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By *Marc Cowling, Ross Brown, Neil Lee*

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The Geography of Business Angel Investments in the UK: Does local bias (still) matter?

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Abstract

Business angels (BAs) are high net worth individuals providing risk capital to small private firms. Theory and conventional wisdom suggest that the need for face-to-face interaction means angels will have a strong preference for local investments. We empirically test this assumption using a large representative survey of UK BAs. Our results show local bias is less common than previously thought with only one quarter of total investments made locally. However, we also show pronounced regional disparities, with investment activity dominated by angels in London and Southern England. In these locations there is a stronger propensity for localised investment patterns mediated by the "thick" nature of informal risk capital market in these locations. Together these trends further reinforce and exacerbate the disparities evident in the UK's financial system. The findings make an important contribution to the literature and public policy debates on the uneven nature of financial markets for sources of entrepreneurial finance within the UK.

Key words: Entrepreneurial Finance, Business Angels; Equity Investment; Local Bias; Public Policy

1. Introduction

This paper examines the spatial dynamics and local investment bias of UK business angels (BAs). Our motivation for examining this topic is threefold. First, there is now growing academic and policy interest in the financing of new and small firms (Klagge et al, 2017). Yet despite its crucial importance for regional development (Martin et al, 2005; Grilli, 2018), the nature and geography of entrepreneurial finance remains something akin to a "black box" (Pollard, 2003, p. 430). Second, the evidence base on local investment bias and BAs is thin and inconclusive[1]. Finally, given the emergence of new investment channels such as equity crowdfunding (Langley and Leyshon, 2017; Gallemore et al, 2019; Wang et al, 2019), there may be further technological reasons to revisit the issue of proximity (Herrmann et al, 2016). While equity investments are mapped into complex social networks (Wray, 2012), technology may be reducing this effect.

Typically, BAs are high net worth individuals providing risk capital to small, private firms investing wealth accrued via their own entrepreneurial endeavours (Shane, 2009; Wiltbank et al, 2009). These informal venture capitalists play a growing role providing seed funding to start-ups across many advanced countries (Lerner et al, 2018), especially in the US, Canada and the UK (Kerr et al, 2011; Cumming and Zhang, 2019). There is growing interest in the role of angel investors, not least in the UK where they are regarded as a crucial component of the country's financial system for small firms (British Business Bank, 2018; Wright et al, 2015), helping establish household names such as Innocent Smoothies (Grilli, 2018). The UK's angel market is now regarded as one of the most highly developed in the

[1] While early studies found as many as three out of four BA investments occurred locally (Mason and Harrison, 1994; Fritsch and Schilder, 2008), recent studies show a diminishing propensity to invest locally (Avdeitchikova, 2008; Harrison, 2010; Wright et al, 2015).

world, which held up well during the recent financial crisis when both bank lending and venture capital (VC) declined markedly (Lee et al, 2015; Mason and Harrison, 2015)[2].

Importantly, informal equity funding by BAs makes a disproportionate contribution to early stage and expansion equity capital within poorer regions (Jones-Evans and Thompson, 2009). For example, BAs often play a crucial intermediary role recycling entrepreneurial wealth within local entrepreneurial ecosystems (Clarysse et al, 2014). Angel funding also confers major benefits for recipient firms themselves through the provision of strategic advice and support (Politis, 2008; Riding 2008). Research strongly shows that angel investments correlate positively in terms of venture growth, survival, employment and follow-on finance (Kerr, et al, 2011; Lerner et al, 2018). Angels therefore can be "major catalysts" fostering new scientific ventures enabling localities to deviate from existing regional path dependencies (Martin, 2010, p. 19).

Yet while BA investments is seen as important for economic development, the dominant view in the literature is that BAs tend to have confined local search horizons. Due to the unique relational and long-term nature of BA funding, some label angels as "co-entrepreneurs" (Morrissette, 2007) engaged in a "full contact sport" (Benjamin and Margulis, 1996). Owing to this, angels and other equity investors are often "dominated by parochialism" and "local bias" (Shane and Cable, 2002; Cumming and Dai, 2010; Harrison et al, 2010; Colombo et al, 2019) with a strong preference for investing "in local firms" (Cumming and Zhang, 2019, p. 693). Close spatial proximity facilitates the transfer of "soft information" which encompasses assessments of the firm, the competitiveness of its products and managerial capabilities (Flögel, 2017). Consequently, there is a widely-held perception that equity investors utilise decision-rules such as the '20 minute rule' (where VCs only

[2] It is estimated UK BAs make approximately 2,500 investments annually, cumulatively amounting to $1.5bn (British Business Bank, 2018).

invest in companies located within a 20 minute drive from their office) being adopted to inform decision-making (Cumming and Dai, 2010). Whereas the veracity of such decision-rules is questionable[3], a substantial body of empirical evidence suggests that the "information intensive" nature of the investment process means that equity investors have an overwhelming local bias (Martin et al, 2002; Mason and Harrison, 2002; Martin et al, 2005; Cumming and Dai, 2010)[4].

Despite their importance, angels remain a relatively under-researched topic (Cumming and Zhang, 2010) partially due to their somewhat "hidden" nature (Mason and Harrison, 2008). Recent reviews of the literature have noted a relative dearth of research on spatial factors associated with BA investments (Harrison et al, 2010; Tenca et al, 2018)[5]. Consequently, little is known about "the impact of distance" on different types of angels (White and Dumay, 2017, p. 206). In other words, what types of angels have the strongest preferences for localised investment patterns, the people element, what types of companies they invest in, and the precise nature of their investments are all poorly understood. These were the questions posed by Cumming and Dai (2010) in their illuminating work on local bias and VC investments in the US, but to date these questions have not been fully addressed in the specific context of BAs. Furthermore, with some notable exceptions (Harrison et al, 2010; Herrmann et al 2016; Bertoni et al 2015), the overwhelming body of work on local bias focuses almost exclusively on the US (Harrison and Mason, 2019).

To overcome these important research gaps, we seek to answer the following overarching research questions:

[3] For example, other researchers discuss the spatial heuristic used by some VCs in Silicon Valley as the "one-hour rule" (Griffith et al, 2007).
[4] A German study found BAs to be even more locally focused than VCs, with angels almost twice as likely to invest locally compared to VCs (Fritsch and Schilder, 2008).
[5] This is all the more surprising given angel and VC investment categories are roughly equivalent in size (Engineer et al, 2019).

i) *Is there a local bias in the investment patterns of UK BAs?*

ii) *What are the personal and behavioural dynamics shaping these spatial investment patterns*?

We empirically examines these questions by assessing where BAs invest in the context of distance from their home base, and then identifies potential differences between BAs who have a preference for local investment and their more geographically adventurous peers in the contexts of (a) their human capital and level of investment expertise, (b) the types of investments they make, and, (c) the nature of investee companies. To answer these questions we use a large unique survey of 546 UK BAs stratified to be representative of the UK BA population. The data therefore constitutes a significant proportion of the overall population of the UK BA market and should be broadly representative of the overall cohort of UK BAs, echoing calls for greater use of registry-based data sources to ensure a fuller coverage of the entire population of BAs (Avdeitchikova and Landström, 2016). This is important as most prior work on BAs typically derives from much smaller non-representative samples of convenience (Mason and Harrison, 2008).

The findings make an important contribution to the literature on the geographies of entrepreneurial finance. Importantly, the work challenges the "local bias thesis" and shows investing at distance is becoming more commonplace than previously thought. The fact more experienced angels prefer to invest on a wider geographic scale suggests some angels undergo "experiential learning" which temporally and spatially alters their investment behaviour. That said, in regions where the population of BAs are most notable (i.e. South-East of England) these investments are less spatially diffuse suggesting that the nature of local demand conditions and the nature of local context remain crucial for mediating BA investment behaviour. Together these findings present stern challenges for policy efforts

designed to encourage and foster angel investments as a tool for promoting regional economic development, especially in more peripheral UK regions.

The remainder of the paper is organised as follows. In Section 2 we review the theoretical and empirical literatures relating to entrepreneurial finance and distance, then draws out some testable hypotheses. Section 3 presents our data and empirical methodology. In Section 4 we move to our core econometric analysis of BA investing and distance. Section 5 provides a discussion of the results. Conclusions are presented in Section 6.

2. The Geography of Entrepreneurial Finance

Theoretical Issues

There are compelling *a priori* theoretical reasons why the market for entrepreneurial finance may be inherently localised. Entrepreneurial opportunities are increasingly viewed as a "*process of social interaction* (between a community and the entrepreneur) rather than solely as an *outcome of thinking*" by entrepreneurs themselves (Shepherd, 2015, p. 491). Relationships and social capital are therefore crucial ingredients mediating the link between entrepreneurs and sources of finance and these are often strongly geographically embedded (Uzzi, 1999; Kemeny et al, 2015; Flögel, 2017). In many respects this mirrors how the innovation and entrepreneurship process is now widely conceived as a systemic process involving a wide variety of geographically-bounded constitutive interconnected actors, institutions and iterative processes inhabiting "regional systems of innovation" (Cooke 2001; Asheim et al, 2011) and regional "entrepreneurial ecosystems" (Alvedalen and Boschma, 2017)[6].

[6]Analogous to regional innovation systems, the concept of "entrepreneurial ecosystems" demonstrates the institutional, relational and embedded nature of how firms form and grow (Alvedalen and Boschma, 2017).

Within these geographical bounded spaces, relationships, networks, social capital and "buzz" are the pivotal relational elements (Kemeny et al, 2015). These processes by their nature are dynamic, fluid and unstructured. Storper and Venables (2004), for example, claim it is the "unplanned contact system" or "buzz" within these spatial environments which engenders vicarious learning and resource gathering opportunities "among actors embedded in a community by just being there" (Bathelt et al, 2004, p. 31). By operating in close geographic proximity entrepreneurs can literally "meet and mate" with providers of resources such as banks, VCs and local BAs (van Rijnsoever, 2020). These intimate relationships are vital for equity investors because they "depend crucially on access to personal networks and face-to-face contacts in finding, evaluating, and monitoring investment opportunities" (Martin et al, 2005, p. 1213). Not only does this enable entrepreneurs to engage with potential funders, it also facilitates trust which is a crucial element mediating these financial relationships (Uzzi, 1999; Huang and Pearce, 2015). Conversely, given the central role played by social ties and relational connections, non-local ventures may have a hard time building the trust required by BA investors (Shane and Cable, 2002).

The spatial nature of entrepreneurial finance is also heavily informed by concepts from the information economics literature, particularly the role imperfect information can play in creating problems of adverse selection and moral hazard (Akerlof, 1970). The most influential perspective in this literature is agency theory, with the central concern of agency theorists being "opportunism" and associated "principal-agent" problems (Landström. 1992; Kelly and Hay, 2003). Under this perspective entrepreneurs are depicted as agents or "potential thieves" and investors are the principals or "police officers" (Arthurs and Busenitz, 2003). This owes to the twin problems of "*hidden information*" and "*hidden action*" whereby entrepreneurs either conceal information, shirk or invest in 'pet' projects unaligned to the objectives of investors (Cumming et al, 2019). For investors', larger geographic distances

"amplifies information asymmetries" and creates uncertainty because of the unfamiliarity with the context within which a venture is embedded (Colombo et al, 2019, p. 1152). To cope with these problems investors' often look to their own personal networks and relational connections to overcome these important agency issues. To minimise the uncertainty caused by agency risks BAs invest in companies in close geographical proximity: the so-called "localized investor hypothesis" (Wong et al, 2009). Shane and Cable (2002, p. 377) found that US VCs and BAs overcome the agency problems by exploiting "their social ties to gather private information" about their investee firms.

Indeed, while distance is most commonly measured from a geographical perspective, it can be argued it is also a proxy for "cultural and social differences" (Bonini et al, 2018). In addition to functional proximity (i.e. distance), economic geographers have introduced the concepts of "*cognitive*" and "*relational"* proximity which denotes non-tangible dimensions of proximity such as behavioural mind-set and trust, all of which have social and organisational dimensions (Boschma, 2005; Herrmann et al, 2016). These factors also encompass things such as similar educational, social or professional backgrounds, mutual acquaintances, affinities through clubs/associations which give entrepreneurial actors common frames of reference (Herrmann et al, 2016). One recent Swedish study of the geography of BAs investments found that geographic or functional proximity was only important insofar as it facilitates close relational proximity (Herrmann et al, 2016). In sum, the theoretical concepts reviewed all suggest that close functional and relational proximity is often a pre-requisite to offset the risks associated with equity investing in opaque new ventures.

Hypothesis Development

Risk and Investor Experience

In the context of distance and local bias in BA investing, we discuss two key issues that may help determine BA preferences for investing locally or investing at distance namely, risk and investor experience. Both are important given the high degree of information asymmetries that characterise the market for capital for younger, smaller private companies (Berger and Udell, 1998). Despite their considerable past entrepreneurial success, informal equity investment markets are characterised by significant risk and investment uncertainty (Wiltbank et al, 2009). Angels have varied experiences and motives that influence their decision making (Drover et al, 2017). Given a significant majority of angels, have accrued entrepreneurial and business ownership experience, a form of accumulated and relevant human capital, we might expect that there is a positive association between the extent of relevant and accumulated experience and the capability at least to feel confident about investing at distance, an empirical feature identified in prior VC studies.

As Wiltbank (2009) argues, as investors become more experienced they may get better at due diligence and organising their deal flow. For example, the Cumming and Dai (2010) US VC study found evidence of reductions in local bias in a VCs portfolio of investments for older and larger VCs, and more experienced VCs, although in some cases specific technological knowledge often increased local bias, and in other models for sub-samples their positive effects on distance were reversed. Other work from Canada found that VC investors demanded a higher "lemons" premium to offset the higher levels of uncertainty of associated with investing at longer distances (Carpentier and Suret, 2006). These positive reputational effects on distance are attributed to the demand-side of the market as companies conducted active searches for VCs with a good reputation (i.e bigger, older, more experienced etc.), and to an asymmetric information reducing effect as 'good' companies seek out better quality VCs. Consistent with the sorting and matching process outlined in Cipollone and Giordani (2018), as better projects from better companies present themselves

to VCs with a good reputation, this reduces the need for VCs to have representation on the boards of distant companies (Lerner, 1995).

All these general measures we can translate into the BA equity investment market which is the focus of our study. We have several measures of prior and current experience including: (a) having a financial qualification, (b) number of companies previously run, (c) years of investment experience, and, (d) current business ownership. On this basis we propose the following two broad hypotheses:

H1: Relevant business-related human capital will be positively associated with investing at distance

H2: Relevant investment related experience will be positively associated with investing at distance

Soft information flows, screening, and monitoring

Physical proximity has long been recognised in the small business banking literature as a key aspect reducing the informational opacity of small firms (Flögel, 2017). In short, closer physical proximity (distance) facilitates the capture of soft information about the entrepreneur and their business that more distant transactional arms-length relationships cannot replicate (Uzzi and Lancaster, 2003). In turn, this increases the quality of information available to the bank when making its lending decisions. Intuitively, much of this would seem applicable for BA equity investments. In the angel investment setting, knowledge shared through frequent interaction is seen as a way of fostering mutual understanding and informational exchange (De Clercq and Sapienza, 2001). Plus, the transfer of tacit knowledge in both directions decreases the "relational risk" by lowering the risk of misunderstanding between investors and entrepreneurs (Fili and Grünberg, 2016).

From their study of UK BA investors, Harrison et al (2010) identify three main informational drivers of local bias. First, they contend that the relevant opportunity set of potential angel investments is geographically restricted due to what they term '*distance decay*' in the availability of pertinent information. Given there are sunk costs of gathering information which rise with distance, it is cheaper and more efficient to use established local networks to identify new investment opportunities. Secondly, they argue that entrepreneur themselves has a higher weighting, and generally a more important role, in the investment decision of angels than by VCs (Kelly and Hay, 2003). Again, local networks and personal knowledge about individual entrepreneurs and associated investment opportunities facilitates a reduction in information asymmetries when investing locally as intimated by the "localized investor hypothesis" (Wong et al, 2009).

Thirdly, close geographical proximity also enables effective monitoring through regular visits. This need for close monitoring was depicted in an Australian study with one angel expressing their desire to stay "*close to my money*" (White and Dumay, 2018, p. 22). Once an investment has been made, monitoring costs increase with distance and this monitoring of investments can be extended to include a more general desire for BAs to take an active role within the investee business which also engenders a local bias in angel investing (Shane and Cable, 2002; Wong et al, 2009). This was further supported by Sorheim and Landström (2001) who found that local bias was a particular characteristic of active investors. Other factors such as "trust" linked to the investor decision-making process may also be geographically mediated. Trust appears to be an important transactional lubricant for BAs (Kelly and Hay, 2003) and has been shown to be pivotal "heuristic" shaping angel investments (Huang and Pearce, 2016). Investing locally enables angels "to identify entrepreneurs that they know and trust" (Shane, 2005, p. 20).

Therefore to obviate some of the aforementioned informational problems (distance decay, monitoring, trust etc.), BAs seek recourse to close post-investment involvement to remain in close relational proximity to their investee companies. This gives rise to our third and fourth hypotheses:

H3: Business angels who want to take an active operational management role are more likely to invest locally

H4: Business angels who want to take an active strategic management role are more likely to invest locally

3. Data, Methodology and Descriptive Statistics

We now outline our data and present the sample statistics. As our focus is distance and BA investments, we report the comparative statistics for each of our three spatial investment categories analysed: local, regional, and national. Our data was collated by Ipsos Mori, a large independent survey house, via a Computer Aided Telephone Interview (CATI) survey process in 2014, using a stratified sample drawn from a national register of UK BAs. In total, our sample includes responses from 546 active UK BA investors. The total number of BAs in the UK is estimated to be somewhere between 8,000 and 10,000, but not all angels are actively investing in any given time period (British Business Bank, 2018). To the best of our knowledge this constitutes the largest ever UK survey of BAs, representing between 4.6% and 6.8% of all BAs in the UK. The survey covers issues relating to; (a) the personal characteristics and experiences of BAs, (b) their motivations for investing, and, (c) the nature of the investments they make. The key survey question that allows us to distinguish between BAs who have a preference for local, regional, or national investments ascertains where angels invest using the following spatial demarcations:

- Within 20 miles (32 km) of you (i.e Local)
- Within your region (i.e. Regional)
- Outside of your region but in the UK (i.e. National)
- Outside of the UK

The survey elicited the following responses: Local (first response option), 26.78%; Regional (second response option), 17.95%, National (third response option), 53.56%, and International (fourth response option), 1.71%. For the following descriptive statistics and core empirical analysis we merge the last two categories into a single one due to the very small numbers of BAs who invested internationally. These findings compare to European VC investment figures reported by Bertoni et al (2015) of 48.6% within 31 miles (50km), 22.6% between 31 and 186 miles (300km), and 28.8% over 186 miles (300km).

Figure 1 shows how the angel population is distributed across the UK regions and presents this information against the respective general population. We immediately observe that there are very strong regional disparities in the respective population shares. On this, five regions have a greater angel share than their respective human population share and these regions include London, South East England (SE), South West England (SW), West Midlands (WM), and Yorkshire & Humberside (YH). Of particular note is that the South East has 3.5 times its population share, the South West 2.6 times its population share, and London 2.4 times. This suggests the spatial composition of our sample is consistent with the overall population of BAs which is strongly concentrated in London and the South East (British Business Bank, 2018). In contrast, the North East of England (NE) has only $1/11^{th}$ of its population share, Northern Ireland (NI) $1/9^{th}$, and Wales (W) $1/5^{th}$. This highlights the significant regional disparities apparent in the UK in terms of the distribution of BAs. If all angels exclusively invested in their locality, then this would generate an uneven pattern of

angel investment activity. But as we noted above, this is not the case and this creates the potential for inter-regional capital transfers from BAs investment activity.

[Insert Figure 1 about here]

From Table 1, we observe that BAs with a preference for local investment are the most likely to have a financial qualification at 57%, compared to only 23% of BAs with a regional preference, and 40% for BAs with a national preference. To some degree this is counterintuitive as we might expect *a priori* that financial competency (a specific and relevant form of human capital for investing) might be positively associated with distance in the investment relationship. Alternatively, it may suggest that BAs have to conduct more detailed financial analysis when evaluating investments from a smaller potential investment pool at the local level, although there may be a business and social networking effect at play if financial intermediaries at the local level are party to a good flow of soft information about investment opportunities. This latter explanation is consistent with the search and matching process outlined in Cipollone and Giordani (2018) and the screening and filtering process using local networks described by Harrison et al (2010). This local networking and superior information flows theory is also supported by the higher incidence of locally (and regionally) investing BAs being currently engaged in running a business.

[Insert Table 1 about here]

BAs whose preference is for investing at the regional level have, on average, a greater breadth of running a business experience. This is measured by the number of businesses they have actively run previously which is higher that their local and nationally focused peers. A particularly interesting feature is that they also have the highest propensity for being retired from the world of work at 30%. Taken together, this additional business experience and having the time that retirement affords an individual, are associated with a more

geographically expansive investment outlook. For BAs who invest beyond their region either nationally or, in a small number of cases, internationally it is apparent that they are the most directly experienced in terms of having, on average, greater investment experience as measured by total number of years elapsed since making their first investment. They are also significantly more likely to be retired from work than BAs with a local investment preference at 29%. Again, this suggests that a willingness to invest at greater physical distance is associated with direct human capital relevant to investing, a longer track record, and also that having more free time available to engage in longer distance investor-investee relationship helps. It also avoids the 'stepping-on-toes' effect which was identified by Cipollone and Giordani (2018) as a notable feature of localised investing.

Table 2 shows that BAs with a regional investment preference are the most risk-loving on average. But a preference for solo investing, as opposed to de-risking through co-investing, did not appear to be affected by distance. In terms of accepting that investments can lose money, measured by a willingness to accept losing 50% of their investment capital, there is a clear and negative association with distance. On this 51% of BAs with a local preference were willing to lose 50% of their invested capital compared to only 38% of BAs with a national investment preference. This suggests that local bias comes with an acceptance of a higher degree of capital risk. On the involvement of the BA in the day-to-day operations of the investee business, we find that the absolute majority of BAs do not undertake such roles in any of their investee companies. Importantly, the probability of being active in day-to-day operations diminishes with distance suggesting that there is a time cost which increases with distance and this constrains BA involvement in their investee companies. This finding is further supported in respect of involvement in the strategic management of investee companies. Again, there is a negative association with investment distance. Taken together,

the two strands of evidence suggest that UK BAs are very passive investors, and that this passivity increases with physical distance in the investment relationship.

[Insert Table 2 about here]

Table 3 details our data on investment patterns. Here we observe that regional and nationally focused BAs tend, on average, to hold their stakes longer, within a general pattern of holding investment stakes between 5 and 6 years. There is a positive association between the number of companies a BA is currently invested in and distance, with local BAs averaging 3.69 investee companies and national BAs averaging 5.32 investee companies. This might suggest that distance encourages BAs to adopt a broader portfolio approach to de-risk their total investment. On investing in high-technology companies, we find less differences with regionally focused BAs have the highest incidence at 35%, compared to 31% for locally focused BAs and 30% for nationally focused BAs.

[Insert Table 3 about here]

In relation to what stage in a company's life BAs invest in we find that regionally focused angels have the highest incidence of investing in start-up companies, at 42.9%, whereas nationally focused angels favour early stage investments, at 49.7%. In contrast, locally focused angels have a higher incidence of investing in later-stage, at 23.9%. These findings suggest quite different foci which has a clear association with BAs preferences *vis a vis* investment distance. For local investments, the preference for later-stage may reflect a limited pool of start-ups and potentially investable projects, but also a networking effect where established companies are more active in local business networks.

On size of largest investment, we find that the majority of BA investments in total are for less than £50,000, supporting the established consensus that angels operate at a level far below that which VCs traditionally operate at. It is interesting to note that nationally focused

BAs have the highest incidence of the very smallest scale of investments, at 65.8%. This is consistent with Tian (2011), who found that VC investors located further away from their investee firms tended to make more funding rounds of shorter duration and smaller scale. However, we also find that the incidence of very substantial large-scale investments over £0.5m increases with distance which again chimes with other previous studies (Shane, 2005; Harrison et al, 2010).

4. Results

In this section we estimate our econometric models to identify key (i.e. personal, behavioural and investment) characteristics differences between BAs who operate at three distinct spatial levels, local, regional, and national. As the classification is ordered and categorical (from local, to regional, to national), we choose to estimate a series of ordered probit models. In ordered probit, an underlying score is estimated as a linear function of the independent variables (personal, behavioural, and investment characteristics) and a set of cut-points. The probability of observing outcome *i* corresponds to the probability that the estimated linear function, plus a random error, is within the range of the cut-points estimated for the outcome: $\Pr(\text{outcome}_j = i) = \Pr(\kappa_i{-}1 < \beta_1 x1_j + \beta_2 x2_j + \cdots + \beta_k xk_j + u_j \leq \kappa_i)$ u_j is assumed to be normally distributed. We estimate the coefficients $\beta_1, \beta_2, \ldots, \beta_k$ together with the cut-points $\kappa_1, \kappa_2, \ldots, \kappa_{I-1}$, where *I* is the number of possible outcomes. κ_0 is taken as $-\infty$, and κ_I is taken as $+\infty$.

The full set of models are contained in Table 4. The first model includes our set of personal characteristics as set out in Table 1. This model is well specified, but the only variable that is significant is years of investment experience, which is positively associated with distance in investment behaviour. This reconfirms our initial finding that knowledge and experience gained through prior investments appears to give BAs greater confidence to invest

at distance. This is in accordance with the VC related findings of Lutz et al (2013) who found a strong correlation between local bias and inexperience by German VCs, and Cumming and Dai (2010), who found that older, and more experienced VCs, with a stronger IPO track record, exhibited less local bias.

[Insert Table 4 about here]

Our second model, which relates to behavioural and attitudinal characteristics described in Table 2, shows that several characteristics have a weak and negative association with investment distance. Having a preference for day-to-day operational involvement in some investee companies (weakly) reduced the distance a BA invested at. Equally, having a preference for involvement in the strategic managements of all investee companies also (weakly) reduced the distance invested at. In this sense, the more hands-on and involved BAs are, the lower the likelihood that they will invest in companies located outside their locality or region. We also find that BAs who are more accepting of the fact that some investment lose money, appear more willing to invest locally. This is statistically significant but only at the 10% level.

Our third model includes our set of investment characteristics set out in Table 3. Here we find that BAs with a larger set of currently invested companies in their portfolios are associated with greater distance when investing. This suggests that to build up a portfolio angels are forced to look beyond their immediate locality. In addition, BAs who have a preference for investing in early-stage companies have a wider spatial reach. There were some very specific results regarding size of largest investments, with investments between £50k and £100k and between £200k and £500k having a stronger local bias than other smaller scale investments. This chimes with other work in Sweden and suggests that smaller investments with no or minimal post-investment involvement are less dependent on close

spatial proximity between BAs and firms (Avdeitchikova, 2008). While very small overall, investments in the largest categories (£500k-£1m) only featured at regional and national levels. These larger investments are typically made by "super-angels" with the capacity to undertake extensive due diligence to evaluate and oversee long-distance investments.

Our final consolidated model in Table 4, which incorporates elements of all three broad sets of variables, generates some very clear findings relating to investment distance. Our first key finding is that BAs who favour becoming involved in the strategic management of investee companies have a strong local bias. Again, there may be a practical aspect to this, it is easier to become involved if a company is close by. In line with agency theory, there may also be a monitoring aspect to this as BAs can oversee the management team to ensure that they are adopting the strategic direction desired. Again, we find a positive relationship between investing at distance and years of accumulated investment experience. This may relate to confidence and also to competency. Weaker evidence shows a positive association between the number of businesses previously run by the BA, another proxy for relevant human capital and experience, and distance when investing. Finally, we note that BAs with a preference for investing in early stage businesses, as opposed to start-ups or later stage, are more willing to invest at distance. Early state businesses may require less relational support that start-ups.

[Insert Table 4 about here]

In the context of our four initial hypotheses, we find weak support for a positive relationship between business' related human capital and experience and investing at distance, but a much stronger and clearer positive relationship between investment experience and investing at distance. On active involvement in investee companies, we find no relationship in respect of active involvement in day-to-day operational management and local

bias, but a strong local investment bias for BAs who like to actively participate in the strategic management of their investee companies. On balance, we have some consistency with the VC based evidence on distance and local bias, and indeed banking and crowd funding too.

Given the clear regional disparities in the distribution of BA across the UK regions displayed in Figure 1, we also augmented all four models to include a regional identifier for the business angels' home region. Reassuringly, the core findings remain the same, but we did establish some consistent regional effects in relation to distance when investing. In our augmented model 1 which captured business angels personal characteristics, we observe weak (at the 10% level of significance) and negative effects for London (β=-0.687*) and the West Midlands (β=-0.867*). In our augmented model 2, which considered behavioural and attitudinal characteristics again we only observe two significant regional effects on distance when investing and in the same two regions, London (β=-0.916**) and the West Midlands (β=-0.780*). Our augmented third model focused on investment characteristics and here we found no regional effects. However, in our augmented fourth, and final, model, we find that three regions were associated with a distance effect. London (β=-0.773**), the West Midlands (β=-0.957*), and the East of England (β=-0.866*). This is also true to a lesser degree for BAs located in the West Midlands and the East of England. These findings strongly suggest that not only is London a place where there is a disproportionate representation of BAs *per se*, they also have a stronger preference for investing locally and regionally than angels from other parts of the UK.

5. Discussion

The novel findings reported contribute both to the expanding academic literature on BAs and to public policy debates surrounding informal equity investment. Empirically, the

research suggests that strong preference for local bias when making investments was less prevalent within our sample than perhaps expected, especially given the theoretical agency concerns identified earlier. This was particularly true for BAs located outside the more dynamic parts of the UK, such as London and the South East of England. In these southern locations there is a much stronger propensity towards more localised investment which we unpack below. Overall, however, this corroborates others who have suggested that the prevalence for local investing by BAs has decreased over time which may reflect a wider evolution of the BA investment market (Avdeitchikova, 2008; Harrison, 2010; Herrmann et al, 2016). Plus, we generate some new and exciting findings suggesting investment experience is the dominant form of human capital in the world of BA investing, at least in the UK.

So what is driving the process of greater longer-distance angel investing? It is now widely considered that the angel market is much more visible and organised via groups or syndicates whereby angels collectively pool their resources and investments (Kerr et al, 2011; Bonini et al, 2018). This significantly changes the dynamics of this form of entrepreneurial finance, altering the manner the investment process occurs (Mason et al, 2019). In turn, this may be leading to less spatial embeddedness across angel investors by enabling local angels to access firms across a wider spatial catchment area. Another related explanation attributes this trend to the increased incidence of BAs utilising online equity crowdfunding platforms (Wright et al, 2015). Crowdfunding platforms may prove attractive for angels seeking passive investments with a limited administrative burden. Risk averse angels can piggyback on the due diligence undertaken by platforms and have their investments de-risked by numerous small investors – i.e. the so-called "crowd" (Langley and Leyshon, 2017). Hence, the digitalization of early stage finance reduces the need for physical and social proximity (Wang et al, 2019). Given the increased propensity for angels to invest in crowfunding platforms

(Wright et al, 2015), in time this may recalibrate the nature of local bias within BA investing, especially for smaller more "hands off" equity investments.

From a theoretical perspective, the angels examined displayed an "effectual" or experimental logic by starting out close to home and then expanding their investment networks further afield (Wiltbank et al, 2009; Schmidt et al, 2018)[7]. Clearly, the attitudes and behaviours of angels change over time with experience (Herrmann et al, 2016). As BAs become more experienced investors their proclivity to invest more widely increases, suggesting important "learning by doing" effectual processes. BA investors undergo a similar process of "entrepreneurial learning" and "experiential learning" (Corbett, 2005) which entrepreneurs themselves encounter. In other words, with accrued experience the need for a hands-on approach based around close relational distance diminishes. In this sense, we could argue that local bias is important for novice BAs as it provides a good 'nursery' where they can use their well-established local networks and strong relational proximity to actively monitor and get physically involved in the management and strategic decision-making of their investee companies[8]. But once sufficient experience has been accumulated, angels are happier making more passive "hands off" investments across the UK and feel less need to "babysit" their investee companies. To mitigate attendant agency risks of longer-distance investing, UK BAs seem to concentrate their larger investments locally with longer-distance investments in the small sub-50k categories.

Importantly, the research also has important implications for public policy and therefore plays to those concerned by a rigour-relevance gap within the field of BA research

[7] Effectuation occurs when "processes take a set of *means* as given and focus on selecting between possible effects that can be created with that set of means" (Sarasvathy, 2001, p. 245).
[8] Theoretically speaking, in some respects this spatial investment behaviour is reminiscent of how many companies internationalise incrementally under the so-called "Uppsala model" in tentative steps beginning first in neighbouring countries with low levels of "psychic" distance before venturing further afield (Johanson and Vahlne, 1977).

(Landström and Sørheim, 2019). As noted earlier, there exists deep-seated spatial imbalances in the distribution of BAs across the UK. This restricts the ability of start-ups and new ventures to obtain inter-regional capital transfers from BAs located in the South-East of England. Additionally, while considerable policy efforts have been devised to help develop localised networks of BAs across some peripheral UK regions such as Scotland and the North-East of England (Martin et al, 2002), these may not necessarily benefit local start-ups if more experienced angels seek out investment opportunities further afield. Clearly, however, steering the locational whereabouts of BA investments is a difficult, if not impossible, policy objective.

In future, the growth of online equity crowdfunding may also engender more long-distance equity investing which could further exacerbate inter-regional disparities given the fact these platforms typically benefit start-ups and SMEs located in the south of England (Langley and Leyshon, 2017). This supports other research suggesting crowdfunding may be exacerbating spatial inequalities (Gallemore et a, 2019). Indeed, one recent study found that over half (52%) of ventures who raised equity crowdfunding in the UK were located in just two regions: London and the South-East of England (Langley, 2016). Policy makers in finance-deficient regions may have to make concerted efforts to foster links between their nascent entrepreneurial ventures and angels located outside their local region to facilitate "cross-regional" access to angel investment (Clarysse, et al, 2014). They may also need to encourage more local firms to access online sources of equity crowdfunding platforms as a means of alleviating localised funding gaps by tapping BAs located further afield (Lee and Brown, 2017).

6. Conclusions

This study makes an important contribution to the under-researched issue of local bias within the informal risk capital market. First, we found that an absolute majority of UK BA investments are made outside of the angel's immediate locality and home region, calling into question the "local bias thesis". In this sense, perhaps due to its geographical 'compactness' the angel market in the UK is becoming more mobile, especially for more seasoned BAs. A particularly novel and important finding from our study is that investment experience dominates business experience in the context of investing at distance. Plus, there appears to be a strong "learning-by-doing" effect through which individuals engage in investment activity become not only more experienced over time but gain the confidence to invest at arms-length in a literal (passive investor) and physical way (at greater distance). Angels undergo important changes to their investment behaviour which are temporally, experientially and spatially mediated.

The second major empirical contribution centres on the major spatial imbalances identified within the geography of informal risk capital in the UK. These regional disparities and stronger propensity for localised investment patterns by angels in southerly regions are undoubtedly mediated by the well-developed or "thick" nature of informal risk capital market in these locations compared to the "thin" markets evident within the UK's more northerly peripheral regions[9]. This is symptomatic of the spatial centralization of the UK's financial system which new fintech technologies (i.e. crowdfunding) seem to be exacerbating rather than overcoming, thereby providing further evidence that financial markets – in driving capital to core regions – are perpetuating uneven regional development (Klagge et al, 2017; Lee & Luca, 2018).

[9] Thin markets occur "where limited numbers of investors and entrepreneurial growth firms within the economy have difficulty finding and contracting with each other" (Nightingale et al, 2009, p.5).

In terms of how this research might stimulate further research, if time-series or panel data on BAs or VCs were available (and for the former this would be incredibly difficult given the hidden nature of BAs) then it would be interesting to establish the temporal dynamics of the experience-distance relationship. A future key issue warranting further investigation is what impact the growing role of equity crowdfunding is having on BA investors. Further in-depth research on this topic would a useful method of probing the underlying motivational drivers of the investment decision-making process by BAs and how this affects the investment-distance nexus.

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Figure 1: Business Angels and Regional Population Distributions

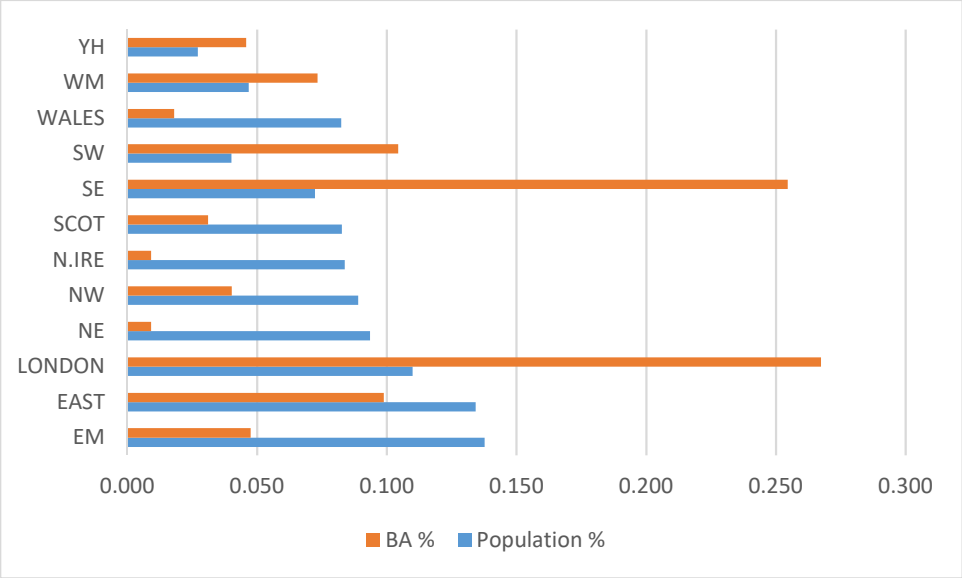

Table 1: Personal characteristics and experience

	Local		Regional		National	
	Mean	S.D	Mean	S.D	Mean	S.D
Financial Qualification	0.57	0.49	0.23	0.43	0.40	0.49
Previous Number of Companies Run	0.94	1.41	1.43	1.78	1.16	1.63
Years Investment Experience	4.36	2.37	4.83	2.30	5.39	2.30
Current Business Owner	0.41	0.50	0.41	0.50	0.35	0.48
Current Employed	0.36	0.48	0.25	0.44	0.32	0.47
Current Unemployed	0.02	0.15	0.02	0.13	0.02	0.12
Current Retired	0.17	0.38	0.30	0.46	0.29	0.45

Table 2: Attitudinal and behavioural characteristics

	Local		Regional		National	
	Mean	S.D	Mean	S.D	Mean	S.D
Attitude to risk (scale=0-10, very risk averse to very risk loving)	7.20	1.90	7.47	1.92	7.18	1.77
Solo Investor (1,0)	0.43	0.50	0.40	0.49	0.43	0.50
Willing to lose 50% of investment (1,0)	0.51	0.50	0.43	0.50	0.38	0.49
Involved in Day-to-Day Operations Management of Investee Companies						
None	78.72		80.95		92.27	
Some Investments	20.21		17.46		7.22	
All investments	1.06		1.59		0.52	
	100.0		100.0		100.0	
Involved in Strategic Management of Investee Companies						
None	68.09		63.49		84.02	
Some Investments	28.72		33.33		15.46	
All investments	3.19		3.17		0.52	
	100.0		100.0		100.0	

Table 3: Investment characteristics

	Local		Regional		National	
	Mean	S.D	Mean	S.D	Mean	S.D
Years Hold Investment Stakes	5.05	1.95	5.33	1.69	5.28	1.93
Current No. of Invested Companies	3.69	2.86	4.92	3.72	5.52	3.96
High-Tech Focus (1,0)	0.31	0.46	0.35	0.48	0.30	0.46
Life-Stage of Investments						
Start-Up	37.78		42.86		30.60	
Early Stage	41.30		41.27		49.73	
Later Stage	23.91		15.87		19.67	
	100.0		100.0		100.0	
Largest Investment £s						
<50,000	52.38		41.67		65.81	
50-100k	21.43		19.44		11.97	
100-200k	9.52		16.67		12.82	
200-500k	14.29		19.44		5.98	
500k-1m	0.00		2.78		3.42	
>1m	2.38		0.00		0.00	
	100.0		100.0		100.0	

Table 4: Personal, Behaviorial and Investment Characteristics

	Model 1			Model 2			Model 3			Model 4		
	Coeff	**z**	**Pr>z**	**Coeff**	**z**	**Pr>z**	**Coeff**	**z**	**Pr>z**	**Coeff**	**z**	**Pr>z**
Personal characteristics												
Financial qualification (1,0)	0.065	0.46	0.645									
No. of previous companies run	0.037	0.86	0.392							0.079	1.77	0.077
Years investment experience	**0.093**	**3.03**	**0.002**							**0.118**	**4.03**	**0.001**
Business owner	0.071	0.15	0.878									
Employed	0.156	0.34	0.738									
Unemployed	0.175	0.26	0.794									
Retired	0.233	0.5	0.618									
Behavioural and attitudinal												
Risk attitude scale				0.011	0.31	0.759				-0.012	-0.32	0.746
Sole investor (1,0)				-0.016	-0.12	0.907				-0.009	-0.06	0.949
Day-to-day management												
None												
Some				-0.383	-1.68	0.093				-0.395	-1.7	0.089
All				0.033	0.05	0.963				0.119	0.17	0.867
Strategic management												
None												
Some				-0.396	-1.59	0.111				**-0.405**	**-2.09**	**0.037**
All				-0.885	-1.74	0.082				**-1.325**	**-2.45**	**0.014**
Willing to lose 50% investment (1,0)				-0.246	-1.88	0.060				-0.261	-1.92	0.055

Investment characteristics								
Years hold stakes			0.002	0.04	0.970			
Number of investee companies			**0.059**	**2.16**	**0.031**			
High-tech (1,0)			-0.196	-0.96	0.336			
Life-stage								
Start-up								
Early stage			**0.575**	**2.63**	**0.009**	**0.32**	**2.11**	**0.035**
Later stage			0.482	1.62	0.106	-0.049	-0.26	0.796
Largest investment £s								
<50,000								
50,000 - 100,000			**-0.566**	**-2.07**	**0.038**			
100,000 - 200,000			0.144	0.46	0.643			
200,000 - 500,000			**-0.621**	**-2.16**	**0.031**			
500,000 - 1m			0.737	1.05	0.295			
>1m			-5.787	-0.03	0.979			
Cut point 1	0.025	-0.81	-0.26			-0.24		
Cut point 2	0.517	-0.301	0.317			0.324		
N obs	343	350	167			345		
Log Likelihood	-329.32	-335.94	-150.25			-320.51		

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