125	-0.038	0.016	0.832	0.006
Production and construction	-0.0213	0.1240	-0.008	0.038	0.00395 ***	0.015	0.191	0.0000 ***	0.071	0.114	0.0000***	0.041
Transport, retail and food service/ accommodation	-0.0732	0.0000***	-0.028	0.019	0.174	0.007	0.128	0.0000 ***	0.048	0.005	0.834	0.002
Business services	-0.0318	0.01599 **	-0.012	0.029	0.0233**	0.011	0.079	0.0002 ***	0.029	0.023	0.314	0.008
Number obs. (Unbalanced panel)	318			318			318			318		
Total Sum of Squares	332.94			328.98			456.22			576		
Residual Sum of Squares	101.26			92.626			253.4			308.02		
R-Squared	0.10153			0.11708			0.06172			0.038925		
Adj. R-Squared	0.087734			0.10353			0.047315			0.024169		
F(36,2475)	23.5902			22.3669			15.5936			14.7676		
p-value	0.0000***			0.0000***			0.0000***			0.0000***		
	Fixed time effects			Fixed time effects			Fixed time effects			Fixed time effects		
	Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )	
2017	0.4560310	0.0000***		0.078118	0.489636		0.121615	0.515502		-0.14009	0.496885	
2019	0.4023606	0.0000***		0.045911	0.683483		0.100306	0.590199		-0.13056	0.524921	
2021	0.4754757	0.0000***		0.050641	0.656823		0.122009	0.517515		-0.14395	0.488592	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t}|x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$ , where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\* : < 5% and \*\*\* : <1%. ME: Marginal Effects

**Table 4.3.2.4: Determinants of current use of external finance (no green mission SMEs)**

		Govt grants			Bank loans			Overdraft			Credit cards		
Variables		Estimate	P< > t )	ME	Estimate	P< > t )	ME	Estimate	P< > t )	ME	Estimate	P< > t )	ME
Geographical access		-0.0024	0.68928	-0.00096	-0.02326	0.0406 **	-0.00898	-0.04622	0.0102 ***	-0.01702	0.02538	0.18683	0.00911
Digital access (techUF)		-0.0004	0.78240	-0.00016	-0.00362	0.17776	-0.00140	-0.00258	0.54404	-0.00095	-0.00153	0.73663	-0.00055
Digital access (techSF)		-0.000002	0.99905	-0.000001	-0.00266	0.41067	-0.00103	0.01164	0.02276 **	0.00429	0.00382	0.48420	0.00137
No employee		-0.0258	0.0000***	-0.01023	-0.08690	0.0000***	-0.03355	-0.06348	0.0000***	-0.02338	-0.07419	0.0000***	-0.02662
Age: 0 - 5 years		0.0419	0.46718	0.01657	0.08183	0.44832	0.03159	-0.02459	0.88548	-0.00906	0.09216	0.61387	0.03307
Age: 6 - 10 years		0.0165	0.77420	0.00653	0.07446	0.48952	0.02874	0.10496	0.53804	0.03866	0.18206	0.31817	0.06533
Age: 11 - 20 years		0.0222	0.69791	0.00880	0.08678	0.41893	0.03350	0.15090	0.37435	0.05558	0.18440	0.31026	0.06617
Age: 20+		0.0301	0.59822	0.01193	0.09537	0.37387	0.03682	0.15673	0.35566	0.05773	0.25514	0.15994	0.09155
Export goods		0.0036	0.66126	0.00141	-0.01738	0.25440	-0.00671	0.01011	0.67503	0.00372	0.10651	0.0000***	0.03822
Aim to grow sales		0.0048	0.40627	0.00190	0.02538	0.019422**	0.00980	0.04167	0.0153 *	0.01535	0.03899	0.0339 **	0.01399
Very likely to apply ext. finance		0.0398	0.0039***	0.01574	0.06669	0.0098 ***	0.02575	0.00458	0.91062	0.00169	0.12158	0.0054 **	0.04363
Fairly likely to apply ext. finance		0.0327	0.0026***	0.01297	0.06488	0.0015***	0.02504	0.23810	0.0000***	0.08770	0.01733	0.61548	0.00622
Ext. finance applied at least once		-0.0047	0.73001	-0.00186	0.23539	0.0000***	0.09087	0.18715	0.0000***	0.06894	0.22788	0.0000***	0.08177
Woman-led (WLED)		-0.0069	0.32103	-0.00273	-0.01556	0.23308	-0.00601	0.00940	0.64869	0.00346	-0.01011	0.64715	-0.00363
Ethnic minority-led (MLED)		-0.0196	0.16508	-0.00774	0.01124	0.67052	0.00434	0.06940	0.0968490 *	0.02556	0.01841	0.68044	0.00661
IMD_20 (20% most deprived)		0.0083	0.36030	0.00327	0.01714	0.31190	0.00662	0.08384	0.00178**	0.03088	0.04809	0.0937*	0.01726
IMD_40		0.0185	0.0203***	0.00732	0.04351	0.0036***	0.01679	0.08343	0.00042 ***	0.03073	-0.00995	0.69371	-0.00357
IMD_60		-0.0082	0.29010	-0.00323	0.00184	0.89883	0.00071	-0.01238	0.58832	-0.00456	-0.02524	0.30251	-0.00906
IMD_80 (40% least deprived)		-0.0042	0.59148	-0.00166	-0.01555	0.28803	-0.00600	0.00053	0.98171	0.00020	-0.02407	0.33132	-0.00864
Turnover Growth		0.0132	0.0729846 *	0.00523	-0.00294	0.83121	-0.00114	-0.03518	0.10740	-0.01296	-0.06150	0.0085 **	-0.02207
Turnover stable		0.0007	0.91829	0.00026	-0.01186	0.32664	-0.00458	-0.06902	0.00031 ***	-0.02542	-0.01296	0.52676	-0.00465
Family-owned		-0.0189	0.0196*	-0.00747	-0.00191	0.89952	-0.00074	0.05241	0.0289 **	0.01930	0.08836	0.0006 ***	0.03170
East Midlands		-0.1098	0.0000***	-0.04346	0.00167	0.97068	0.00064	0.17264	0.01626 **	0.06359	-0.03832	0.61792	-0.01375
East of England		-0.1023	0.0000***	-0.04050	0.00023	0.99588	0.00009	0.09805	0.16538	0.03612	-0.00913	0.90394	-0.00327
London		-0.1032	0.0000 ***	-0.04085	0.01611	0.73102	0.00622	0.09811	0.18574	0.03614	-0.11773	0.13779	-0.04224
North East		-0.0477	0.0866835*	-0.01888	-0.00197	0.96985	-0.00076	0.01599	0.84645	0.00589	-0.16457	0.0625*	-0.05905
North West		-0.1068	0.0000 ***	-0.04229	0.00066	0.98825	0.00025	0.14437	0.04098 **	0.05318	-0.10592	0.16097	-0.03801
South East		-0.0760	0.0009443 ***	-0.03009	0.01088	0.80047	0.00420	0.09004	0.18619	0.03317	-0.09218	0.20589	-0.03308
South West		-0.1025	0.0000 ***	-0.04060	0.00480	0.91234	0.00185	0.10171	0.14045	0.03747	-0.03089	0.67554	-0.01109
West Midlands		-0.1019	0.0000 ***	-0.04035	-0.03640	0.41849	-0.01405	0.04520	0.52542	0.01665	-0.02407	0.75201	-0.00864
Yorkshire & the Humber		-0.1034	0.0000 ***	-0.04093	0.00137	0.97544	0.00053	0.08638	0.21829	0.03182	-0.06495	0.38686	-0.02331
Scotland		-0.0927	0.0001 ***	-0.03672	-0.01093	0.80833	-0.00422	0.06132	0.38948	0.02259	-0.14655	0.0546*	-0.05259
Wales		-0.0989	0.00035 ***	-0.03917	0.00673	0.89671	0.00260	-0.02407	0.76915	-0.00887	-0.12815	0.14422	-0.04598
Production and construction		0.0011	0.88651	0.00044	0.04878	0.00092***	0.01883	0.11001	0.0000 ***	0.04052	0.07448	0.0028 ***	0.02673
Transport, retail and food service/ accommodation		-0.0190	0.02592**	-0.00752	0.07571	0.0000 ***	0.02923	0.08129	0.0013 ***	0.02994	0.09859	0.0003***	0.03538
Business services		-0.0089	0.24229	-0.00354	0.02140	0.13534	0.00826	0.03103	0.17120	0.01143	0.02057	0.39643	0.00738
Number obs. (Unbalanced panel)		2810		2810		2810				2810			
Total Sum of Squares		110.11		355.57		627.68				18.305			
Residual Sum of Squares		63.971		224.88		644.25				9.5269			
R-Squared		0.027655		0.082816		0.039381				0.11442			
Adj. R-Squared		0.014321		0.070238		0.026208				0.021951			
F(36,2771)		5.5094		13.992		7.94029				7.61591			
p-value		0.0000		0.0000		0.0000				0.0000			
		Time fixed effects			Time fixed effects			Time fixed effects			Time fixed effects		
		Estimate	P< > t )		Estimate	P< > t )		Estimate	P< > t )		Estimate	P< > t )	
2017		0.1445348	0.028174**		0.10653885	0.388021		-0.03158079	0.8798297		0.7158043	0.0000***	
2019		0.1228333	0.059284*		0.10599209	0.385257		0.00480922	0.9814294		0.6584652	0.0000***	
2021		0.1278499	0.06029*		0.08798361	0.490356		-0.08428257	0.6962577		0.9118303	0.0000***	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t}|x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector\ c_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$ , where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\* : < 5% and \*\*\* : <1%. ME: marginal effects.

**Geographical disparities** are less evident in Table 4.3.2.4, where it is clear that SMEs with no social or green aim located in any UK region tend to use less government grants (1% significance). Location is not significant for any other type of external finance, bar overdrafts which tend to be more used by SMEs in NW England. A similar pattern appears in the case of businesses with major green objectives (Table 4.3.2.1). Geography has no impact on the use of government grants by SMEs with minor green objectives (Table 4.3.2.2).

#### **4.3.2 Determinants of demand for external finance**

Tables 4.3.3.1 to 4.3.3.4 show the results of the regressions where the dependent variable is the type of external finance applied for. The choice of dependent variable was informed by the descriptive analysis in Section 3 (Table 3.1.8). The variables we will look at are bank loans and overdrafts, credit cards, and government grants. The independent and control variables used in these regressions are the same as those in Tables A2.2 and A2.3. The dependent variables are listed in Table A2.1 in the Appendix.

Looking at the impact of accessibility indicators, it is clear that for green SMEs and SEs, higher geographical accessibility has no impact on the application for bank loans. It has a negative impact on the application for government and local authority grants, at 5% significance (Major) and 10% (Minor). This finding is in line with the economic geography literature that has shown the detrimental impacts of peripheral locations when applying for finance (e.g. Brown and Lee 2017), where it is established that the more peripheral the location the lower the access to external finance. The effects of **digital accessibility** are also what we would expect given the core-peripherality dynamics established in the literature. More precisely, we found that **higher digital accessibility (*techSF*) reduces the likelihood of a business applying for government funding** (Table 4.3.3.1 for *Major* green mission, Table 4.3.3.3 for SEs, and Table 4.3.3.4 for *None*). The variable has a negative sign and is significant at 5, 1, and 10%, respectively. Digital accessibility has a significant impact on the demand for external finance by *Minor* green mission SMEs. It has a positive impact on the demand for government grants and overdraft, which are more likely the higher is the coverage of ultra-fast broadband (*techUF*) at 5% significance. The coefficient of digital accessibility is also positive for demand for bank loans by Minor green SMEs (1% significance). In the panel regressions presented in Tables 4.3.3.1 to 4.3.3.4 demand for external finance excludes Covid-19 related finance, specifically government grants and bank loans. As was seen in Section 3, in 2021 the overwhelming percentage of bank loans and government finance was related to Covid-19. Consequently, the results of the regressions are based on a much smaller sample than those



presented in Tables 4.3.2.1 to 4.3.2.4, since they only include SMEs that demand external finance for purposes unrelated to the pandemic.

However, the results shown here are robust as far as the impact of peripherality and digital accessibility are concerned. We have estimated the same econometric model using a Heckman selection model (Heckman 1974) and obtained similar results.

**Table 4.3.3.1 Determinants of the type of finance applied for (Major green mission)**

Variables	Govt grants			Bank loans			Overdraft			Credit cards		
	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME
Geographical access	-0.0333	0.088839**	-0.0131	-0.0448	0.2613	-0.017	-0.073	0.103061	-0.027	-0.029	0.533	-0.010
Digital access (techUF)	0.0153	0.00178***	0.0060	0.0340	0.0007***	0.013	0.035	0.00183**	0.013	-0.007	0.552	-0.002
Digital access (techSF)	0.0066	0.2708	0.0026	0.0198	0.1079	0.008	0.023	0.09693**	0.009	-0.025	0.0738*	-0.009
No employee	-0.0770	0.0000***	-0.0303	-0.0667	0.0497**	-0.025	-0.050	0.188995	-0.019	0.055	0.157	0.020
Age: 0 - 5 years	-0.0644	0.8473	-0.0253	0.3352	0.6236	0.127	0.204	0.790434	0.076	0.183	0.816	0.065
Age: 6 - 10 years	-0.0086	0.9796	-0.0034	0.4589	0.5015	0.174	0.321	0.67526	0.120	0.116	0.883	0.041
Age: 11 - 20 years	-0.0831	0.8023	-0.0326	0.2203	0.7452	0.084	0.496	0.514098	0.186	-0.028	0.971	-0.010
Age: 20+	-0.0298	0.9285	-0.0117	0.3151	0.6428	0.120	0.330	0.665501	0.123	0.085	0.914	0.030
Export goods	0.0833	0.00725**	0.0327	0.1596	0.0112**	0.061	-0.088	0.215176	-0.033	-0.170	0.0196**	-0.061
Aim to grow sales	0.0240	0.3436	0.0094	-0.0683	0.1877	-0.026	0.035	0.54668	0.013	0.134	0.02601**	0.048
Very likely to apply ext. finance	-0.0466	0.055341*	-0.0183	-0.1251	0.01197*	-0.047	0.242	0.0000***	0.091	0.090	0.117	0.032
Fairly likely to apply ext. finance	-0.0544	0.097909*	-0.0214	-0.1170	0.08122*	-0.044	0.212	0.00503***	0.079	0.164	0.0343**	0.058
Ext. finance applied at least once	-0.0141	0.5663	-0.0055	0.0406	0.4185	0.015	0.199	0.00047***	0.074	-0.245	0.0000***	-0.087
Woman-led (WLED)	0.0092	0.7654	0.0036	0.0787	0.2103	0.030	0.050	0.481378	0.019	-0.108	0.135	-0.039
Ethnic minority-led (MLED)	0.0041	0.9347	0.0016	0.2220	0.0315**	0.084	-0.102	0.37846	-0.038	-0.161	0.176	-0.057
IMD_20 (20% most deprived)	-0.1200	0.0012***	-0.0471	-0.1600	0.0330**	-0.061	0.019	0.822284	0.007	-0.030	0.730	-0.011
IMD_40	-0.0595	0.0725*	-0.0234	0.0245	0.7159	0.009	0.166	0.02859**	0.062	-0.100	0.200	-0.035
IMD_60	-0.0355	0.27115	-0.0140	0.2652	0.0000***	0.101	0.051	0.486787	0.019	0.234	0.002***	0.083
IMD_80 (40% least deprived)	-0.0424	0.18082	-0.0166	-0.0733	0.2570	-0.028	-0.196	0.00709**	-0.074	-0.017	0.817	-0.006
Turnover Growth	0.0696	0.032773**	0.0273	-0.2142	0.00137***	-0.081	0.026	0.725732	0.010	0.020	0.794	0.007
Turnover stable	0.0055	0.86414	0.0022	-0.3219	0.0000***	-0.122	0.005	0.948686	0.002	0.074	0.328	0.026
Family-owned	-0.0258	0.33720	-0.0102	0.1901	0.0006***	0.072	0.123	0.04615**	0.046	-0.224	0.0005***	-0.080
Production and construction	-0.0331	0.28120	-0.0130	-0.1613	0.01058***	-0.061	0.344	0.0000***	0.129	-0.250	0.0006***	-0.089
Transport, retail and food service/ accommodation	-0.0912	0.008470***	-0.0358	-0.1672	0.0179**	-0.064	0.272	0.00065***	0.102	-0.307	0.0002***	-0.109
Business services	0.0219	0.447	0.0086	-0.1790	0.0025***	-0.068	-0.023	0.730664	-0.009	-0.072	0.291	-0.025
Number obs. (Unbalanced panel)	313		313				313			313		
Total Sum of Squares	20.428		47.674				52.466			67.772		
Residual Sum of Squares	4.2583		17.768				22.362			23.62		
R-Squared	0.029758		0.075485				0.025727			0.23691		
Adj. R-Squared	-0.06216		-0.0121				-0.06657			0.16462		
F(25,285)	3.26829		5.86				6.7344			10.4565		
p-value	0.0000***		0.0000***				0.0000***			0.0000***		
Time fixed effects												
Time fixed effects												
Time fixed effects												
Time fixed effects												
2017	0.17941	0.598587		0.056684	0.935088		-0.56962	0.465877		0.750933	0.349752	
2019	0.170032	0.620272		0.070138	0.920284		-0.67777	0.388985		0.595206	0.461593	
2021	0.11029	0.752339		-0.18416	0.796438		-0.69506	0.385765		0.734591	0.372467	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t}|x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$ , where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\* : < 5% and \*\*\* : <1%. ME: marginal effects.



**Table 4.3.3.2 Determinants of the type of finance applied for (Minor green mission)**

Variables	Govt grants			Bank loans			Overdraft			Credit cards		
	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME
Geographical access	-0.033	0.0889 *	-0.0131	-0.0448	0.2613	-0.0170	-0.0731	0.1031	-0.0274	-0.0287	0.5333	-0.0102
Digital access (techUF)	0.015	0.0018 **	0.0060	0.0340	0.0001***	0.0129	0.0349	0.0018**	0.0131	-0.0068	0.5520	-0.0024
Digital access (techSF)	0.007	0.271	0.0026	0.0198	0.1079	0.0075	0.0229	0.0969*	0.0086	-0.0254	0.0738*	-0.0090
No employee	-0.077	0.000***	-0.0303	-0.0667	0.0497*	-0.0253	-0.0500	0.1890	-0.0187	0.0553	0.1574	0.0197
Age: 0 - 5 years	-0.064	0.847	-0.0253	0.3352	0.6236	0.1273	0.2036	0.7904	0.0763	0.1830	0.8163	0.0651
Age: 6 - 10 years	-0.009	0.980	-0.0034	0.4589	0.5015	0.1742	0.3208	0.6753	0.1202	0.1157	0.8831	0.0412
Age: 11 - 20 years	-0.083	0.802	-0.0326	0.2203	0.7452	0.0837	0.4964	0.5141	0.1860	-0.0284	0.9710	-0.0101
Age: 20+	-0.030	0.928	-0.0117	0.3151	0.6428	0.1196	0.3295	0.6655	0.1235	0.0846	0.9140	0.0301
Export goods	0.083	0.0073 **	0.0327	0.1596	0.0117 *	0.0606	-0.0876	0.2152	-0.0328	-0.1701	0.0196*	-0.0605
Aim to grow sales	0.024	0.344	0.0094	-0.0683	0.1877	-0.0260	0.0350	0.5467	0.0131	0.1335	0.02601*	0.0475
Very likely to apply ext. finance	-0.047	0.0553*	-0.0183	-0.1251	0.012 *	-0.0475	0.2417	0.0000***	0.0906	0.0896	0.1170	0.0319
Fairly likely to apply ext. finance	-0.054	0.09791 *	-0.0214	-0.1170	0.0812 *	-0.0444	0.2121	0.0050**	0.0795	0.1640	0.0343*	0.0584
Ext. finance applied at least once	-0.014	0.566	-0.0055	0.0406	0.4185	0.0154	0.1986	0.0005***	0.0744	-0.2453	0.0000***	-0.0873
Woman-led (WLED)	0.009	0.765	0.0036	0.0787	0.2103	0.0299	0.0496	0.4814	0.0186	-0.1083	0.1350	-0.0385
Ethnic minority-led (MLED)	0.004	0.935	0.0016	0.2220	0.0315*	0.0843	-0.1017	0.3785	-0.0381	-0.1608	0.1756	-0.0572
IMD_20 (20% most deprived)	-0.120	0.0012**	-0.0471	-0.1600	0.0330 *	-0.0608	0.0188	0.8223	0.0071	-0.0298	0.7296	-0.0106
IMD_40	-0.059	0.0725*	-0.0234	0.0245	0.7159	0.0093	0.1663	0.02859*	0.0623	-0.0997	0.2003	-0.0355
IMD_60	-0.036	0.271	-0.0140	0.2652	0.0000***	0.1007	0.0514	0.4868	0.0193	0.2339	0.0023**	0.0832
IMD_80 (40% least deprived)	-0.042	0.181	-0.0166	-0.0733	0.2570	-0.0278	-0.1963	0.0071**	-0.0735	-0.0172	0.8168	-0.0061
Turnover Growth	0.070	0.0328**	0.0273	-0.2142	0.00137 **	-0.0813	0.0261	0.7257	0.0098	0.0199	0.7944	0.0071
Turnover stable	0.006	0.864	0.0022	-0.3219	0.0000***	-0.1222	0.0047	0.9487	0.0018	0.0741	0.3280	0.0264
Family-owned	-0.026	0.337	-0.0102	0.1901	0.0001***	0.0722	0.1233	0.0462 *	0.0462	-0.2236	0.0005***	-0.0796
Production and construction	-0.033	0.281	-0.0130	-0.1613	0.01058*	-0.0612	0.3438	0.0000***	0.1288	-0.2500	0.0001***	-0.0890
Transport, retail and food service/ accommodation	-0.091	0.0085 **	-0.0358	-0.1672	0.0179 *	-0.0635	0.2719	0.0001***	0.1019	-0.3070	0.0002***	-0.1093
Business services	0.022	0.447	0.0086	-0.1790	0.0025 **	-0.0680	-0.0227	0.7307	-0.0085	-0.0716	0.2912	-0.0255
Number obs. (Unbalanced panel)	1889			1889			1889			1889		
Total Sum of Squares	20.428			47.674			52.466			67.772		
Residual Sum of Squares	4.2583			17.768			22.362			23.62		
R-Squared	0.0298			0.0755			0.0257			0.2369		
Adj. R-Squared	0.06216			0.012101			0.066573			0.16462		
F(25,285)	3.26829			5.86			6.7344			10.4565		
p-value	0.00			0.00			0.00			0.00		
	Time fixed effects			Time fixed effects			Time fixed effects			Time fixed effects		
	Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )		Estimate	Pr(> t )	
2017	0.17941	0.5985872		0.05668	0.935088		-0.5696	0.465877		0.7509	0.349752	
2019	0.17002	0.6202718		0.07014	0.920284		-0.6778	0.388985		0.595	0.461593	
2021	0.11029	0.7523392		-0.1842	0.796438		-0.695	0.385765		0.7346	0.372467	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t}|x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector\ c_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$ , where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\* : < 5% and \*\*\* : <1%. ME: marginal effects.

**Table 4.3.3.3 Determinants of the type of finance applied for (SE)**

Variables	Govt grants			Bank loans			Overdraft			Credit cards		
	Estimate	$P_x(> t )$	ME	Estimate	$P_x(> t )$	ME	Estimate	$P_x(> t )$	ME	Estimate	$P_x(> t )$	ME
Geographical access	-0.02865	0.468916	-0.01064	-0.0179	0.710562	-0.0064	-0.14545	0.00052 ***	-0.05405	0.016643	0.476994	0.006453
Digital access (techUF)	-0.03227	0.00096 ***	-0.01198	0.0306	0.009985 **	0.010938	-0.0053	0.601948	-0.00197	0.011905	0.0383488 *	0.004616
Digital access (techSF)	-0.02808	0.0161*	-0.01043	0.023657	0.0956780 *	0.008456	-0.01926	0.114426	-0.00716	0.004957	0.470746	0.001922
No employee	-0.15898	0.0000 ***	-0.05905	0.148529	0.001237 **	0.053089	-0.10746	0.0064 ***	-0.03993	-0.13157	0.0000 ***	-0.05101
Age: 0 - 5 years	0.39364	0.503202	0.146209	0.429885	0.548964	0.153655	0.001639	0.997878	0.000609	0.126678	0.71567	0.049117
Age: 6 - 10 years	0.51024	0.38437	0.189518	0.468213	0.512809	0.167354	0.094725	0.877515	0.035202	0.178488	0.606864	0.069205
Age: 11 - 20 years	0.436615	0.456123	0.162172	0.533945	0.455044	0.190849	0.113657	0.853143	0.042238	0.127372	0.713162	0.049386
Age: 20+	0.38449	0.509545	0.142811	0.294543	0.6787	0.105279	0.143282	0.814602	0.053247	0.097314	0.777757	0.037731
Export goods	-0.05666	0.392424	-0.02104	0.029421	0.715704	0.010516	-0.1078	0.121223	-0.04006	0.036345	0.353822	0.014092
Aim to grow sales	-0.08527	0.103551	-0.03167	0.098485	0.123206	0.035202	0.147382	0.0075 **	0.05477	0.00994	0.747875	0.003854
Very likely to apply ext. finance	-0.10167	0.0632*	-0.03776	0.200077	0.002856 **	0.071514	0.160154	0.0054 **	0.059517	0.072211	0.0259 *	0.027998
Fairly likely to apply ext. finance	-0.02517	0.684093	-0.00935	0.277091	0.00028 ***	0.099041	0.07543	0.245401	0.028032	0.056222	0.12526	0.021799
Ext. finance applied at least once	-0.30869	0.0000 ***	-0.11465	0.186593	0.00089 ***	0.066694	0.024459	0.609025	0.009089	0.013723	0.611049	0.005321
Woman-led (WLED)	-0.01923	0.745007	-0.00714	0.046576	0.518683	0.016648	-0.12503	0.0445 *	-0.04646	0.119037	0.0008 ***	0.046154
Ethnic minority-led (MLED)	-0.15642	0.0572*	-0.0581	0.56947	0.0000 ***	0.203547	0.230136	0.0078 **	0.085524	0.029098	0.548736	0.011282
IMD_20 (20% most deprived)	0.018267	0.796726	0.006785	-0.05327	0.538214	-0.01904	-0.02168	0.770626	-0.00806	0.096048	0.0227 *	0.037241
IMD_40	-0.00937	0.878165	-0.00348	0.200093	0.00766 **	0.07152	-0.09457	0.140826	-0.03514	0.061476	0.08996 *	0.023836
IMD_60	0.064136	0.33241	0.023822	0.236901	0.00355 **	0.084676	0.077158	0.266199	0.028674	-0.0106	0.786368	-0.00411
IMD_80 (40% least deprived)	0.137142	0.0475*	0.050938	0.20655	0.0146 *	0.073828	-0.20184	0.005558 **	-0.07501	-0.00356	0.930427	-0.00138
Turnover Growth	0.06677	0.285122	0.0248	-0.20806	0.00662 **	-0.07437	-0.02874	0.660536	-0.01068	0.013215	0.720412	0.005124
Turnover stable	-0.02803	0.634837	-0.01041	-0.23732	0.00109 **	-0.08483	0.045452	0.462721	0.016891	0.059833	0.0873*	0.023199
Family-owned	-0.08002	0.102473	-0.02972	-0.05308	0.373797	-0.01897	0.259452	0.0000 ***	0.096418	-0.00686	0.812586	-0.00266
Production and construction	-0.23905	0.00012 ***	-0.08879	0.18038	0.0165*	0.064474	0.268864	0.0000 ***	0.099916	0.074164	0.0418 *	0.028755
Transport, retail and food service/ accommodation	-0.27099	0.00014 ***	-0.10065	0.259836	0.00269 **	0.092874	-0.00582	0.937209	-0.00216	0.112439	0.00731 **	0.043596
Business services	-0.00893	0.88389	-0.00332	0.025223	0.735168	0.009015	-0.09893	0.123363	-0.03677	0.056294	0.120249	0.021827
Number obs. (Unbalanced panel)	318			318			318			318		
Total Sum of Squares	58.085			70.123			58.085			31.092		
Residual Sum of Squares	14.727			19.939			14.727			4.689		
R-Squared	0.089414			0.063043			0.089414			0.066398		
Adj. R-Squared	0.004635			-0.02419			0.004635			-0.02052		
F-statistic	8.2817			8.60604			8.2817			4.01656		
p-value	0.00			0.00			0.00			0.00		
Time fixed effects												
Time fixed effects												
Time fixed effects												
Time fixed effects												
2017	-0.61487	0.397972		-0.61487	0.397972		0.373512	0.550088		-0.26796	0.447441	
2019	-0.67929	0.353877		-0.67929	0.353877		0.341943	0.586931		-0.30997	0.382956	
2021	-0.78732	0.293338		-0.78732	0.293338		0.516773	0.42205		-0.3623	0.318646	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t}|x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$ , where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\* : < 5% and \*\*\* : <1%. ME: marginal effects.

**Table 4.3.3.4 Determinants of the type of finance applied for (No green mission)**

Variables	Govt grants			Bank loans			Overdraft			Credit cards		
	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME	Estimate	Pr(> t )	ME
Geographical access	-0.03763	0.2518232	-0.01477	-0.02433	0.655373	-0.01477	-0.23589	0.0000***	-0.08663	-0.04064	0.042435	-0.9576
Digital access (techUF)	-0.01726	0.0809755*	-0.00678	0.046839	0.00459**	-0.00678	-0.0289	0.0468 *	-0.01061	0.015748	0.012759	1.2343
Digital access (techSF)	-0.01816	0.1165181	-0.00713	0.019343	0.313736	-0.00713	-0.02627	0.121867	-0.00965	0.008862	0.014932	0.5935
No employee	-0.01784	0.584452	-0.007	-0.13476	0.0135 *	-0.007	-0.16374	0.0007 ***	-0.06013	-0.04697	0.042189	-1.1133
Age: 0 - 5 years	0.124083	0.01719*	0.048705	0.122979	0.15388	0.048705	-0.23334	0.00236 **	-0.08569	-0.04009	0.067	-0.5983
Age: 6 - 10 years	0.150496	0.00281 **	0.059072	0.28442	0.0007***	0.059072	0.29438	0.0000***	0.108112	-0.06707	0.064582	-1.0384
Age: 11 - 20 years	0.103909	0.01474*	0.040786	0.11608	0.100086	0.040786	-0.16632	0.00791**	-0.06108	0.067623	0.054803	1.2339
Export goods	0.026445	0.5236019	0.01038	-0.12042	0.0813838*	0.01038	-0.02044	0.736942	-0.00751	-0.05948	0.053626	-1.1091
Aim to grow sales	-0.16838	0.0000***	-0.06609	0.084519	0.174568	-0.06609	-0.14434	0.009 **	-0.05301	-0.03	0.048372	-0.6201
Very likely to apply ext. finance	0.08093	0.0514018 *	0.031767	-0.03607	0.600069	0.031767	0.138054	0.023773 *	0.050701	0.133341	0.053546	2.4902
Fairly likely to apply ext. finance	0.143198	0.00099***	0.056208	0.038686	0.58851	0.056208	0.041071	0.515562	0.015083	-0.09277	0.055651	-1.6669
Ext. finance applied at least once	-0.00535	0.8975235	-0.0021	-0.11597	0.0937*	-0.0021	0.116845	0.056100 *	0.042912	0.08462	0.053715	1.5754
Woman-led (WLED)	0.185197	0.0000***	0.072693	-0.21	0.00556**	0.072693	0.11755	0.077515 *	0.043171	-0.11422	0.058508	-1.9522
Ethnic minority-led (MLED)	-0.0896	0.2044999	-0.03517	-0.42793	0.00031***	-0.03517	0.151753	0.143423	0.055731	-0.0185	0.091218	-0.2028
IMD_20 (20% most deprived)	-0.20457	0.00035***	-0.0803	0.042194	0.653334	-0.0803	0.034161	0.680542	0.012546	0.017868	0.073118	0.2444
IMD_40	-0.19906	0.00033***	-0.07814	-0.12065	0.185099	-0.07814	-0.24563	0.0024 **	-0.09021	0.064486	0.070749	0.9115
IMD_60	-0.22656	0.0000***	-0.08893	-0.04227	0.624398	-0.08893	-0.07702	0.312846	-0.02829	0.203788	0.067192	3.0329
IMD_80 (40% least deprived)	-0.19127	0.00050***	-0.07508	-0.17235	0.05703*	-0.07508	0.065597	0.410779	0.024091	0.253517	0.070245	3.609
Turnover Growth	-0.0053	0.9017269	-0.00208	-0.05347	0.453854	-0.00208	-0.10055	0.111461	-0.03693	0.116924	0.05554	2.1052
Turnover stable	0.026471	0.5326553	0.01039	0.03261	0.64369	0.01039	-0.20213	0.0013 **	-0.07423	0.100896	0.054871	1.8388
Family-owned	-0.15422	0.00024 ***	-0.06053	0.138138	0.04561*	-0.06053	0.014739	0.808436	0.005413	-0.0003	0.05358	-0.0057
Production and construction	-0.16658	0.00402 **	-0.06539	0.308638	0.00137***	-0.06539	0.180339	0.033224 *	0.06623	-0.01363	0.074307	-0.1834
Transport, retail and food service/ accommodation	-0.06164	0.3267878	-0.02419	0.430549	0.0000***	-0.02419	0.237517	0.010475 *	0.087228	-0.1392	0.081246	-1.7133
Business services	-0.08267	0.1697895	-0.03245	0.113563	0.256231	-0.03245	0.40577	0.0000***	0.14902	-0.00765	0.077765	-0.0984
Number obs. (Unbalanced panel)	276			276			276			276		
Total Sum of Squares	18.305			66.749			58.673			34.651		
Residual Sum of Squares	9.5269			26.318			20.53			15.981		
R-Squared	0.11442			0.026221			0.13333			0.074143		
Adj. R-Squared	0.021951			-0.07546			0.042834			-0.02253		
F(24,249)	7.61591			6.61953			7.01752			2.82151		
p-value	0.00			0.00			0.00			0.00		
Time fixed effects												
Time fixed effects												
Time fixed effects												
Time fixed effects												
2017	0.715804	0.0000		-0.00177	0.993927		1.107172	0.0000		-0.02849	0.874913	
2019	0.658465	0.0000		-0.09795	0.668365		1.15704	0.0000		0.00086	0.996146	
2021	0.91183	0.0000		-0.34534	0.283291		1.34791	0.0000		-0.09048	0.718018	

This table reports the results of the estimation of the model  $p = P[y_{i,t} = 1] = E(y_{i,t}|x_{i,j,t}) = \Phi(B'X) = \Phi(\beta_1 access_{i,t} + \beta_2 techSF_{i,t} + \beta_3 techUF_{i,t} + \dots + \beta_{36} sector\ c_{i,t} + \delta_1 T_{2017} + \delta_2 T_{2019} + \delta_3 T_{2021})$ , where  $\Phi(\cdot)$  is the cumulative Normal distribution,  $y_{i,t}$  is the type of external finance used by SME  $i$  in year  $t$ , and  $x_{i,j,t}$  is the independent variable  $j$  for SME  $i$  in year  $t$ . Significance levels: \* : <10%, \*\*: < 5% and \*\*\* : <1% . ME: marginal effects



Moreover, we have estimated the models for the use of external finance on subsamples of smaller SMEs (turnover lower than 50 million<sup>9</sup> euros) and larger SMEs (turnover higher than 50 million euros), and obtained results consistent with those in Tables 4.3.2.1 to 4.3.2.4. These results are not presented here for the sake of conciseness but are available from the authors on request.

## 5. CONCLUSIONS

This study investigated how geographical disparities impact on the different amounts and types of external finance used and demanded by green UK SMEs and social enterprises (SEs). The analysis was conducted on the 2021 Wave of the Longitudinal Small Business Survey (LSBS), which provides 3 years of data for SMEs that declare to have some level of environmental business objective, 2017,2019,2021. The descriptive analysis presented the cross-sectional examination of environmental mission (Section D) SMEs, and of social enterprises (SOCENT). Appropriate LSBS cross-sectional and cohort weightings to the descriptive data analysis will be applied in order to gain an impression of the UK-wide representation of findings.

The cross-sectional analysis compared different groups of SMEs identified from the taxonomy constructed in Owen et al (2022) for green SMEs, viz., green mission companies, and green laggards, and by DCMS (2021) for the classification of SEs. The comparison looked at external financing requirements, financing needs, reasons for seeking finance and types of finance sought, in addition to a comparison of their business characteristics, such as industrial sector, employment size, age, location, management characteristics (e.g. management team size, family owned, gender and ethnicity), attitudes towards support (e.g. use of external financial advisors and use of strategic advice), recent growth (in the last 12 months), growth aims (e.g. future growth plans, exporting behaviour), and business capabilities (e.g. perceived abilities for accessing finance and developing a business plan). In addition, the study investigated the regional patterns that are present in green indicators (energy efficient adoption, environmental mission) related to the use of renewable energy and potential influence on neighbouring regions. The contribution of this study to the literature is construction of geographical accessibility and digital accessibility indices, which are used to assess the implications of peripheral location on the demand

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<sup>9</sup> See <https://www.gov.uk/government/publications/fcd0-small-to-medium-sized-enterprise-sme-action-plan/small-to-medium-sized-enterprise-sme-action-plan> for details.

and obtention of external green finance by green SMEs and social enterprises. Geo-accessibility indicators have been constructed in the past by the European Spatial Development Perspective (ESPON), and used in the empirical geography literature (e.g. Lee and Brown 2017 for the UK). We extend this methodology to the construction of a digital accessibility index based on Ofcom data on regional broadband coverage.

A series of panel probit regression analyse different SME groups including green mission companies, social enterprises, green laggards, and SMEs without any environmental mission. The regressions tested the relationships between external finance – the amount, success rate and different types thereof – and the independent variables of peripherality, industrial sector, and other characteristics of SMEs.

Our main results show that the vast majority of UK SMEs, irrespective to their social or green mission are located in England, and in the South East region in particular. There is a high density of SMEs with major green objective in Northern Ireland, and the North West of England, whilst Scotland has the lowest density of green mission SMEs, followed by Wales (northern and central regions). Most of the major green mission SMEs in Scotland are located in the axis Glasgow-Edinburgh. Social enterprises (SEs) tend to agglomerate around large urban centres, e.g., London, Manchester-Liverpool, Glasgow, Cardiff-Newport, Belfast, and are much sparser in the rest of the country.

Geographical peripherality (low geo-accessibility) is a hurdle for the use of -and applications for- bank-based external finance (loans, overdrafts and credit cards). It increases the likelihood that SMEs will use government and local authority grants. *Major* green mission SMEs are significantly ( $<.05$ ) much less likely to use bank overdraft and credit cards than other types of green mission companies. **SMEs that prioritise environmental aims rely more on government grants and less on financial services than those that prioritise profit-making.** Digital accessibility is altering the way SMEs approach their finances. **Higher digital accessibility reduces the likelihood that all SMEs will use -and apply for- government grants, and has a significant positive impact on the demand for bank-based external finance.**

More SMEs have become green between 2017-2021. Only 10% of all SMEs have no environmental objective in 2021, against 30% in 2017. However, the proportion of SMEs that prioritise financial goals over environmental ones (*Minor* green mission) has also increased significantly between 2017 and 2021 (56.3% in 2017 and 72% in 2021). About 60% of UK SMEs with environmental objectives know about UK SME energy efficiency

related programmes. However, most are only aware of two schemes, the Renewable Heat Scheme and Workplace Charging Scheme for electric vehicle charge points. Finally, the energy saving schemes that matter for social enterprises are different from those of green mission SMEs. About 39% of SEs are aware of the Energy Savings Opportunity Scheme, but only 1.2% are aware of The Renewable Heat Incentive. Around a third are aware of the Private Rented Sector Energy Efficiency Regulations. Overall, more than half of the SMEs without any green objective have no awareness of energy saving schemes.

The policy implications arising from this study are threefold. Firstly, the UK government needs to extend -and develop- schemes that increase the availability of external finance for green SMEs and social enterprises, irrespective of their geographical location. This study suggests that policies such as the government's "nationwide gigabit-broadband by 2030" target presented in the Levelling Up White Paper in February 2022, and the 2017 Open Banking scheme could have major impacts on SMEs' access to external finance.

Secondly, there is a need for increased awareness of existing energy saving schemes, and accompanying incentives to taking up greener forms of energy use, e.g., an improved, coherent, national programme of SME Net Zero awareness, with support and advice for SMEs to becoming Net Zero. The latest 2021 LSBS Wave provides clear evidence that the number of SMEs without any form of environmental goal has gone down since 2017. Further government support mechanisms to encourage going green, particularly for laggard SMEs could increase the numbers that have a major green aim. This may come in the form of grants, soft loans with low interest and repayment holidays, or other forms of inducement such as improved energy feeder tariffs, green R&D tax credits.

Finally, further research on the implications of geographical peripherality -and specifically on the closure of bank branches- on the demand for banking services by SMEs needs to be done. This study presents strong evidence that despite the increase in broadband coverage in all regions of the UK, being located close to a financial centre still matters for accessing bank loans. Is this a fundamental aspect of financial services, i.e., does a business loan always requires in-person relationships between a banker and a business manager? Or is it a remnant of a traditional way of banking that will disappear when digital finance becomes the default way of banking in the UK? The UK government Open Banking initiative, and the nationwide broadband coverage targets were initiated very recently (2017), and their impacts may become clearer in future LSBS waves.

This last implication echoes Owen et al (2022b) where it was noted that findings are constrained by inability to gain sufficient baseline of data for green investment taking place prior to the LSBS waves examined. In addition, green SMEs defined by their green mission status have only been captured biennially since 2017. Although the 2021 LSBS Wave provides three years of data on green SMEs, more data would make the analysis of the different financing needs and activities of these businesses more meaningful.



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## ACKNOWLEDGMENTS

We thank Openroute Service (<https://openrouteservice.org> and OpenStreetMap contributors) for access to their Collaborative Plan, which enabled the distance calculations in this study. We are grateful to Seran Veysi for exceptional research assistance. This study has benefitted from discussions with Ian Vickers, and we are grateful for his comments and suggestions. The usual caveat applies.

## APPENDIX

### A1. Accessibility Indicator calculations

We present two examples using data from the LSBS 2021 wave to illustrate these concepts. The first example is that of an SME located in the Shetland Isles, in the postcode ZE2. The second of an SME located in the City of London, in the postcode EC4N. The accessibility index for the postcode ZE2 in 2021 is calculated as

$$A_{ZE2,2021} = \sum_{j=1}^n \frac{GVA_{j,2021}}{distance_{ZE2,j}} = \frac{GVA_{1,2021}}{distance_{ZE2,1}} + \frac{GVA_{2,2021}}{distance_{ZE2,2}} + \dots + \frac{GVA_{24,2021}}{distance_{ZE2,24}}$$

where  $GVA_{j,2021}$  is the GVA of the local authority  $j$  in 2021, and  $distance_{ZE2,j}$  is the shortest driving distance between the postcode ZE2 and the centre of the local authority  $j$ . Using Table 3, and numbering the cities from 1 for Newcastle to 24 for Cardiff,

$$\frac{GVA_{1,2021}}{distance_{ZE2,1}}$$

represents the ratio of the GVA of Newcastle in 2021 divided by the distance between ZE2 and the centre of Newcastle. Analogously for the remaining 23 ratios.

The resulting accessibility index for ZE2 is thus:

$$A_{ZE2,2021} = \frac{63.71552975}{923.76} + \frac{100.2793296}{940.24} + \dots + \frac{1352.23}{121.4993804} = 2.137027662$$

$$\begin{aligned} A_{ZE2,2021} &= \frac{63.71552975}{923.76} + \frac{100.2793296}{940.24} + \frac{127.6547842}{1068.44} + \frac{95.84605987}{1106.91} + \frac{93.67088608}{1075.41} \\ &+ \frac{85.60076287}{1057.43} + \frac{113.4060795}{1043.12} + \frac{55.0955414}{1218.77} + \frac{122.8370221}{1267.31} + \frac{79.2173913}{1189.07} \\ &+ \frac{87.60484623}{1215.59} + \frac{77.15179969}{1338.49} + \frac{169.9275362}{1284.5} + \frac{125.6059302}{1370.46} + \frac{84.35455735}{1370.1} \\ &+ \frac{76.40625}{1293.44} + \frac{165.2631579}{1464.81} + \frac{78.57522594}{1321.13} + \frac{101.9047619}{1455.32} + \frac{160.8187135}{1307.41} \\ &+ \frac{102.5093433}{720.35} + \frac{100.0720202}{739.69} + \frac{94.97751124}{1513.73} + \frac{121.4993804}{1352.23} \end{aligned}$$

$$\begin{aligned}
 A_{ZE2,2021} &= 0.068974116 + 0.106652907 + 0.119477728 + 0.086588846 + 0.087102487 \\
 &+ 0.080951706 + 0.108718153 + 0.045205856 + 0.096927367 + 0.066621302 \\
 &+ 0.072067758 + 0.057640923 + 0.132290803 + 0.091652387 + 0.061568176 \\
 &+ 0.059072125 + 0.112822249 + 0.05947577 + 0.070022237 + 0.123005571 \\
 &+ 0.142304912 + 0.135289135 + 0.062744024 + 0.08985112
 \end{aligned}$$

$$A_{ZE2,2021} = 2.137027662$$

For the SME located in postcode EC4N, the accessibility indicator is:

$$A_{EC4N,2021} = \sum_{j=1}^n \frac{GVA_{j,2021}}{distance_{EC4Nj}} = \frac{GVA_{1,2021}}{distance_{EC4N,1}} + \frac{GVA_{2,2021}}{distance_{EC4N,2}} + \dots + \frac{GVA_{24,2021}}{distance_{EC4N,24}}$$

$$A_{EC4N,2021} = \frac{63.71552975}{443.48} + \frac{100.2793296}{434.69} + \dots + \frac{121.4993804}{246.09}$$

$$\begin{aligned}
 A_{EC4N,2021} &= \frac{63.71552975}{443.48} + \frac{100.2793296}{434.69} + \frac{127.6547842}{321.77} + \frac{95.84605987}{306.44} + \frac{93.67088608}{342.16} \\
 &+ \frac{85.60076287}{317.75} + \frac{113.4060795}{348.99} + \frac{55.0955414}{166.19} + \frac{122.8370221}{109.77} + \frac{79.2173913}{192.02} \\
 &+ \frac{87.60484623}{155.97} + \frac{77.15179969}{120.66} + \frac{169.9275362}{197.28} + \frac{125.6059302}{0.02} + \frac{84.35455735}{2.78} \\
 &+ \frac{76.40625}{88.44} + \frac{165.2631579}{86.18} + \frac{78.57522594}{204.47} + \frac{101.9047619}{176.55} + \frac{160.8187135}{133.04} \\
 &+ \frac{102.5093433}{639.78} + \frac{100.0720202}{649.42} + \frac{94.97751124}{719.43} + \frac{121.4993804}{246.09}
 \end{aligned}$$

$$\begin{aligned}
 A_{EC4N,2021} &= 0.14367171 + 0.230691595 + 0.396726805 + 0.312772679 + 0.273763403 \\
 &+ 0.269396579 + 0.324955098 + 0.3315214 + 1.119040012 + 0.412547606 \\
 &+ 0.561677542 + 0.639414882 + 0.861352069 + 6280.29651 + 30.34336595 \\
 &+ 0.863933175 + 1.917650939 + 0.384287308 + 0.577200577 + 1.208799711 \\
 &+ 0.160225927 + 0.154094454 + 0.132017724 + 0.493719291
 \end{aligned}$$

$$A_{EC4N,2021} = 6322.409336$$

Clearly, the accessibility indicator of the SME located in the City of London is almost 3 thousand times higher than that of the SME in the Shetland Isles. This is due to two aspects. Firstly, EC4N is closer to all financial centres in Table 3, as can be seen in the detailed calculations in Appendix A1. Secondly, EC4N is also at a distance of 0.02km, and 2.78km of the two largest financial centres in the UK, City of London and Canary Wharf, respectively. The weight of each location in the accessibility indicator of EC4N is much higher than in the accessibility indicator of ZE2. Table 6 shows the difference between the weights of each financial centre in the indicators of each location.

The **digital accessibility** in each postcode is given by:

$$DA_{ZE2,2021} = GVA_{2021} * SFBB_{ZE2} = 116.023066 * 0.5198 = 60.30496$$

$$DA_{ZE2,2021} = GVA_{2021} * UFBB_{ZE2} = 116.023066 * 0.2944 = 3.415$$

And

$$DA_{EC4N,2021} = GVA_{2021} * SFBB_{EC4N} = 116.023066 * 1 = 116.023066$$

$$DA_{EC4N,2021} = GVA_{2021} * UFBB_{EC4N} = 116.023066 * 0.87 = 100.941$$

The digital accessibility of the City of London is significantly higher than that of ZE2, but not in the same order of magnitude as the geographical accessibility. The DA indicator of EC4N is less than twice that of ZE2, whereas the accessibility indicator of EC4N is 3000 times higher than that of ZE2.



## A2. Variables

**Table A2.1: Groups of SMEs analysed according to whether the business is green mission or SE**

Variable	Values	Description
D312	0: D3=3,4,5,6,7 ;1: D3=1,2	Your business's only concern or Your business's primary concern
D334	0: D3=1,2,5,6,7 ;1: D3=3,4	Equal to financial or other goals or Secondary to financial or other goals,
SE	0=No;1=Yes.	See Table 1C in section 3
D35	0: D3=1,2,3,4,6,7; 1: D3=5	None

Note: The numbers correspond to LSBS coding to the answer to the question: Do you have a social or environmental goal? 1=Your business's only concern;2=Your business's primary concern;3=Equal to financial or other goals;4=Secondary to financial or other goals;5=None; 6=Don't know; 7= refused

**Table A2.2: Control and independent variables**

Independent variables		
techSF	number	digital accessibility (Ultra-fast broadband coverage)
techUF	number	digital accessibility (Super-fast broadband coverage)
access_index	number	accessibility indicator
Control variables		
A2SPSS2a	1= No employees; 0= otherwise	Age of business
A2SPSS2b	1= SME employer; 0=otherwise	Age of business
A2SPSS2c	1= 250+ employees; 0=otherwise	Age of business
URBRUR2a	1=Urban; 0=otherwise	Broad urban/rural categorisation from postcode
URBRUR2b	1=Rural; 0=otherwise	Broad urban/rural categorisation from postcode
A12	1=Yes; 2=No	Is your business a family owned business
WLED	1= yes, 0=No	Whether business is women-led
MLED	1= yes, 0=No	Whether business is MEG-led
C1_C2	1= yes, 0=No	Whether export goods or services
P1	In pounds	approximate turnover of your business in the past 12 months
R1	1=yes; 0=no	Aim to grow sales.
IMD_20	1 if in 20% most deprived; 0 otherwise	Index of multiple deprivation from postcode
IMD_40	1 if in 40% most deprived; 0 otherwise	Index of multiple deprivation from postcode
IMD_60	1 if in 60% most deprived; 0 otherwise	Index of multiple deprivation from postcode
IMD_80	1 if in 80% least deprived; 0 otherwise	Index of multiple deprivation from postcode
IMD_100	1 if in 100% most deprived; 0 otherwise	Index of multiple deprivation from postcode
H4a	1=Yes- applied at least once;0=otherwise	Have you tried to obtain external finance for your business in the past 12 months?
H4b	1= Yes - applied more than once;0=otherwise	Have you tried to obtain external finance for your business in the past 12 months?
Growtha	1=Turnover growth; 0 otherwise	Summary of growth in last year.
Growthb	1=Stable;0=otherwise	Summary of growth in last year.
Growthc	1=Turnover decline; 0 otherwise	Summary of growth in last year.
SECTORa	1=ABCDEF - Production and construction; 0=otherwise	Broad sector
SECTORb	1=GHI - Transport, retail and food service/ accommodation; 0 otherwise	Broad sector
SECTORd	1=JKLMN - Business services;0 otherwise	Broad sector
SECTORc	1=PQRS - Other services	Broad sector
Agea	1=0 - 5 years; 0 otherwise	Age of business - summary
Ageb	1==6 - 10 years; 0 otherwise	Age of business - summary
Agec	1=11 - 20 years; 0 otherwise	Age of business - summary
Aged	1= above 20 years; 0 otherwise	Age of business - summary
GORa	1 if in East Midlands; 0 otherwise	Location in UK regions
GORb	1 if in East of England; 0 otherwise	Location in UK regions
GORc	1 if in London; 0 otherwise	Location in UK regions
GORd	1 if in North East; 0 otherwise	Location in UK regions
GORe	1 if in North West; 0 otherwise	Location in UK regions
GORf	1 if in South East; 0 otherwise	Location in UK regions
GORg	1 if in South West; 0 otherwise	Location in UK regions
GORh	1 if in West Midlands; 0 otherwise	Location in UK regions
GORi	1 if in Yorkshire & the Humber; 0 otherwise	Location in UK regions
GORj	1 if in Scotland; 0 otherwise	Location in UK regions
GORk	1 if in Wales; 0 otherwise	Location in UK regions
GORk	1 if in Northern Ireland; 0 otherwise	Location in UK regions

**Table A2.3: dependent variables: types of finance being used**

Variable	Values	Description
H3A	0=No;1=Yes.	Bank overdraft facility
H3B	0=No;1=Yes.	Commercial mortgage
H3C	0=No;1=Yes.	Credit cards
H3D	0=No;1=Yes.	Equity Finance
H3E	0=No;1=Yes.	Factoring/invoice discounting
H3F	0=No;1=Yes.	Government or local authority grants or schemes not including any directly related to Coronavirus
H3G	0=No;1=Yes.	Leasing or hire purchase
H3H	0=No;1=Yes.	Loan from a bank, building society or other financial institution not directly related to Coronavirus
H3I	0=No;1=Yes.	Loan from family/friend
H3J	0=No;1=Yes.	Loan from a peer to peer platform
H3K	0=No;1=Yes.	Loan from business partner/directors/owner

**Table A2.4 Dependent variables: type of finance applied for**

Variable	Values	Description
H53	0=No;1=Yes.	Credit cards
H56	0=No;1=Yes.	Government or local authority grants or schemes not including any directly related to Coronavirus
H57	0=No;1=Yes.	Leasing or hire purchase
H58	0=No;1=Yes.	Loan from a bank, building society or other financial institution not directly related to Coronavirus
H95	0=No;1=Yes.	Other finance



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