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The engagement of home-based businesses in the digital economy

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ABSTRACT

This paper explores the engagement of home-based businesses in digital trading, measured as proportion of their sales from buying and selling services and products online of all their sales. Findings are drawn from a sample of 994 Small- and Medium-Sized Businesses that are members of the Federation of Small Businesses in Scotland. Multivariate findings show that home-based businesses are associated with high proportions of online sales supporting the view of home-based businesses as 'online' businesses. However, quantitatively, the overall transformational effects of digital technologies on the nature and processes of entrepreneurship are rather small as the vast majority of home-based businesses, like SMEs that are not home-based, trade offline. Online business models represent a very small proportion of the home-based business sector. Home-based businesses in rural areas do not make greater use of e-commerce. The findings add to the critical literature on the transformative nature of digital entrepreneurship and the emerging home-based business literature that question whether the role of digital technologies and online marketplaces for home-based businesses are being exaggerated, particularly in rural economies.

1. Introduction

Digital technologies are transforming the nature of entrepreneurial processes, entrepreneurial activities and the way in which entrepreneurship is pursued (Nambisan, 2016). However, research on digital entrepreneurship is still in its infancy, with one recent review identifying just 35 articles on the topic (Kraus, Palmer, Kailer, Kallinger, & Spitzer, 2019; Kraus, Roig-Tierno, & Bouncken, 2019). Our focus in this paper is on the impact of digitalisation on where entrepreneurship is practiced. Specifically, to what extent are digital technologies enabling the home to become a space for entrepreneurship?

Home-based businesses (HBBs) comprise two types of businesses: (i) those that undertake most or all of their activity in the residential home and (ii) those that operate from the home but a large proportion of their activity is conducted either at the client's premises or at outdoor sites (Reuschke & Domecka, 2018). HBBs account for the majority of businesses in some advanced economies, for example, 52 % in the USA (Reuschke & Domecka, 2018) and 59 % in the United Kingdom (UK) (Department for Business, Innovation & Skills, 2014a). One in ten domestic properties in the UK has at least one business (Department for Business, Innovation & Skills, 2014b). One of the key drivers in the growth of home-based businesses is suggested to be digitalisation and e-commerce (Anwar & Daniel, 2016; Clark & Douglas, 2011; Deschamps, Dart, & Links, 1998; Phillips, 2002). Internet and e-commerce reduce the significance of economies of scale and the minimum economic size of operation, hence enabling profitability with a small turnover. It has brought about the creation of new digital products ('e-goods'). Online storefronts (e.g. Magento, Shopify) and marketplaces (e.g. Amazon Marketplace, eBay, Etsy, Alibaba) have created new market opportunities with no geographical constraints, enabling

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businesses, and micro enterprises in particular, to showcase their merchandise and direct customers to their e-commerce site (Church & Oakley, 2018). These new trading opportunities are facilitated by social media (Huws, Spencer, & Syrdal, 2018), online payment systems (e.g. Paypal, Square) and dropshipping¹ (which avoids the need for inventory). At the same time, consumers have increasingly accepted shopping online, making 'e-shopping' a global trend that has come to threaten high street shopping in many countries (Nathan, Victor, Chin Lay, & Kot, 2019; Weltevreden & Van Rietbergen, 2007). However, there is no systematic evidence to indicate whether HBBs are more engaged in digital trading and e-commerce than other small businesses or to identify its influence as a driver of the growth in home-based business activity.

This paper seeks to extend our understanding of the transformational effects of digital technologies on the nature and processes of entrepreneurship. With the focus on exploring the extent to which home-based businesses are engaged in e-commerce – the buying and selling services and products online – we seek to establish whether HBBs are more likely than Small- and Medium-Sized Enterprises (SMEs) that are not home-based to engage in digital trading.

The geography of the home-based business sector appears to be quite distinct from the geography of entrepreneurship in that it is disproportionately concentrated in rural areas (Mason, Carter, & Tagg, 2011) although it also has a strong presence in some types of urban area (Kane & Clark, 2019; Reuschke & Houston, 2016; Sayers, 2010). In this context, 'e-homeworking', 'e-flexibility' and home-based businesses have been suggested to increasingly contribute to the sustainability of the SME sector in peripheral rural areas (Newbery & Bosworth, 2010; Townsend, Wallace, Fairhurst, & Anderson, 2017; Wyncarczyk, 2005). Philip and Williams (2019, 308) even argue that the home-based micro business sector is "an intrinsic part of the 'new rural economy'" in which the creative industries (arts, digital communication) are becoming increasingly significant. This, in turn, suggests that home-based businesses in rural areas are particularly likely to use the advances of technology to succeed (Phillips, 2002). A second focus of this paper is therefore the geographies of entrepreneurship, specifically on whether rural-based HBBs are more likely to engage in digital trading than non-HBBs and/or those in more urbanised areas.

The data that we use to address the research aims are drawn from a survey of the members of the Federation of Small Businesses (FSB) in Scotland. Scotland's geography comprises an urbanised belt of cities and larger towns alongside significant rural and remote areas including islands. Within the UK, the proportion of HBBs is slightly higher in Scotland than the UK average, with the Highlands and Islands of Scotland, a remote rural county, having one of the highest sub-regional home-based business rates in the UK (Mason et al., 2011, 631). Scotland is therefore an appropriate geographical context in which to study urban-rural differences in how HBBs compared to other businesses engage in e-commerce. Multivariate analysis is performed that systematically compares the engagement in e-commerce of HBBs versus non-HBBs in relation to the location of the businesses, the locations of their customers and other business and entrepreneur characteristics that may influence the engagement of businesses in e-commerce trading.

The home-based business sector has attracted attention in a number of countries (e.g. Burgess & Paguio, 2016 and Jain & Courvisanos, 2013 for Australia; Van Gelderen, Sayers, & Keen, 2008 for New Zealand; Holliss, 2015 for Japan and the UK; Kane & Clark, 2019 for the USA; Folmer & Kloosterman, 2017 for the Netherlands; Nathan et al., 2019 for Malaysia and Singapore). Moreover, the growth of digital marketplaces is a global phenomenon (Church & Oakley, 2018; D'Cruz & Noronha, 2016). Given the international importance of the home-based business sector and general global trends underlying its growth, the findings of this study will be of relevance beyond the specific case and give an indication of the extent to which digital technologies and the entrepreneurial opportunities of digital entrepreneurship are associated with the home-based business sector.

2. Literature review

2.1. Characteristics of the home-based business sector

There are three main reasons for operating a business from home: cost-minimisation; the nature of the business which does not require commercial premises; and convenience, for example by minimising travel time (Mason et al., 2011; Vorley & Rodgers, 2012). Other reasons, especially for women, include childcare and other family needs and the flexibility offered by home-based working which provides a better work-life balance and quality of life (Ekinsmyth, 2011; Loscocco & Bird, 2012; Reuschke, 2019; Walker, Wang, & Redmond, 2008; Wyncarczyk & Graham, 2013).

The majority of HBBs operate full-time, although a smaller proportion than other businesses (Mason et al., 2011). The home does not preclude employment creation and growth (Kane & Clark, 2019; Walker & Webster, 2004). A significant minority of home-based businesses have international sales (Mason et al., 2011). However, HBBs tend to be smaller in terms of employment size and turnover than other SMEs (Mason et al., 2011). Some HBBs do move into separate business premises once they begin to grow (Reuschke & Houston, 2016).

There is some ambiguity in the literature as to whether home-based business owners differ from other owners. While some business studies on women and older entrepreneurs pay attention to the home as entrepreneurial opportunity for specific demographic groups (Ekinsmyth, 2011 for mothers and Wainwright & Kibler, 2014 for older entrepreneurs), comparative studies have found little difference in the socio-demographic characteristics of HBB owners to non-HBB owners (Mason et al., 2011).

The business activities of the home-based business sector fall equally into traditional and knowledge-intensive activities (Kane & Clark, 2019). This is further supported by the industry sectors that home-based businesses are most prevalent in the UK. Amongst

¹ Dropshipping is a retail fulfilment method where the business does not keep the products it sells in stock. Instead, when it sells a product, it purchases the item from a third party and has it shipped directly to the customer. As a result, the merchant never sees or handles the product.

non-employing small businesses, those in construction, education, transport and storage and information and communication are most likely to be home-based whereas those in finance and real estate are less likely to be home-based (Department for Business, Energy & Industrial Strategy, 2018, 27). Other studies also underline the diversity of businesses that operate from home, with those in traditional trades serving primarily local markets contrasting with newer information and technology-based services that have the ability to serve non-local customers (Mason et al., 2011). In rural areas a higher proportion of HBBs are in the tourism sector (Mason et al., 2011) although more recent research points to the increasing importance of HBBs in newer industries (e.g. art, telecommunication) in remote/rural areas (Philip & Williams, 2019).

2.2. Digital entrepreneurship

“Digital technologies herald a new era in entrepreneurship” (Nambisan, 2016, 1047), refashioning traditional ways of pursuing entrepreneurial opportunities and bringing about new ways of creating and conducting business (Kraus, Palmer et al., 2019; Kraus, Roig-Tierno et al., 2019). As Autio, Nambisan, Thomas, and Mike Wright (2017) argue, digital technologies both re-shape the locus of entrepreneurial opportunities in the economy and also transform best practices in how these opportunities are pursued. Nambisan (2016) emphasises that digital technologies have resulted in more fluid and less bounded entrepreneurial processes and outcomes. Kraus, Palmer et al. (2019); Kraus, Roig-Tierno et al. (2019) highlight the higher social component and greater social interactions of digital entrepreneurship compared with traditional entrepreneurship. This, in turn, increases the importance of relationship capital for entrepreneurial success in a digital world to build legitimacy, assemble resources and identify opportunities (Kraus, Palmer et al., 2019; Kraus, Roig-Tierno et al., 2019). It is also suggested that digital technologies are increasing the temporability of entrepreneurship, enabling product ideas and business models to be quickly formed, enacted, modified and re-enacted in repeated cycles of experimentation and implementation. It also provides the potential for rapid scaleability (Nambisan, 2016).

There are at least five ways in which digitalisation is impacting on entrepreneurship. First, it creates new opportunities. At least three types can be recognised: shifting off-line businesses to online; new products and services that take digital form; and new products that are not themselves digital but leverage digital technology to exploit new opportunities in the market place (Sussan & Acs, 2017). Digital technologies also enable the combination of manufacturing and services to develop hybrid solutions that comprise tangible and intangible components (Laudien & Pesch, 2019).

Second, with its ability to connect with different types of customers at vastly decreasing transaction costs, digital technologies are enabling new business models to be created. Sussan and Acs (2017) identify three emerging models: (i) user-intensive business models that provide free content; (ii) sharing business models based on unused tangible assets (e.g. Uber, AirBnB); (iii) user-intensive business models that attract both paid and unpaid customers (e.g. Spotify).

Third, is the emergence of digital infrastructures – for example, online payment systems, crowdfunding, digital maker spaces and social media platforms. These help entrepreneurs to develop superior market intelligence by providing an efficient medium for communicating with, and collecting high quality market information from customers (Pergevova, Manolova, Simeonova-Ganeva, & Yordanova, 2019). It also leads to more collaborative and collective ways of pursuing entrepreneurship (Aldrich, 2014).

Fourth, digital platforms have opened up a broader set of opportunities for entrepreneurs, offering value creation and value appropriation infrastructure for entrepreneurs through their ability to connect with multiple potential customers at minimal transaction cost as well as mitigating liabilities of both newness and smallness (Nambisan & Baron, 2019). There are three main types (Hsieh & Wu, 2018). Innovation platforms enable entrepreneurs to develop complementary products and services within a digital ecosystem. Transaction platforms foster commercial activities such as online retail and on-demand services. Integration platforms are a mixture of transaction and innovation platforms.

Fifth, implementing digital technologies enables firms – especially service firms – to overcome geographical constraints on business activity, enabling the linkage between human activity and services to be disentangled (Laudien & Pesch, 2019). Digital technologies also help small firms to internationalise (Pergevova et al., 2019).

It has also been suggested that by shifting entrepreneurial activity into online space, and thereby reducing the resource barriers to enter entrepreneurship, digitalisation is having a democratising effect, opening up entrepreneurship to socially-marginalised people. However, this ‘emancipation thesis’ is challenged by Martinez Dy, Martin, and Marlow (2018) who argue that the obstacles to becoming an entrepreneur that exist offline that arise from social structure are equally present in online activities, with digital resource inequality mirroring offline resource inequality. They go on to say that “not only are familiar inequalities exacerbated with the phenomenon of digital enterprise, but also that new dimensions of inequality are emergent The internet is not leveller for entrepreneurial activity.” (Martinez Dy et al., 2018, 603).

2.3. Digitisation and home-based businesses

Digital technologies eliminate many of the constraints of operating a business from home, including physical space (e.g. digital products and services, order fulfilment services, virtual organisations) and visibility (e.g. online marketing). However, only a handful of studies have investigated home-based businesses in relation to digital technologies. The main focus of these studies is on businesses that operate exclusively online and make extensive use of the internet (Daniel, Di Domenico, & Sharma, 2015; Daniel, Di Domenico, & Bunan, 2017; Van Gelderen et al., 2008) which promotes the view – consistent with the early vision of the ‘electronic cottage’ by Alvin Toffler (1980) – that HBBs are indicative of a shift from off-line to online businesses (Sussan & Acs, 2017). Key themes explored in these studies are, first, the contrasting experiences of autonomy and self-regulating work, on the one hand, and feelings of isolation and loneliness (Daniel et al., 2017), on the other, and second, business performance (Nathan et al., 2019). However, much less is

known about the extent to which digital technologies are driving the home-based business sector and their access to international markets. Other studies with a wider focus on home-based business motivation and operation also highlight the importance of digital technologies for operating a business from home (Burgess & Paguio, 2016; Kapasi & Galloway, 2016; Wynarczyk & Graham, 2013) and as a source of sales, although, rather contradictory to the focus on online and internet trading (Anwar & Daniel, 2016; Deschamps et al., 1998), the differences in online sales between HBBs and non-HBBs seems to be rather small according to descriptive findings in Mason et al. (2011) study. Besides selling and buying online, HBBs also use digital technologies for marketing and promotion, day-to-day communication and administration. In some cases, digital is the business model (Wynarczyk & Graham, 2013).

Increasingly for many business activities, super-fast broadband access is required (Philip, Cottrill, Farrington, Williams, & Ashmore, 2017). However, digital connectivity is usually better in commercial business areas than in residential areas and is still a challenge for remote businesses and households in some remote rural areas (Philip et al., 2017; Salemink, Strijker, & Bosworth, 2017; Williams, Philip, Fairhurst, & Farrington, 2016; Wilson, Atterton, Hart, Spencer, & Thomson, 2018). This may be a geographical constraint on the wider existence of the 'electronic cottage' (Toffler, 1980).

E-commerce trading within the SME sector has been found in a UK-wide study by Pickernell et al. (2013) to be higher amongst smaller, young businesses in the service sector, both in basic services and knowledge-intensive services, and those businesses with growth ambitions. The study further suggests that e-commerce is used for trading with non-local markets, but nationally (across the UK in their study) rather than internationally. The study did not investigate home-based businesses but the 'smallness' of HBBs, with most being estimated to have less than ten employees (Mason et al., 2011, 634), and the over-representation of HBBs in service industries, might suggest that e-commerce trading is of greater importance among HBBs compared to non-HBBs. This is further suggested by the higher level of non-local trade relationships of HBBs compared to non-HBBs identified by Folmer and Kloosterman (2017) in their study of cognitive-cultural businesses in selected Dutch cities. However, the smallness of many HBBs related to turnover and running the business part-time (Mason et al., 2011; Thompson, Jones-Evans, & Kwong, 2009) contrasts with the growth orientation and ambitions that Pickernell et al. (2013) identified as being related with higher e-commerce trading amongst SMEs. Equally, Galloway (2007) argues that economic development in rural and remote areas is lagging primarily because of the lack of growth ambitions of some rural businesses with the urban-rural digital divide being a secondary issue.

2.4. Research questions

This paper adds to an extremely limited literature on the use of digital technologies by HBBs. It has three research questions. *First, are HBBs engaged in digital trading to a greater extent than other small businesses?* The existing literature does not offer a clear answer to this question. Although some literature on home-based businesses portrays them as 'online' or 'internet' businesses (Anwar & Daniel, 2016), there is a scarcity of empirical evidence on whether HBBs are more engaged in digital trading than SMEs that are not home-based.

The existing literature is particularly sparse in relation to the geography of digital entrepreneurship. To the extent that geography has been discussed, it is suggested that newer industries in rural areas may be linked with higher use of e-commerce trading, but because little is known about the use of digital technologies among urban-based HBBs it is not clear that this is the case. Our second research question is therefore as follows: *do HBBs based in rural areas have a higher level of digital sales than their counterparts in urban areas?*

Based on the review of this limited literature, it appears that HBBs use e-commerce for non-local and international trading. Although digital technologies are a tool for the internationalisation of small businesses more generally (Pergevova et al., 2019), it may be that HBBs make greater use of digital technologies as their business model, including through online market platforms, than non-HBBs (Church & Oakley, 2018). Moreover, in contrast to the view of the HBB sector as dominated by online/internet businesses, the evidence indicates that traditional activities including in construction (Kane & Clark, 2019) comprise a significant proportion of home-based businesses. Many of these HBBs may combine skilled manual/traditional activities with online services as suggested in the digital entrepreneurship literature (Laudien & Pesch, 2019). However, their use of e-commerce might not be any higher than amongst other businesses as micro businesses in general increasingly access niche markets through digital technologies (so-called long-tail marketing strategies) (Church & Oakley, 2018). Further, for small businesses, evidence suggests that e-commerce is used for trading nationally rather than internationally. Our third research question addresses this ambiguity in the literature by asking: *are HBBs using e-commerce to a greater extent than other small businesses for international sales?*

3. Research framework

3.1. Data

This study draws on data from a survey of members of the Federation of Small Businesses (FSB) Scotland with email addresses in November 2014 (approximately 12,000 businesses). The FSB is the largest UK lobby group for SMEs (0–249 employees) positioning itself as the 'voice' of small businesses.² Business owners were invited via email sent by the FSB to take part in the survey that was administered online. The total response was 1128 businesses which corresponds to a response rate of nine per cent. This response rate

² Membership of the FSB is open to owners, partners and directors of a business (or businesses), as long as the total number of employees for all businesses combined does not exceed 249.

is only slightly lower than in the FSB 2005/06 survey of its members across the whole of the UK 11.2 %) that provided the basis for an earlier study of HBBs (Mason et al., 2011) and is substantially higher than achieved in the 2008 FSB survey (4%) by Pickernell et al. (2013) that related to e-commerce trading.

The survey covered both home-based businesses and non-home-based businesses. The study design therefore has the great advantage of enabling comparative analysis between home-based businesses and non-home-based small businesses both in relation to e-commerce trading and also to other business characteristics, owner characteristics and business location which were captured in the survey.

The questionnaire included a question about the type of premises that the business operates from which enabled home-based businesses to be identified in the responses. The following response items were given to describe the premises type: home or external premises linked to home; mobile (e.g. van); retail premises; factory/workshop; or business unit and office. In addition, an open text category was provided. Home-based businesses are defined in this study as those businesses that are run in the owner's home or in external premises linked to the home as well as those who wrote in the free text response that they use their home as a base but work mostly at their clients' premises. Not included in the definition of home-based businesses are mobile businesses.

The other key variable in this study is the proportion of sales from e-commerce ("What proportion of your sales comes from e-commerce, e.g. online?") that we use as an indicator of the engagement of businesses in digital trading. Responses are categorical including 'none' and 'all' (see Table 1).

The study is based on a sample of 994 businesses which provided information on whether they are based in the owner's own home and the proportion of e-commerce trading of their total sales. In this sample, 39 % (n = 387) could be defined as home-based businesses. Among non-employing businesses, 60 % are home-based in this sample which corresponds exactly to the estimated home-based business rate amongst non-employing SMEs in the UK (Department for Business, Energy & Industrial Strategy, 2018, 27). Among those with employees, 32 % are home-based in our sample compared with an estimated 25 % in the UK SME population (ibid.). Since only just under one-quarter of businesses in the study sample are non-employers, which are expected to represent the majority of UK SMEs (Department for Business, Energy & Industrial Strategy, 2019), the overall proportion of HBBs in the study sample appears to be lower than in the UK SME population (39 % compared with 59 % among UK SMEs (Department for Business, Innovation & Skills, 2014b)). This higher proportion of employer businesses in our sample is related to the FSB membership which is biased towards larger (employer) SMEs (FSB - Federation of Small Businesses, 2014).³ This notwithstanding, the proportion of home-based businesses in this sample is in line with existing SME studies. The UK-wide home-based business study by Mason et al. (2011), for example, which was also based on an FSB membership survey, reported a proportion of home-based businesses of 37 % for Scotland which was in line in their study with the national FSB membership average (36 %).

The study sample has a distinctive industry composition which arises from its geographical focus on Scotland. Compared to all UK members, the Scottish branch of the FSB has a higher proportion of members in the sectors 'hotel, catering, leisure' and 'retail' while the proportion of businesses in 'business services' is lower (FSB - Federation of Small Businesses, 2014, p. 47). Both the sample-specific overall lower proportion of home-based businesses (related to the underrepresentation of non-employing SMEs) and the industry composition may be reflected in the descriptive reports of the engagement of businesses in e-commerce trading but should not significantly limit the generalisability of the multivariate analysis. However, since the survey was administered online, there may be the risk that those who are engaged in e-commerce were more inclined to respond to the survey. Table 1 provides a sample description with all variables employed in this study.

3.2. Modelling framework

Multivariate models are used to test the relationship between the engagement in e-commerce for home-based vs non-home-based businesses independent of other factors that may also be related with the engagement of businesses in e-commerce which is the dependent variable in all models. The five response categories to the question on engagement in e-commerce are ordered from no proportion of sales from e-commerce to all sales made from e-commerce (Table 1). The reason for using multinomial logistic regressions instead of ordered logistic regressions is that our key predictor variable – home-based business vs non-home-based business – does not meet the proportional assumption of an ordinal logistic regression. Multinomial logistic regressions can be used for ordinal responses (Hosmer, Lemeshow, & Sturdivant, 2013, 289). We prefer this model framework to the partial proportional odds model (Williams, 2006), as we want to include interaction terms with the home-based business dummy variable in order to sufficiently address the research questions, and the estimates provide a good description of the level of engagement with e-commerce. Multinomial logistic regressions, however, are sensitive to small cell sizes. Given the distribution of our variables (Table 1), we therefore compute a dependent variable (sales from e-commerce) with three categories: (1) no sales from e-commerce, (2) less than half of the sales come from e-commerce and (3) half and more of the sales come from e-commerce. The modelling framework including all independent variables is summarised in Table 2.

We first test the association of e-commerce trading and HBBs vs non-HBBs (first research question) controlled for the business

³ The FSB underrepresents sole proprietors and non-employing businesses. According to its membership survey 2013/14 (reflecting the time of the present study), 70% of all Scottish FSB members were registered for Value Added Tax (VAT), six out of ten members employed staff and 47% were limited companies (FSB, 2014). To compare, only 43% of all UK private sector businesses were estimated to be registered with VAT or PAYE (Businesses with employees have to register with Pay-As-You-Earn) in 2014, 76% of businesses were non-employers and 29% were companies (Department for Business, Innovation & Skills, 2014c).

Table 1

Sample description, column percentages (rounded).

Source: FSB Scotland membership survey 2014.

Variables	Home-based business	Non-home-based business
Sales from e-commerce		
None	0.66	0.72
Less than half	0.14	0.21
About half	0.06	0.02
More than half	0.10	0.05
All	0.04	(-)
	(n = 387)	(n = 607)
Business location		
City	0.18	0.29
Town	0.29	0.44
Village/rural	0.53	0.27
	(n = 383)	(n = 606)
Location of majority of sales/customers		
Local	0.22	0.36
Region/Scotland	0.36	0.42
UK	0.29	0.17
International	0.12	0.06
	(n = 385)	(n = 605)
Industry (SIC07)		
Agriculture, forestry, fishing (A)	0.05	0.02
Manufacturing, energy, water (C–E)	0.06	0.13
Construction (F)	0.12	0.12
Wholesale and retail (G)	0.06	0.30
Transportation (H)	0.02	0.02
Accommodation and food (I)	0.23	0.13
Information and Communication (J)	0.05	0.02
Finance, insurance, real estate (K, L)	0.03	0.04
Professional, scientific, technical (M)	0.13	0.06
Education (P)	0.04	0.02
Health and Social (Q)	0.03	0.04
Arts, entertainment (R)	0.09	0.05
Other services (S)	0.07	0.04
Other	0.02	0.01
	(n = 387)	(n = 606)
Business is part-time	0.17	0.07
	(n = 386)	(n = 606)
Employed people in business		
Owner only	0.35	0.15
2–3 (incl. owner)	0.38	0.21
4–9 (incl. owner)	0.18	0.39
10+ (incl. owner)	0.08	0.24
	(n = 387)	(n = 607)
Turnover in last year		
Less than £25,000	0.27	0.09
£25,000 - £50,000	0.19	0.08
£50,001 - £100,000	0.27	0.16
£100,001 - £250,000	0.18	0.22
£250,001 - £500,000	0.07	0.19
£500,001 +	0.02	0.26
	(n = 373)	(n = 595)
Years of trading		
0–<2	0.09	0.05
2–<5	0.15	0.14
5–<10	0.22	0.17
10–<15	0.20	0.18
15–24	0.21	0.20
25+	0.13	0.25
	(n = 382)	(n = 592)
Type of customers		
Other businesses	0.41	0.35
Individuals	0.51	0.56
Other	0.09	0.10
	(n = 386)	(n = 603)
Women owners	0.33	0.33
	(n = 383)	(n = 605)
Age of owner		
< = 40	0.08	0.11

(continued on next page)

Table 1 (continued)

Variables	Home-based business	Non-home-based business
41–54	0.39	0.45
55–64	0.37	0.29
65+	0.16	0.15
	(n = 383)	(n = 606)
Owner has disability/long-term health condition	0.14	0.13
	(n = 384)	(n = 605)
Number of children in household		
0	0.74	0.69
1 child	0.11	0.13
2 and more children	0.15	0.18
	(n = 387)	(n = 607)

Table 2

Modelling framework.

Variables in models	Research Questions
Dependent variable	
Proportion of sales from e-commerce (no sales, less than half, half and more)	
Key co-variables	
Home-based business (yes/no)	
Business location (city, town, village/rural)	<i>1st research question</i>
(Broadband speed at postcode district level) ^a	
Interaction term between home-based business and business location	<i>2nd research question</i>
Location of customers (local; regional (Scotland); national (UK); international)	
Interaction term between home-based business and location of customers	<i>3rd research question</i>
Controls	
Business characteristics	
Number of employees	
Turnover last year	
Part-time business	
Type of majority of customers	
Industry (selected sectors)	
(Age of business) ^a	
Entrepreneur characteristics	
Age of owner	
Sex of owner	
Lives with children	
Disability of owner	

^a Tested but not significant and not used in final models.

location in a city, town or village/rural area, alongside a large number of business characteristics and entrepreneur characteristics as controls (Table 3). For further testing whether home-based businesses in rural/remote areas are associated with a greater engagement in e-commerce than SMEs in urban areas (second research question), we include in a separate model an interaction term between the HBB dummy variable and the business location variable.

The business location is a self-reported variable in the survey data. The survey questionnaire did not capture whether the business actually had connectivity to a mobile network or broadband. However, we collected the postcode district of the business location and merged broadband speed data (minimum, mean and medium speed) from 2013 (to match our survey year) at this small area level to our dataset⁴. Neither of these variables were significant in our models, and they also did not change the estimates of the business location and home-based business variables.

Included as controls of business characteristics in these models (Table 2) are measures of the size of the business. This is because home-based businesses are usually small in terms of turnover and number of employees and are often run on a part-time basis (Mason et al., 2011; Walker & Webster, 2004) and these characteristics were found to be related with e-commerce (Pickernell et al., 2013). In addition, we include the type of customer (individuals, businesses and others) that accounts for the majority of sales as B2B transactions have increased in importance through online marketplaces (D’Cruz & Noronha, 2016). The detailed capture of industry sectors (Table 1) cannot be included in the models because some industries have small cell sizes in the dataset. We therefore include as a dummy variable ‘accommodation and food services’ in which home-based businesses are overrepresented in this sample. This industry was also found by Pickernell et al. (2013) to have a negative association with e-commerce trading (although basic services showed a positive association in their study). We further investigated via dummy variables ‘wholesale and retail’ (in which home-based businesses are underrepresented) and ‘professional, scientific and technical services’ (as a proxy of knowledge-intensive

⁴ <https://www.ofcom.org.uk/research-and-data/data/map-data/broadband-2013>.

Table 3

Proportion of sales from e-commerce, multinomial logistic regression (3 categories), relative-risk ratios.

Source: FSB Scotland membership survey 2014.

Independent variables	Model 1		Model 2	
	Less than half (reference group: no sales from e-commerce)	Half and more	Less than half (reference group: no sales from e-commerce)	Half and more
HBB (ref.: non-HBB)	0.871	3.497***	0.708	3.830**
Business location (ref.: city)				
Town	0.823	0.632	0.797	0.698 (0.293)
Village/rural area	0.839	0.672	0.751	0.701 (0.316)
Interactions HBB*business location (ref.: HBB*city)				
HBB*town	–	–	1.172	0.818 (0.509)
HBB*village/rural area	–	–	1.412	0.935 (0.561)
Accommodation and food	1.297	4.321***	1.315	4.324***
Number of employed people in business (ref.: one) ^a				
2–3	1.091	1.718	1.072	1.714 (0.578)
4–9	1.015	1.264	1.004	1.266 (0.531)
10+	1.098	0.827 (0.446)	1.090	0.830 (0.447)
Type of majority of customers				
Individuals	1.111	3.763*** (1.156)	1.104	3.756***
Other	0.712	1.122 (0.621)	0.713	1.118 (0.619)
Age of owner (< = 40 years)				
41–54	1.067	0.446*	1.065	0.446*
55–64	1.021	0.333** (0.138)	1.026	0.331** (0.138)
65+	1.223	0.663	1.228	0.657
n (observations)	943		943	
Log likelihood	–696.110***		–695.792***	
R2	0.104		0.104	

Note: Standard error in brackets. Predictor variables that are not significant and not shown: part-time business, turnover last year, sex, disability of owner, owner lives with children in household.

Significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

^a Including the owner.

services) but in both cases the effect of the HBB dummy on the outcome (sales from e-commerce) did not change. We also tested the effect of years of trading on the engagement in e-commerce as [Pickernell et al. \(2013\)](#) found a small effect of business age on e-commerce in SMEs; however, this was not significant and did not change the effect of the HBB dummy variable in this study. We therefore did not include years of trading in the final models.

As entrepreneur characteristics we include: age, gender and household composition (children or not) since the use of online platforms in particular may lend itself to younger age groups ([Huws et al., 2018](#)) and the home-based business literature has emphasised the childcare- and family-related reasons for women to run businesses from home ([Walker & Webster, 2004](#); [Wynarczyk & Graham, 2013](#)). We also add whether the owner has a disability on the basis that e-commerce may open up opportunities for entrepreneurs who are limited in their spatial mobility.

We further investigate the location of customers and the engagement in e-commerce and related differences between HBBs vs non-HBBs addressing our third research question. The location of the majority of customers was captured in the survey as follows: local; in Scotland (regional); UK (national); Europe and overseas. Because of small cell sizes ‘Europe’ and ‘overseas’ were collapsed into the single category of ‘international’ (see [Table 1](#)). The relationship between the location of customers and HBB vs non-HBB is tested via an interaction term. International sales are highly associated in the dataset with higher proportions of e-commerce. For modelling e-commerce as a function of the location of customers ([Table 4](#)), separate models with dummy variables for each location compared to all other locations are displayed as the 95 % confidence intervals for these estimates were more reliable than for the full set of location dummy variables in one model. Sample sizes in this sample are too small to test further a three-way-interaction between HBBs, the location of the majority of customers and the location of the businesses (rural, city or town). For these models, a selected number of controls were used that proved to have a significant effect in the first set of models ([Table 3](#)).

4. Empirical findings

4.1. Description of e-commerce trading

Approximately one-third of home-based businesses in this sample are engaged in e-commerce trading. This compares with 28 % of SMEs in this sample that are not home-based ([Table 1](#)). One-fifth of home-based businesses achieved upwards of half of their sales from e-commerce. This proportion is substantially smaller among businesses that are not home-based (< 6%). Businesses that make all of their sales from e-commerce represent only a fraction of this sample of SMEs – but these businesses which exclusively trade online are almost all home-based.

These descriptive findings clearly point to e-commerce being of greater importance amongst home-based businesses and more so

Table 4

Proportion of e-commerce and location of majority of customers, multinomial logistic regression (3 categories), relative-risk ratios.
Source: FSB Scotland membership survey 2014.

Independent variables/Models	Less than half (reference group: none)	Half and more	Less than half (reference group: none)	Half and more
Models 1 & 2 - mainly local customers				
HBB (ref.: non-HBB)	0.752	2.197** (0.554)	0.683 (0.160)	1.955* (0.521)
Mainly local customers (ref.: no)	0.618*	0.160*** (0.060)	0.560** (0.127)	0.105*** (0.058)
Interaction: HBB*Local customers	–	–	1.427 (0.610)	2.450 (1.840)
Log likelihood	–719.141***		–718.185***	
R2	0.101		0.102	
Models 3 & 4 - mainly regional customers				
HBB (ref.: non-HBB)	0.786 (0.158)	2.621***	1.034 (0.256)	3.211***
Mainly regional customers (ref.: no)	0.954 (0.165)	0.280***	1.177 (0.242)	0.448*
Interaction: HBB*regional customers	–	–	0.499 (0.190)	0.387
Log likelihood	–726.22***		–723.526***	
R2	0.092		0.095	
Models 5 & 6 - mainly customers from the rest of the UK				
HBB (ref.: non-HBB)	0.721	2.305**	0.644	3.237*** (0.977)
Mainly customers from rest of UK (ref.: no)	2.342*** (0.475)	3.479***	2.118**	6.166***
Interaction: HBB*rest of UK customers	–	–	1.348 (0.557)	0.399* (0.189)
Log likelihood	–719.717***		–717.090***	
R2	0.100		0.103	
Models 7 & 8 - Mainly international customers				
HBB (ref.: non-HBB)	0.793	2.479*** (0.632)	0.813	2.571***
Mainly international customers (ref.: no)	0.495	6.934*** (2.060)	0.640	7.979***
Interaction: HBB*international customers	–	–	0.415	0.762
Log likelihood	–712.872***		–712.516***	
R2	0.108		0.109	

Note: N = 980 observations; standard error in brackets. Control variables not shown: Business location, accommodation and food services, number of people employed in business and age of owner.

Significance: *p < 0.05, **p < 0.01, ***p < 0.001.

than reported in an earlier study (Mason et al., 2011). However, even though businesses that only trade online are more often home-based, their numerical significance in this study sample is very small. It is therefore important to emphasise that home-based businesses are – by a large margin – not ‘online’ or ‘internet’ businesses (Daniel et al., 2015, 2017; Deschamps et al., 1998).

It is also striking that trading via eBay and Amazon is slightly less often mentioned by HBBs than non-HBBs (3% vs. 5% and 2% vs. 4% respectively) while the online marketplaces of Etsy, Alibaba.com and Notonthehighstreet.com are almost negligible in the dataset (not reported in Table 1). This is surprising, particularly as Etsy has received some attention in the literature in relation to home-based businesses and women entrepreneurs in particular (Luckman, 2015). The present study suggests that only a small minority of home-based businesses are operating exclusively on online marketplaces that trade craft and other goods.

4.2. Multivariate analysis of e-commerce

The findings in Tables 3 and 4 are displayed as relative-risk ratios (RRRs) which indicate the risk of the outcome (proportion of e-commerce) falling into the comparison group relative to the reference group (no e-commerce) with a one unit increase in the predictor variable. An RRR > 1 (<1) means that the risk of the outcome falling in the comparison group increases (decreases) as the predictor variable increases; in other words, the outcome of the comparison group is more (less) likely. In all models, the reference group are businesses that do not trade online (i.e. the proportion of their sales from e-commerce is zero) (Table 1). Reported are the relative-risk ratios for a business having less than half or half and more of its sales from e-commerce respectively in separate columns – compared to no sales. For reasons of brevity, some control variables that are not significant in either of the models are not reported in Table 3. For reasons of space, Table 4 only displays the variables of greatest interest for this study.

Findings in Table 3 confirm that HBBs have a statistically significant higher proportion of e-commerce sales than non-HBBs. Specifically, home-based businesses compared to non-HBBs are more likely to obtain half and more of their sales from e-commerce (to having no sales from e-commerce) while there is no difference in HBBs vs non-HBBs in relation to having some (less than half) of their sales from e-commerce (compared to no sales at all). In other words, HBBs are more associated than non-HBBs with heavy use of e-commerce.

We cannot find a statistically significant difference in the engagement in e-commerce based on the location of the businesses – whether it is in a rural area/village, town or city (Model 1). Model 2 adds interactions terms between the HBB dummy variable and the location of the business. The interaction terms are also not significant, meaning that we cannot find statistical evidence that home-based businesses are associated with a greater engagement in e-commerce if they are located in a village/rural area. These findings contrast with previous work that highlighted the entrepreneurial opportunities created by digital technologies to enable home-based businesses to operate in remote/rural areas (Newbery & Bosworth, 2010; Philip & Williams, 2019; Wynarczyk, 2005).

One possible explanation for this finding may be our use of a single, aggregated rural category that does not capture the heterogeneity of rural areas (e.g. accessible vs. remote, agricultural vs. mining vs. forest, mainland vs. island) (Price, Shutt, & Sellick, 2018; Saleminck et al., 2017). Another possible explanation may be the poorer broadband connectivity and speed specifically in rural areas in Scotland, with Ofcom (the UK regulator for communication services) reporting that some rural areas in Scotland lagging behind towns and cities in terms of coverage.⁵ However, our findings do not change when broadband speed is controlled for at the postcode district level. Hence, in our study home-based businesses are associated with having at least half of their sales from e-commerce (to have no sales from e-commerce) regardless of whether they are based in a city, town or rural area/village. In Model 2 (Table 3) the RRR of the HBB dummy variable is now the main effect for HBBs in cities, showing a high association of home-based businesses in cities with a large proportion of sales from e-commerce of 50 % and more (to no sale from e-commerce). This underlines the importance of digital technologies for home-based businesses in cities, i.e. in areas with high digital connectivity.

We further find that businesses in accommodation and food services are significantly associated with obtaining large proportions (50 % and upwards) of their sales from e-commerce. The strong positive effect of accommodation and food services on e-commerce engagement is different to findings by Pickernell et al. (2013) who reported a small negative association. The positive association found in our data could be because of the use of websites by accommodation and food service businesses for marketing and booking and the role of comparison sites (Tripadvisor, etc.). We further tested the three-way-interaction between home-based business (vs non-home-based business), business location and accommodation and food services but again cannot find a significant relationship with villages/rural areas.

Businesses with individuals as their main customers show in Table 3 a significantly increased engagement in e-commerce. The importance of B2C relative to B2B for e-commerce trading in our data is consistent with the limited use of online market platforms for e-commerce trading in this study sample (see Section 4.1).

Entrepreneur characteristics are of little important in these models (Table 3) except for the age of the owner, with the youngest group of entrepreneurs (< = 40 years old) being associated with having more than half of their sales from e-commerce. This age group are 'digital natives' and so instinctively use digital tools and are more likely to identify digital-enabled opportunities. It may also offer an illustration of the limited emancipatory effects of digital entrepreneurship as argued by Martinez Dy et al. (2018).

Findings in Table 4 show a strong relationship between the location of customers and the engagement in e-commerce. Broadly speaking, a mainly local and regional customer base is associated with a lack of engagement in e-commerce while customers mainly based outside of the region (Scotland) in the rest of the UK and internationally increase the likelihood of e-commerce, broadly in line with existing findings (Pickernell et al., 2013). Importantly for the context of this study is that controlling for the location of customers and the location of businesses in villages/rural areas vs cities or towns, HBBs compared to non-HBBs are still associated with a greater reliance on e-commerce for sales (half and more of sales to no sales from e-commerce) (Models on the left-hand side of Table 4).

Models on the right-hand side of Table 4 include interaction terms between the HBB dummy variable and the location of customer variable to test whether there is a unique effect of home-based business (relative to a non-home-based business) and the location of customers on e-commerce trading. However, we cannot find such unique interaction effects with mainly local customers (Model 2), mainly regional customers (Model 4) and mainly international customers (Model 7). However, we find that even though SMEs with a mainly national customer base are positively associated with e-commerce trading (Model 5 in Table 4), this is not the case for HBBs (Model 6 in Table 4). Indeed, HBBs with the majority of national customers (outside of Scotland in the rest of the UK) are associated with a decreased likelihood of heavy use of e-commerce for their sales (half and more), controlled for other factors. Overall, the findings suggest that home-based businesses are associated with obtaining large proportions of their sales (50 % or more) from e-commerce but they are not any more enabled by digital technologies to trade nationally or internationally (in terms of customers and suppliers) than other SMEs. This said, descriptive findings show that the geography of sales is more international and national in nature amongst home-based businesses compared to non-home-based businesses (Table 1).

5. Discussion and conclusion

HBBs comprise more than half of all businesses in developed economies but because of their invisibility they have not attracted the attention of researchers that their significance deserves. This paper – which is based on a survey of the Scottish members of the Federation of Small Businesses in the United Kingdom – focuses on two specific gaps in the HBB literature: first, the extent to which HBBs are disproportionately engaged in e-commerce and second, given the role of digital technologies in overcoming the friction of distance, whether HBBs in rural areas have a higher level of engagement in e-commerce and access to international markets through e-commerce. It makes three contributions.

First, it qualifies the findings of existing studies that strongly link home-based business with 'online' or 'internet' businesses (Daniel et al., 2015, 2017; Di Domenico, Daniel, and Nuan (2014); Deschamps et al., 1998; Van Gelderen et al., 2008). This study finds that home-based businesses are associated with a great reliance on e-commerce trading for sales (which is measured by half and more of their sales), compared to SMEs that are not home-based. On the one hand, this provides support for the view of home-based businesses as online business. But on the other hand, the majority of HBBs have no online sales at all and only a minority derive all of their sales from e-commerce. This underlines the evidence from earlier studies that emphasise the diversity of the home-based

⁵ Ofcom: Latest Scottish broadband and mobile coverage revealed, 20 December 2019, <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2019/latest-scottish-broadband-and-mobile-coverage-revealed> (accessed on 10 February 2020).

business sector (Mason et al., 2011): as shown in this study, they comprise a minority with a high dependency on e-commerce and a majority which make traditional offline sales in regional markets.

Second, although e-commerce trading facilitates trading beyond the region and internationally (Church & Oakley, 2018; Pergevova et al., 2019; Pickernell et al., 2013), HBBs are no more associated with digital trading to access international markets than non-HBBs.

Third, despite the prevalence of HBBs in rural areas compared with non-HBBs (Mason et al., 2011), we find little evidence that this distinct geography of the home-based business sector is reflected in their use of e-commerce trading. We specifically tested whether HBBs in rural areas make greater use of digital technologies than those in towns or cities and whether there are differences in the engagement of small businesses located in cities, towns or rural areas by whether they are HBBs or non-HBBs – but could not find any statistically significant differences. While some studies have emphasised digital technologies specifically for running a business from home in rural and remote areas (Newbery & Bosworth, 2010; Philip & Williams, 2019; Townsend et al., 2017; Wyncarczyk, 2005), other studies have found no impact of broadband expansion and the prevalence of home-based business and other forms of home-based work (Kolko, 2012). Similarly, it was suggested that investment in broadband expansion in remote/rural areas would benefit the entrepreneurial activities in areas where small businesses were already well-networked but it can equally lead to a decrease in entrepreneurial activities in remote areas due to increased competition in international markets (Cumming & Johan, 2010). This links to our first point about the diversity of the home-based business sector. Broadband investment has the highest impact on technology-reliant industries (Kolko, 2012). This is a minority of the home-based business sector and therefore the potential future impact of investments in mobile networks/broadband in rural areas is likely to have a small positive effect on the prevalence of digitally engaged home-based businesses. An alternative scenario may equally be that with an increasing importance of digital technologies (including e-commerce) for small businesses, we will see an increase of home-based businesses in cities — areas where technology-reliant industries are concentrated — or in a few rural areas where networks of small businesses exist that can leverage the advantages of global digital trading.

The opportunities to trade digitally have facilitated some home-based business activities. However, the findings of this study challenge the emphasis of digital technologies as a driver of home-based businesses, suggesting that this narrative is exaggerated. It therefore adds to the critical literature on the transformative nature of digital entrepreneurship (Martinez Dy et al., 2018). Neither do we find that underrepresented social groups in entrepreneurship (notably women, older and disabled people) are engaging more in e-commerce trading in the home-based business sector. The dominance of traditional offline trading and the small proportion of home-based businesses that trade exclusively online therefore suggests that at this point in time the overall transformational effects of digital technologies on the nature and processes of entrepreneurship are rather small. In particular, online business models and online marketplaces such as Etsy, eBay or Amazon have a much smaller impact on this transformation according to our than is suggested by some existing studies (Church & Oakley, 2018; Luckman, 2015). However, our evidence that the proportion of home-based businesses that derive half and more of their sales from e-commerce is higher than that of other small businesses does show that digital technologies are transforming the home-based business sector by extending their geographical reach to global markets – although to a lesser extent than suggested by existing research and in media commentaries.

One policy implication that can be drawn from this evidence is that governments must avoid basing interventions to support small businesses, and HBBs in particular, and rural entrepreneurship on the basis of stereotypes. Only a minority of small businesses are extensively engaged in digital commerce hence digital commerce initiatives are likely to have limited relevance. Moreover, government investment to support the take-up of digital technologies of SMEs need to go beyond investment into infrastructure and consider the existing small business sector in a specific area (i.e. industry composition, support networks). This is because it seems rather unlikely that home-base business start-ups increase simply as a consequence of improved broadband and internet connection (Kolko, 2012). But equally, our evidence that only a minority of small businesses engage in e-commerce could be seen as a justification for interventions to achieve a digital transformation of the small business sector.

Finally, this study points to issues that would benefit from further research. More research is needed to explain why the ‘emancipatory’ effects of digital technologies on disadvantaged social groups to use their home as entrepreneurial space are lower than expected. Understanding why the engagement in e-commerce trading in the home-based business sector does not display stronger geographical variation – specifically that the level of e-commerce in rural areas is not as high as expected – and the extent to which this reflects constraints to access digital technologies in some areas also warrants further investigation. There is also a need to explain why rural areas are not attracting more home-based businesses that obtain large proportions of their sales from e-commerce and hence failing to fully benefit from digitisation.

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