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Spatial proximity effects and regional equity gaps in the venture capital market: evidence from Germany and the United Kingdom

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Abstract. The issue of 'equity gaps' has loomed large in recent discussions of enterprise formation and development, both in the United Kingdom and in Germany. One particularly intriguing, but highly elusive, aspect of this issue is the question of whether equity gaps have a regional dimension: are certain regions at a systematic disadvantage with respect to the provision of equity capital? In this paper, we explore this question in the context of the UK and German venture capital industries, drawing both on unpublished industry data and on information obtained from original surveys of venture capital firms in the two countries. We report clear evidence that the venture industries in both countries are spatially constituted. Despite important national differences, venture capital firms tend to be concentrated in identifiable clusters and their investment outcomes show clear evidence of spatial proximity effects; investment is disproportionately concentrated in those regions that also contain the major clusters of venture capital firms. However, how far this spatial form produces regional equity gaps is hard to determine. Venture capitalists themselves argue that they do not intentionally discriminate between regions in their decisionmaking, and many acknowledge the existence of funding and deal-size gaps but not regional gaps per se. But their perception of project risk is, nevertheless, regionally sensitive. We argue that the notion of a simple supply gap overlooks the way in which the localised form of the industry is based on a dynamic learning process in which demand and supply processes combine with their embeddedness in social networks and individual perceptions in a mutually reinforcing way. Less-favoured regions, with low investment rates, few local venture capital firms, and a dearth of experienced specialist intermediaries, may thus be trapped in a situation of both depressed demand for and supply of venture capital investment.

1 Introduction

The issue of 'funding gaps' has loomed large in recent discussions of enterprise formation and development, both in the United Kingdom and in Germany. In the United Kingdom, the equity-gap question has been closely bound up with a recurring debate over finance for small and medium-sized enterprises (SMEs) that goes back to the Macmillan enquiry in the 1930s, and which resurfaced in the 1950s and 1970s, and again more recently (Bank of England, 2001; Cruickshank, 2000; HM Treasury, 2003a; 2003b). Much of this debate has focused on the difficulties, obstacles, and high charges that SMEs are alleged to experience in obtaining loan finance and credit from the British banking system. Although the small-firm sector has periodically complained about the lack of such funding, the banks have consistently denied that they ration

or restrict finance, arguing that the problem is not one of undersupply but a lack of demand from viable projects.

As part of this continuing debate, comparison has often been made with the situation in Germany where, it is argued, there has traditionally been a much closer relationship between industry and banks, and SMEs find it easier to raise bank finance (Black and Moersch, 1998; Deeg, 1999). However, a counterclaim is that the advantages of the German system have been exaggerated. This concerns, first, the claim that for much of the German SME sector the issue of funding gaps may be no different from that discussed in the United Kingdom; and, second, the insight that with the changing competitive and regulatory landscape of European Union (EU) banking (for example, Basel II), relations with small firms are in decline, and only really large firms enjoy close relationships with the banks [Kokalj and Pfaffenholz (2001); but see Deutsche Bundesbank (2003, page 24) for a more cautious assessment of Basel II on German SEMs].

The development of the venture capital market itself has often been viewed as a potential solution to the small-firm funding gap, namely by providing risk capital or equity to enterprises that find it difficult (or prefer not) to raise medium-term to long-term finance either from banks or from the normal capital markets.[1] But even within the venture capital market there has been increasing concern over the existence of 'equity gaps'. In the United Kingdom there has been a general criticism that venture capital institutions have tended to steer funds towards less risky investments—into expansions and especially MBOs (management buy-outs) and MBIs (management buy-ins), and into retail and wholesale sectors—rather than into much riskier seed and new start-up projects, particularly in high-technology activities. In Germany too, concern has been expressed about a lack of sufficient venture capital funding, not only for high-technology start-ups and other early-stage ventures in 'new economy' sectors, but also expansion finance for 'old economy' enterprises and SMEs with more modest returns on investment potential (see Kokalj et al, 2003).

Two interrelated problems confront discussions of funding gaps in general, and venture capital gaps more particularly. The first is that the concept of a 'funding gap' is by no means straightforward (see, for example, Cressy, 2002). So controversial is the notion, and so diverse its definitions, that different authors may arrive at quite opposite conclusions. Moreover, as has been pointed out in much research on financial exclusion, the idea of gaps may distract attention from wider issues of marginalisation in which certain agents are provided with finance, but at higher costs and on poorer terms than others. The second is that the empirical measurement of funding gaps is equally problematic and contentious: even if a conceptual definition can be agreed upon, it may not be possible to translate that definition into precise empirical or statistical terms.

An additional layer of complexity is introduced into this debate over equity gaps when we consider the regional dimensions of venture capital activity. Over recent years there has been growing interest in the geographies of venture capital investment (see, for example, Florida and Kenny, 1988; Martin, 1989; 1992; Martin et al, 2002; Mason, 1987; Mason and Harrison, 1991; 1999; 2002; 2003; Thompson, 1989). The US experience is often used as the exemplar. There, it is argued, the development of a large and successful venture capital market has, at least in principle, been closely interwoven with the emergence and rapid growth of distinct spatial clusters of high-technology firms. These geographical concentrations of innovative enterprises, and their supportive venture

[1] The research forming the empirical base of this paper used a broad definition of 'venture capital': that is, both venture capital in the narrow sense (capital raised for start-ups and expansions) as well as capital used to finance MBOs and related activities. This was made clear to interviewees and survey participants.

capital organisations and institutions, are held to be the key to the leadership of the USA in the 'new economy' (Norton, 2001).

The US experience has been highlighted by the European Commission, which sees the absence of large well-developed regional high-tech clusters in Europe as a key constraint on both the demand for and supply of venture capital there (European Commission, 1998; see also Gill et al, 2000).The argument is that regional high-tech clusters in Europe are not only few in number, but also lack the critical mass and sufficient deal flow to generate the mutually reinforcing networking synergies between entrepreneurs, intermediaries, and venture capitalists that are needed to give such clusters the strong growth dynamic found in US examples. More generally, however, there has been concern that less prosperous areas in Europe are particularly disadvantaged when it comes to venture capital backed new enterprise development. According to this view, venture capital funds are vital to economically lagging regions in order to stimulate and support new and small-firm activity—especially innovative activity—in such areas. Many policymakers argue, for example, that the key problem facing lagging regions is that of low rates of new and small, and especially high-technology-based, enterprise formation (Bannock Consulting, 2001; Bottazzi and Da Rin, 2002; European Commission, 1998; Koschatzky, 2000; Lerner, 2002; Murray, 1998; OECD, 1996; 1997). These low rates of small innovative firm creation are attributed, at least in part, to a lack of readily available risk capital—the implication being that such regions may therefore face an 'equity capital gap' by virtue of the overconcentration of venture capital funds in more prosperous regions:

> "The difficulty which venture capitalists say they encounter in finding good investment propositions may be caused, in part, by geographical mismatches between the supply of, and demand for, venture capital which arises from the geographical concentration of venture capital funds and investment in certain regions" (OECD, 1996, page 17).

Thus, although much of the equity-gap debate has centred on the undersupply (or rationing) of risk finance at the bottom end of the venture capital market (seed, start-up, and early-stage enterprises), there may well be a regional dimension to the problem. Indeed, a recurring theme in the geographical studies of venture capitalism mentioned above has been that this circuit of finance is distinctly regionally uneven in its organisation and investments. But do such regional disparities in venture capital investment necessarily imply the existence of regional equity gaps? In fact, the very notion of a 'regional equity gap' itself raises several questions. What do we mean by the term? Are 'regional' gaps merely the geographical expressions of other gaps (for example, gaps in the new start-up or new high-tech venture sectors of the market) that arise because of regional differences in economic, industrial, and business structure? Or are there explicit spatial biases in the operation of the venture capital market that give rise to an inherent regional dimension to equity gaps? Although previous studies have thrown some light on these and related issues, we are still far from a full understanding of the spatialities of the venture capital process.

Our aim in this paper is to contribute to this ongoing task, both in conceptual terms and by examining the empirical geographies of venture capital investment activity comparing the United Kingdom and Germany. More specifically, we seek, within the limitations of our data, to ascertain whether and to what extent there is evidence of regional equity gaps in the venture capital markets in the two countries, and how far these gaps derive from geographical biases (what we call 'spatial proximity effects') in investment behaviour on the part of venture capitalists. Given the difficulties of identifying equity gaps, we adopt a twofold approach using aggregate statistical measures and data on the perceptions of market actors. We draw on some evidence

collected as part of a larger comparative study of regional venture capital activity and policy in the two countries (Martin et al, 2003). That study involved several streams of information: published and unpublished information obtained from the British and German Venture Capital Associations, the Kreditanstait für Wiederaufbau (KfW) and Deutsche Ausgleichsbank (DtA) in Germany, and the Department for Trade and Industry (DTI) in the United Kingdom; a purpose-designed postal survey of UK and German venture capital firms; and data from semistructured interviews with a range of national and regional institutions and organisations in the two countries.[2]

The comparison of the United Kingdom and Germany is instructive because the two countries lead Europe in terms of venture capital activity. But it is also the case that the venture capital market differs between the two countries (as it does indeed between the United Kingdom and the USA, which are often compared), in that the UK market is much larger and more mature than its German counterpart. Thus in 2001, for example, in the United Kingdom venture capital investment (or 'private equity' as it also called in both countries) amounted to €46.1 billion, as against €16.4 billion in Germany. Furthermore, this is in the context of the much more capital-market orientated financial system in the United Kingdom. In 2001, the market capitalisation of publicly listed companies in the United Kingdom exceeded 150% of gross domestic product (GDP), compared with 58% in Germany; while in contrast, bank loans and credit to domestic companies were equivalent to 61% of GDP in Germany but only 38% in the United Kingdom. Perhaps more significantly, however, the development of the venture capital market in Germany has been much more supported and underpinned by public and quasi-public institutions, at various geographical scales from the local to the regional to the national, and thus stands in contrast to the traditional bank-oriented nature of the finance–industry relationship there, and to the situation—at least until very recently—in the United Kingdom (for a discussion of this issue, see Sunley et al, 2005). These points of difference do not undermine the value of comparing the two markets, however. No two national markets are identical, and notwithstanding the differences between the UK and German cases, there are also significant similarities and commonalities between them (they were certainly sufficiently similar for the European Venture Capital Association and other market observers to make direct comparisons). And, in any case, it is of key interest to know whether differences in detail and context find expression in the institutional perceptions and geographical expression of equity gaps in the venture capital market or whether, despite such differences, similar perceptions and geographies emerge.

2 Equity gaps in the venture capital market

A common assumption in the discussion of equity gaps is the idea that in some specific market segments—whether particular deal sizes, types of firm, stage of firm development, economic sectors, or specific regions—the quantity of capital supplied is for one reason or another insufficient or rationed relative to demand. For example, in the UK context, Cruickshank (2000, page 8) argues that

> "there is clearly a mismatch between the needs of firms requesting small scale equity investments and the supply of these investments. Venture capital deals tend to be too large and business angel finance is underdeveloped. This gives rise to the long recognized market failure known as the equity gap."

In a neoclassical world of competitive capital markets, costless and perfect information, complete contracting, and rational expectations, there would be no 'market failure',

[2] Questionnaires were sent out to all of the head offices of members of the British and German Venture Capital Associations (BVCA and BVK, Bundesverband Deutscher Kapitalbeteiligungsgesellschaften, respectively)—see the appendix for details.

no persistent equity gaps, only temporary mismatches between the demand for and supply of venture capital arising from slight delays in the adjustment of agents to unpredictable market shocks and opportunities.

Persistent gaps, or 'mismatches' to use Cruickshank's phrase, imply an equilibrium situation in which the volume of investment in a particular segment of the economy is below that which would emerge in a perfectly competitive market. This corresponds to what Cressy (2002) calls a 'positive funding gap'. According to Cressy, the existence of such a positive gap is a necessary (but not sufficient) condition for 'market failure' (or what he calls a 'normative funding gap'). Why should mismatches and market failure arise, particularly in a regional context?

One possibility is that the transaction costs associated with venture capital deals do not vary sufficiently (progressively) with deal size, thus making small deals disproportionately expensive to execute. Thus it is often argued in the United Kingdom that the basic costs associated with due diligence and related project screening and evaluation do not differ appreciably whether the deal size is, say, £250 000 or £5 million. The deal cost/deal size ratio thus tends to militate against small new projects, and it is this segment of the market that has most often been identified with the equity gap. For example, Lonsdale (1997) defines the UK equity gap as "the shortage in the availability of equity capital in amounts of less than £400,000 to businesses with a reasonable prospect of profitability" (page 4). The UK the DTI (1999) has based its new Regional Venture Capital Fund policy on precisely this segment, arguing that the equity gap is particularly significant for ventures of less than £250 000.

However, in general, market failure can exist for at least two reasons—incomplete markets and information failures—though these are not mutually exclusive and are often interrelated. According to Stiglitz (1988, page 76):

> "Whenever a private market fails to provide a good or service, even though the cost of providing it is less than what individuals are willing to pay, there is a market failure that we refer to as incomplete markets."

Markets may be incomplete in this sense because they are segmented. For the venture capital industry there is often a hierarchy of market steps involved, for example, from initial cash injections by friends or family, to investments by informal business angels, to investments by active institutional venture capital companies, and finally exit via some route in order to liquidate the fund and realise capital gains—through an initial public offering (IPO), trade sale, etc. If this chain or tiered system of risk–venture capital coordination is incomplete for certain types of investment (for instance, because those types of activity are considered especially risky or have a poor track record), a resultant equity gap may emerge in that segment of the market (Harding, 1999; Norton, 2001).

The second cause of market failure that is often discussed concerns information failures and asymmetries, and the problems of moral hazard and adverse selection to which these give rise (Harding, 2002). One area of the venture capital market where problems of asymmetric information may be most damaging to capital supply is that of young high-tech firms (see Carpenter and Petersen, 2002). Such ventures are by their nature very risky, failure rates are high, and potential financial returns are uncertain. Added to these problems, the opaqueness of new technologies, the lack of a track record, and, in certain cases, few physical collateral assets, all tend to mean that venture capitalists are typically less well informed and enthusiastic about these projects than are their entrepreneurs (who may themselves be over optimistic in their assessment of success and growth).

Although the process of due diligence is intended to bridge this information gap, and venture capitalism is itself based on 'relationship investment' (in which the venture capital company takes on a close and continuing relationship with the firms in which

it invests), nevertheless, major information asymmetries and opaqueness are likely to characterise new, especially high-tech, start-ups. Venture capitalists may tend therefore to give young high-tech enterprises a wide berth, in favour of large established companies that have a proven track record, are involved with less risky, more tried-and-tested, technologies, and have a more assured rate of return. In the United Kingdom for example, not only has the venture capital market preferred MBOs to new high-tech start-ups, but also annual rates of return on early-stage investments have tended to be lower than those on later stage investments (Bank of England, 2001). Although this may reflect problems on the demand side (too few good early-stage projects), many commentators argue that it is also the result of capital constraints: that is, a supply deficit of venture capital for this market segment. In this sense, therefore, an equity gap may be said to exist in the high-tech sector.

The existence of such a gap between the demand for and supply of venture equity can be illustrated graphically (figure 1). The demand for risk capital tends to be higher in the initial stages of enterprise development (seed and start-up phases), where access both to bank finance and to normal capital markets tends to be limited and costly (primarily because of the high risk and long pay-back periods associated with such projects, and possibly also the existence of information gaps). Demand for venture capital declines as the company grows, as access to normal capital markets becomes easier, and there are greater opportunities to use retained profits to fund expansion and growth. Ironically, the supply of venture capital tends to follow the reverse pattern. In the seed and start-up phases, suppliers of venture capital display the least interest because of high costs, high risk, and uncertain returns—an undersupply often thought to be filled by informal venture capital, that is by 'business angels' (Aernoudt, 2003). In the expansion and maturity stages of an enterprise, when venture capitalists become more interested in investing in the company, external finance of this sort becomes less appealing (except, perhaps, in assisting MBOs and MBIs). In this way, seed and start-up businesses can encounter significant problems in finding venture capital, as they face what is in effect a seller's market (demand exceeds supply). Conversely, venture capitalists tend to prefer the expansion and later stages of company development, when risk is lower and more in line with the investment preferences of financial institutions and other investors, and thus when the necessary funds may more easily be raised. As a result, a gap may emerge at the 'lower end' of the market, at the seed-capital/start-up and very early stages levels, even though there is a plentiful total supply of funds for investment.

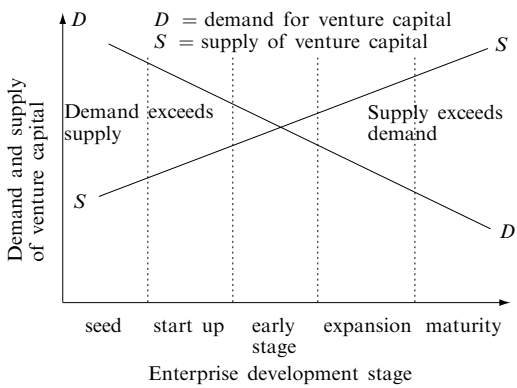

Figure 1. A simple model of the venture capital gap (based on Aernoudt, 2003).

3 Spatial proximity effects in the venture capital market

Venture capital firms, so the argument goes, depend crucially on access to personal networks and face-to-face contacts in finding, evaluating, and monitoring investment opportunities. Venture capital investment typically involves a 'hands-on' approach (a 'relationship investment'), with regular visits to meet with management in the client firms to oversee firm performance:

> "venture capitalists solve the corporate governance and monitoring problem through extensive initial due diligence about start-up relationship by frequently visiting and talking to company management. The venture capitalists also sit on the boards of directors. In some instances, they even perform some key corporate functions for the firm, such as running the corporate finance department and working with suppliers and customers" (Jeng and Wells, 1997, page 8).

This close relationship, together with the reliance on personal visits to evaluate potential clients and to monitor and supervise investee companies, suggests that venture capital firms will tend to have a limited geographical range of activity. Some observers believe the effective geographical radius within which venture capital firms prefer to make investments may be restricted to one to two hours' travel time from their office (Mason and Harrison, 1992). Thus, because of the 'distance-decay effect' of information flow about investment opportunities, and the desire to minimise risk by close involvement with client firms so as to secure the expected return from investments, as well as to be close to other, related, financial institutions and specialist services, we would expect the geography of investment to be closely correlated with the location of venture capital firms themselves—what we might term a 'spatial proximity effect'.

Our survey results both for the UK and for the German venture capital industries lend some support for the operation of a spatial proximity effect in investment. Of the 48% of UK venture capital firms and 46% of German firms which responded to the question "how is important is it to you to be geographically near the following?", 'nearness to investee companies' was stated to be more important than proximity to potential investors, other venture capital firms, investors, research institutions, or large urban markets more generally (table 1).

Yet, even if it exists, this spatial proximity, or spatial bias, effect in investment behaviour would not of itself give rise to regional equity gaps if venture capital firms were broadly evenly distributed between regions. If, however, the geography of venture capital firms is highly clustered in particular locations or regions, the outcome may be rather different. The argument is shown in simple diagrammatic form in figure 2 (see over). Assume a major cluster of venture capital firms exists at location A, and that no such firms are to be found at location B. Also assume that the demand for venture capital is

Table 1. The importance of geographical proximity in venture capital investment (Source: authors' survey).

Geographical proximity to	Mean scores[a]	
	United Kingdom	Germany
Other venture capital firms	3.82	3.37
Other financial service companies	3.78	3.52
Investee companies	2.30	2.16
Existing and potential investors	3.85	3.16
Research institutions	4.22	3.53
Larger agglomeration area	3.68	3.82

[a] Mean scores: 1 = very important – 6 = not important.

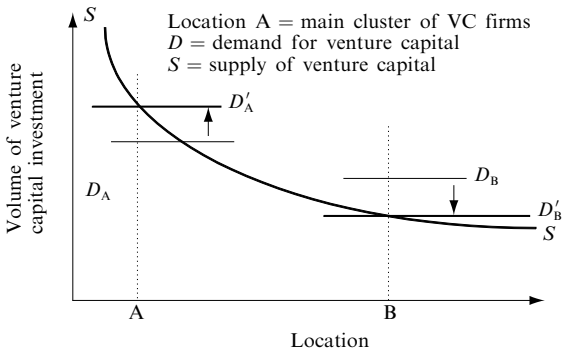

Figure 2. Spatial proximity effects, locational clustering and regional equity gaps in the venture capital (VC) market.

higher at A than at B (shown as D_A and D_B, respectively). Next, assume that a spatial proximity effect in investment behaviour also operates on the part of venture capital firms located in A, so that the venture capital supply curve slopes downwards with increasing distance from A, as agency costs, transactions costs, information asymmetries, and risk aversion all rise with increasing distance from the cluster of venture capital firms located there. The result is that venture capital investment may well be demand-constrained in location A, but supply-constrained in location B.

As Mason and Harrison (1992) point out, however, demand-side and supply-side aspects of venture activity interact. For example, the clustering of venture capital firms at location A may itself tend to raise demand there (a sort of Say's law effect), as experience and knowledge of the local venture capital market spread through local business and information networks to encourage additional entrepreneurial activity to seek private equity. Conversely, at location B, the absence of a thriving and locally embedded venture capital market on the one hand, and a reluctance of venture capital firms based at location A to seek out and fund projects located in and around B, on the other, may itself actually dampen demand at location B. In other words, an induced regionally depressed demand for venture capital occurs as a result of the regional 'supply gap'. In this way, both regions (locations) may appear (and be perceived by venture capital firms) to be at their respective equilibria, as indicated by the respective local demand schedules D'_A and D'_B, with no apparent regional gaps, even though the volume of investment in particular regions is below that which would emerge in a perfectly competitive market. Certain regions can thus become trapped in a 'low demand – low supply' equilibrium. Detecting this phenomenon from observable investment patterns, or from venture capitalists' perceptions of local demand, is likely to be difficult.

4 The geographical clustering of investment around major venture capital centres

Much then may depend on the extent to which venture capital firms themselves tend to cluster in certain locations. Why should such geographical clusters of venture capital firms develop in some regions and not others? Do venture capital firms follow demand, and locate near to existing concentrations of entrepreneurialism and new-firm growth? Or do these concentrations tend to emerge and flourish in and adjacent to major centres of venture capital supply? In reality, of course, examples of each tendency can be found, and probably in many cases the process is a conjoint one, with demand and supply mutually reinforcing one another, as suggested above.

However, there is another aspect of the location of venture capital firms that can bear upon the issue. Many venture capital companies are linked to, or are offshoots from, other financial institutions, such as banks and investment houses. Indeed, many venture capital firms start life as 'spin-offs' from such institutions, or are subdivisions or branches of them. Added to this, venture capital firms draw staff from other financial institutions, and tap into the circuits of information and expertise that exist within and between such organisations. In short, it is by no means coincidental that some of the main geographical concentrations of venture capital firms are to be found in major national and provincial financial centres. These major financial centres also often contain stock exchanges, and the concentration of venture capital firms near to stock exchanges no doubt facilitates the ease and effectiveness of exit from venture capital investments via IPOs.

In the United Kingdom, some 75% (114 out of 151 head offices) of the private equity firms that are members of the BVCA are located in Greater London (see figure 3). By comparison, other, provincial cities—such as Birmingham, Bristol, Manchester, Leeds, Edinburgh, and Glasgow—have relatively small numbers of such offices. In an earlier study, using BVCA records, Martin (1989) found that London-based offices tended to exhibit a pronounced distance decay in the geographical patterns of their investment behaviour. Thus he found that, whereas London-based companies accounted for some 92% of investment in the surrounding South East region, their involvement declined steadily with increasing distance from London, so that in the Northern region London-based firms accounted for 44% of investments, and for only 20%–25% in Wales and Scotland. This implies that firms looking for private equity backing in these regions

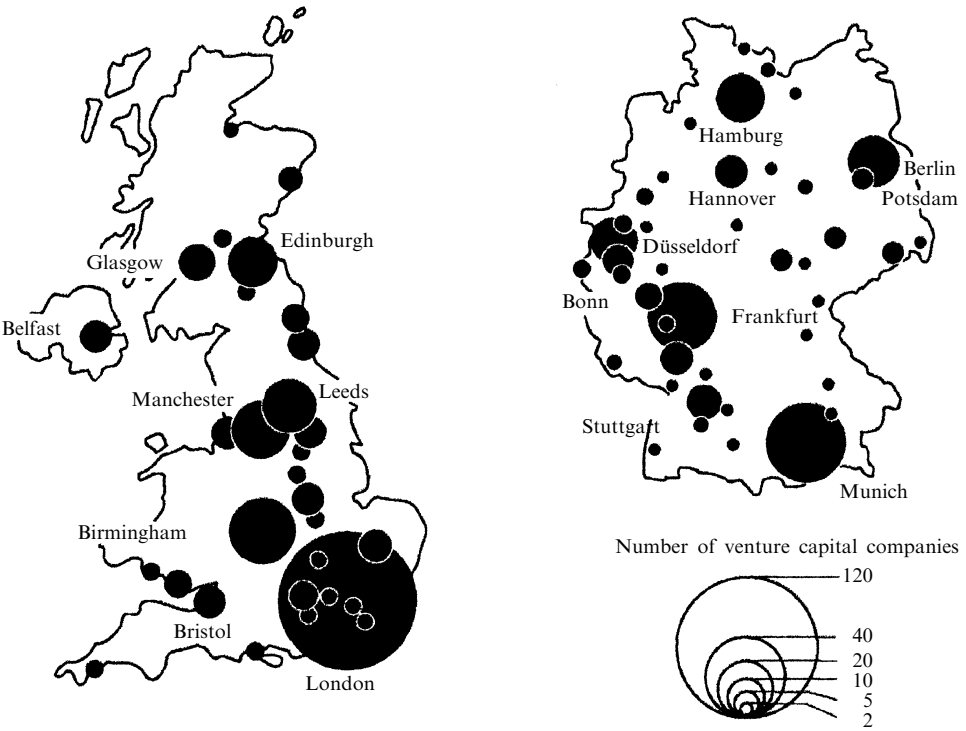

Figure 3. Location of venture capital firms (head offices) in the United Kingdom and Germany, 2002 (source: British and German Venture Capital Associations).

were much more dependent on local suppliers of venture capital. But given the paucity of venture capital firms outside London, this may also imply a relative shortage of private equity—a 'regional equity gap'—in the northern and peripheral regions of the country (Martin, 1989; Mason, 1987; Mason and Harrison, 1991). Unfortunately, the BVCA was unwilling to provide similar locational breakdowns of their members' investments for the more recent period. However, the continued clustering of venture capital firms in London, and the concentration of investment in the London and South East regions noted above suggest that the situation has probably not changed significantly since the late 1980s (Martin, 1989).

In the case of Germany, the locational geography of venture capital companies is much more dispersed (figure 3). No one city or region dominates the industry in the same way that London and the South East do in the United Kingdom. Rather, there are six significant urban clusters of venture capital firms (head offices): Hamburg (20 firms), Berlin–Potsdam (20); Munich (37); Frankfurt (35); Düsseldorf (17); and Hannover (11). Taken together, these six cities account for about 65% of the total number of German venture capital firms (head offices). These same cities have significant banking sectors, and also contain six of the country's seven stock markets. How does this more decentralised geography of venture capital firms in Germany influence the regional distribution of investment there? As in the United Kingdom, our survey results indicate that in Germany spatial proximity to investee companies is of relevance in shaping the geography of investment (table 1). In addition, some valuable data on the regional distribution of investments made by venture capital firms in each of the six main centres referred to above were kindly made available to us by the KfW (Reconstruction Loan Corporation, Frankfurt). Although these data exclude investments made in Saarland, they do, nevertheless, provide some interesting insights into the spatial proximity issue.[3] Two main features stand out (table 2).

First, there is a clear preference by venture capital firms to favour their immediate surrounding region in their investment decisions; this is especially true of firms in Munich, Hannover, and Berlin. Thus 68% of investment made by firms located or headquartered in Munich is directed to the surrounding Bayern region; 53% of investment made by Hannover-based firms goes to Niedersachsen; and 46% of that by firms in Berlin ends up in Brandenburg. Although the spatial proximity effect is less pronounced in the other centres—Frankfurt, Düsseldorf, and Hamburg—even in these the surrounding region still attracts the largest share of investments made by firms based in these cities.

Second, it seems that, after their own proximate region, venture capital firms in the five cities other than Munich tend to favour Bayern as a secondary location for investment. Thus 29% of investment by Hamburg-based venture capital firms has gone to Bayern in recent years—almost as much as that destined for the Hamburg region itself, and in strong preference to its regional neighbours of Niedersachsen and Schleswig-Holstein. Similarly, over a quarter of the investments made by Düsseldorf firms has gone into Bayern.

An implication of these patterns is that, in general, the German Länder are crucially dependent on local venture capital firms for investment funds. Table 3 (see over) shows the proportion of investments in each region originating from firms based or headquartered in that region. In nearly two thirds of the Länder more than half of

[3] Because the Saarland region accounts for less than 2% of total venture capital investment in Germany, its omission from table 2 has an insignificant effect on the results contained therein. The data held by the KfW relate to those venture capital investments that the KfW itself underwrites. These differ from the data on investments held by the BVK, which cover the entire formal venture capital market.

investments are financed by indigenous venture capital firms. In Niedersachen and Rheinland-Pfalz the proportion is more than 75%. Only three regions—Saarland, Bremen, and Nordrhein-Westfalen—are overwhelmingly dependent on external sources of venture capital investment funds.

Table 2. Regional distribution of investments by firms located in the six main centres of the German venture capital market, 1998 – 2000 (source: data provided by KfW, 2002).

Region receiving investments[a]	Percentage of investments from[b]					
	Munich	Frankfurt	Düsseldorf	Hannover	Hamburg	Berlin
Baden-Württemberg	1.9	8.9	0.0	10.1	5.0	2.0
Bayern	**68.3**	16.7	25.5	15.6	29.1	10.8
Berlin	2.5	4.1	0.0	0.0	4.8	7.6
Brandenburg	2.2	13.0	17.9	6.4	6.2	**45.7**
Bremen	0.0	0.3	0.0	2.2	3.0	0.0
Hamburg	1.5	7.8	9.6	1.0	**31.0**	4.4
Hessen	3.0	**20.0**	0.0	0.0	1.9	3.1
Mecklenburg-Vorpommern	0.2	1.8	0.1	2.6	2.0	5.3
Niedersachsen	1.3	1.0	0.0	**53.3**	1.0	1.1
Nordrhein-Westfalen	15.9	13.7	**32.7**	4.1	9.8	7.0
Rheinland-Pfalz	0.0	1.0	0.0	0.5	1.0	0.1
Sachsen	2.1	4.2	4.4	0.0	3.3	4.8
Sachsen-Anhalt	0.8	4.6	8.7	0.0	0.0	3.0
Schleswig-Holstein	0.2	0.6	0.0	4.3	2.1	1.6
Thüringen	0.0	0.5	0.0	1.0	0.0	2.0
Total (excludes Saarland)	100.0	100.0	100.0	100.0	100.0	100.0

[a] Data do not include investments in Saarland.
[b] Figures in bold show the regional location of each of the six centres.

Table 3. Proportion of regional investment originating from venture capital firms based or headquartered in that region, Germany, 1998 – 2001 (source: Based on data supplied by KfW, 2001).

Region	Proportion of investment originating from within the region
Baden-Württemberg	63.7
Bayern	58.7
Berlin	44.4
Brandenburg	41.5
Bremen	25.2
Hamburg	52.7
Hessen	64.5
Mecklenburg-Vorpommern	56.3
Niedersachsen	76.4
Nordrhein-Westfalen	32.0
Rheinland-Pfalz	79.8
Saarland	16.4
Sachsen	59.2
Sachsen-Anhalt	59.6
Schleswig-Holstein	65.6
Thüringen	44.7

Both in the United Kingdom and in Germany, therefore, despite claims made by venture capital firms that they do not discriminate between regions when seeking investment opportunities, the evidence suggests that strong spatial proximity effects are in fact at work. These mainly involve structural imbalances as a result of the workings of venture capital transactions. For example, it is likely that perceived risk increases with distance between the venture capital firm and potential investee companies. One interviewee stated that in 'peripheral regions' just one or two venture capital firms usually dominate, and that if they decide not to invest in a deal then outside firms are also unlikely to invest as they assume the local venture capital firms know something they do not, and that the risk is too high. This means that venture capital investment and activity will tend to be concentrated around the main clusters of venture capital firms.

Whether the spatial proximity effect reflects a strong distance decay in information—about investment opportunities (actual or potential demand for risk capital) on the part of venture capital firms, and about potential sources of investment funds (supplies of risk capital) on the part of those seeking finance—or the desire by venture capital companies for close regular contact with their investee firms, the result is a process that can produce marked regional differences in venture capital activity. In the United Kingdom, the overwhelming clustering of venture capital firms in and around the financial centre of London reinforces the marked concentration of investment in the southeastern area of the country relative to other regions (Martin et al, 2003; Mason and Harrison, 1999; 2003). In Germany, although venture capital firms are distributed more evenly between six primary cities, there would nevertheless appear to be significant localisation of investment around the main clusters there too.

An immediate question that arises is whether this spatial proximity effect implies the existence of 'regional venture equity gaps' in areas and regions that do not have their own well-developed clusters of venture capital firms, and which are not within easy access of such clusters in other regions. Empirical efforts to prove the existence and scale of equity gaps are notoriously difficult exercises, as these effects need not be directly observable. In the academic literature, positions vary between outright dismissal of their very existence (for the case of the United Kingdom, see Mason and Harrison, 2003), and various assertions of some sort of market imperfections, variably framed according to investment stage, deal size, information asymmetries, differences in innovative behaviour, sectoral differences, etc. Regional gaps are mentioned less frequently, although different industrial structures do, of course, manifest themselves regionally as regards the supply of and demand for venture capital.

Detecting regional equity gaps and quantifying their magnitude in the UK and German contexts are therefore anything but straightforward. Locational quotients are an often-used simple statistical device to detect overconcentrations and underconcentrations of venture capital investment across regions. The reasoning here is that when each region's actual share of venture capital investment is compared with that 'expected'—for example, on the basis of its share of firms, new firms, or GDP, or some other proxy for 'demand'—the resultant regional location quotients (LQs) point to possible 'gaps' in the regional distribution of venture capital investment. Those regions with LQs greater than unity are regarded as having more investment than 'expected' and, conversely, those regions with LQs less than unity have less. More sophisticated versions of the LQ approach would seek to allow for regional differences in the sectoral composition of their stocks of firms, or their GDP, assuming that the necessary data were available.

Here we report regional LQs calculated as each region's share of national venture capital investment over the period 1998–2001, divided by its share of the national

Table 4. Regional distribution of venture capital investment by stage, United Kingdom, 1998 – 2001 (source: BVCA, 2002).

Region	Percentage				Location quotient[a]			
	total	early stage	expansions	MBO/ MBI[a]	total	early stage	expansions	MBO/ MBI[a]
London	29.5	31.8	24.0	31.2	**2.02**	**2.07**	**1.56**	**2.03**
South East	19.0	22.8	16.0	20.0	**1.17**	**1.37**	0.99	**1.20**
South East and London	**48.5**	**54.6**	**40.0**	**51.2**	**1.51**	**1.71**	**1.25**	**1.60**
Eastern	6.8	11.5	6.0	6.7	0.70	**1.18**	0.62	0.63
South West	3.8	4.0	3.2	4.5	0.41	0.44	0.35	0.50
East Midlands	8.2	3.2	8.3	9.0	**1.09**	0.46	**1.21**	**1.31**
West Midlands	8.2	4.0	7.4	9.0	0.90	0.48	0.90	1.00
Yorkshire and Humberside	4.5	3.3	4.5	4.5	0.61	0.47	0.64	0.64
North West – Merseyside	10.1	7.3	17.5	7.3	0.83	0.75	1.80	0.75
North East	1.3	1.0	1.6	1.5	0.54	0.40	0.64	0.60
Wales	1.3	0.7	2.0	1.5	0.18	0.10	0.28	0.21
Scotland	7.8	9.0	9.5	4.0	**1.02**	**1.24**	**1.25**	0.55
Northern Ireland	0.5	1.3	0.5	0.3	0.15	0.39	0.02	0.09
Total		100.0	100.0	100.0	1.00	1.00	1.00	1.00

[a] Location quotient defined in text; values greater than unity indicate a relative concentration of venture capital investment in the regions concerned.
[b] MBO—management buy-out; MBI—management buy-in.

stock of VAT-registered (in the United Kingdom) or UST-registered (in Germany) firms in 2001.(4) Starting with the United Kingdom, and using BVCA data, the London and South East regions emerge with LQs well above unity, especially in the case of investments in early-stage ventures—what is often viewed as 'classic venture capital'—and in MBQ/MBI activity (table 4). The only other regions in addition to London and the South East to have LQs greater than unity are the East Midlands and Scotland. Northern Ireland and Wales have particularly low LQs.

When regional differences in the stock of firms are taken into account in Germany, and the BVK data on regional venture capital activity are used, five regions emerge with location quotients greater than unity: Baden-Württemberg, Bayern, Berlin, Hessen, and Hamburg (table 5, over). The KfW data indicate no fewer than eight regions with location quotients greater than unity for total investment: Baden-Württemberg, Bayern, Berlin, Hamburg, Brandenburg, Mecklenburg-Vorpommern, Sachsen, and Sachsen-Anhalt.(5)

(4) Essentially, the same results were obtained when regional shares of new firm start-ups, and shares of GDP, rather than shares of the stock of firms, were used as the basis for the calculation of the location quotients. Given that these different denominator variables are themselves highly correlated across regions (for example, new firm start-up rates tend to be higher in more prosperous regions, and vice versa), the similarity in the LQs derived from them is not surprising.

(5) The difference between the regional pattern of total investment based on KfW data and that based on BVK data may reflect particular differences in the sectoral, stage, and regional focus of KfW's involvement in venture capital investment compared with the market as a whole. Almost all of KfW's equity schemes deliberately allow for positive treatment (in varying degrees) of the 'Neue Bundesländer' (the former East German Länder), such as Mecklenburg-Vorpommern, Sachsen, and Sachsen-Anhalt, though not by the operation of any negative bias towards West German regions. This explains at least part of the differences in the relative regional distributions of venture capital investments as indicated by BVK data and KfW data.

Table 5. Regional distribution of venture capital investment by stage in Germany, 1998 – 2001 (BVK) and 1999 – 2001 (KfW).

Region (Bundesland)	Percentage					Location quotient[a]				
	BVK total	KfW				BVK total	KfW			
		total[b]	early stage	expansions	MBO/ MBI[c]		total[b]	early stage	expansions	MBO/ MBI[c]
Baden-Württemberg	13.3	13.8	11.7	15.0	36.3	**1.05**	**1.10**	0.82	**1.07**	**2.59**
Bayern	21.1	24.5	22.6	27.7	0.9	**1.21**	**1.46**	**1.30**	1.59	0.02
Southern Germany	**34.4**	**38.3**	**34.3**	**42.7**	**37.2**	**1.09**	**1.26**	**1.10**	**1.36**	**1.18**
Berlin	9.7	13.6	15.2	12.1	8.6	**2.55**	**3.68**	**3.98**	**3.17**	**2.25**
Brandenburg	2.2	2.6	2.3	3.0	4.0	0.83	**1.02**	0.86	**1.12**	**1.50**
Bremen	0.6	0.7	1.3	0.1	0.0	0.81	0.89	0.94	**1.75**	0.00
Hamburg	5.0	5.9	7.5	4.4	1.5	**1.89**	**1.87**	**2.34**	**1.37**	0.46
Hessen	10.5	4.9	4.8	5.2	0.0	**1.34**	0.62	0.72	0.79	0.00
Mecklenburg-Vorpommern	0.7	3.7	4.5	2.9	0.0	0.40	**2.18**	**2.58**	**1.66**	0.00
Niedersachsen	4.4	2.8	3.0	2.7	1.9	0.51	0.33	0.34	0.31	0.22
Nordrhein-Westfalen	20.3	8.9	10.6	7.5	0.0	0.84	0.34	0.49	0.35	0.00
Rheinland-Pfalz	2.7	1.4	1.0	1.5	7.2	0.52	0.62	0.27	0.20	1.41
Saarland	0.9	0.4	0.5	0.2	0.0	0.25	0.34	0.42	0.17	0.00
Sachsen	3.6	9.1	6.5	11.1	28.4	0.78	**2.18**	**1.39**	**2.38**	**6.08**
Sachsen-Anhalt	1.2	3.2	5.4	0.7	0.0	0.52	**1.46**	**2.34**	0.30	0.00
Schleswig-Holstein	1.9	2.0	1.6	2.2	11.3	0.55	0.57	0.46	0.64	3.27
Thüringen	1.8	2.4	1.7	3.5	0.0	0.71	0.98	0.67	**1.38**	0.00
Total	100.0	100.0	100.0	100.0	100.0	1.00	1.00	1.00	1.00	1.00

[a] Location quotient defined in text; values greater than unity indicate a relative concentration of venture capital investment in the regions concerned.
[b] Totals for KfW include 'other' category of investment.
[c] MBO—management buy-out; MBI—management buy-in.

Three key points seem clear. First, in the United Kingdom, venture capital investment is relatively more spatially concentrated (in the London—South East regions) than is the case in Germany (where other significant regional concentrations exist outside of the two southern Länder of Bayern and Baden-Württemberg). Second, the range of regional disparities in investment (as measured in terms of LQs) is, nevertheless, quite similar in the two countries. In both nations, therefore, venture capital investment has been regionally uneven, both generally and by stage of investment. But third, in both instances, the pattern of this unevenness is at least consistent with the spatial proximity effect argument outlined above in that the regional distribution of investment is closely correlated with the locational geography of venture capital firms, and regions that do not have sizeable clusters of venture capital firms also tend to have shares of venture capital investment below what would be expected given their shares of firms.

However, the use of LQs to identify possible regional equity gaps is severely limited. One problem concerns the firm-share data used as a proxy for local 'potential' demand. Regional shares of firms tell us nothing about the nature of those firms, in terms of their need for risk capital, their expansion plans, sectoral specialisation, and so on.

Further, in both the UK and German cases, the data exclude small firms with low sales revenues—precisely the type of business that finds it difficult to raise investment finance. An additional problem is that data relate to a company headquarters, distorting the picture for multisite firms; this even includes those subsidiaries that are legally independent. Second, of themselves, location quotients tell us nothing of *why* actual regional shares deviate from 'expected' shares, or whether regional investment shares are demand constrained or supply constrained. Thus, LQs of less than unity do not necessarily indicate a lack of supply of venture capital, as there may also be a lack of demand. The low level of demand may itself be induced by the lack of supply, as discussed above, but location quotients of themselves give no indication as to whether or where demand and supply factors are interdependent. So, although LQs are able to shed some light on the regional unevenness in venture capital activity, and can point to where such activity seems to be especially overrepresented and underrepresented, additional ways to approach the problem are obviously needed.

5 Perceptions of the equity gap

Just as with any market imbalance, the very notion of an equity gap is about perceptions (see Cressy, 2002)—on the part of venture capital firms, entrepreneurs seeking capital, and also policymakers. With their daily actions and decisions, informed by constantly shifting frames of reference and experiences, investors, investees, and policymakers constantly shape and reshape the 'market' for venture capital. They produce or reproduce a market landscape in which certain sectors, technologies, enterprises—and perhaps even places—are perceived to be 'hot', others 'cold', some 'low risk' and others 'high risk'. To put it differently, market participants are not confronted with a pregiven, singular, equity gap, but, rather, produce various 'gaps' in time and space through their perceptions and actions. While acknowledging these difficulties, we throw some limited light on this issue in relation to venture capital firms, drawing again on our survey materials. In our survey we asked venture capital companies whether they considered an undersupply of equity existed in any particular segment of the market, relative to their perceptions of demand in that segment. The results are summarised in table 6 (over).

In both countries, over two thirds of respondents appeared to agree that there was an undersupply of venture capital. Seed and start-up stages were widely identified as suffering from equity gaps. The UK start-up figure is higher, which may be explained by a stronger focus on MBO/MBI investments there. On the other hand, a gap in turnaround capital is more widely perceived in Germany—which is in accord with the widespread view about the need for restructuring finance in that economy. Small deal sizes, below £100 000 (€150 000) and between £100 000 and £250 000 (€150 000 – €375 000), were also strongly identified in both countries (small deal sizes obviously correlate closely with investments in start-ups and early-stage enterprises). In general, as the deal-size category increases above £250 000 (€375 000) the proportion of venture capital firms identifying gaps falls. This is consistent with the widespread anecdotal views and criticisms found amongst commentators and policymakers about the failure of the venture capital market to channel sufficient funds into what is generally regarded as the 'classic' seed and new-firm segment.[6] However, in the United Kingdom nearly half of respondent companies also identified a gap in the £250 000 – £500 000 (€375 000 – €750 000) sector (see figures 4 and 5, over). This probably reflects the stronger

[6] As was pointed out above, in Germany there is the argument that informal venture capital (that is, business angels) may be able to address the financing needs of smaller firms with more moderate returns on investment potential. However, Kolkalj et al (2003) argue that German business-angel networks still lack the efficiency and transparency to fulfil this role adequately and argue for political measures to improve this vital market segment.

Table 6. Venture capitalists' perception of equity gaps in Germany and the United Kingdom, as revealed in the survey (source: authors' survey).

Percentage of respondent companies agreeing that venture capital is undersupplied in some market segments	Germany	United Kingdom
Regional gaps		
Two most-cited regional gaps	13.2 Brandenburg 12.0 Sachsen	8.1 North West 8.0 South West
Sector gaps		
Information technology and media	18.8	31.6
Other services	23.5	10.5
Manufacturing high-tech	17.6	15.8
Manufacturing low-tech	40.0	13.2
Life sciences	12.9	26.3
Stage gaps		
Seed stage	52.6	54.5
Start-up	38.1	56.4
Expansion	14.4	7.3
MBO/MBI[a]	4.1	1.8
Replacement	3.1	3.6
Bridge	3.1	5.5
Deal-size gaps		
<£100 000 (< €150 000)	42.9	42.9
£100 000 – £250 000 (€150 000 – €375 000)	48.4	51.8
£250 000 – £500 000 (€375 000 – €750 000)	26.4	48.2
£500 000 – £1 million (€750 000 – €1.5 million)	13.2	35.7
£1 million – £3.33 million (€1.5 million – €5 million)	12.1	21.4
£3.33 million – £33 million (€5 million – €50 million)	4.4	1.8
> £33 million (> €50 million)	4.4	1.8

[a] MBO—management buy-out; MBI—management buy-in.

drift to larger deal sizes in the UK venture capital market in recent years, compared with Germany (see Martin et al, 2003).

The most striking difference between the two countries is in the perception of sectoral gaps. In Germany the main sector most often identified as suffering from an undersupply of risk capital was low-technology manufacturing. This corresponded with the KfW's view that the main shortage of venture capital in Germany is for the restructuring of what it calls 'old economy' activities, not for the creation and development of 'new economy' ones. This is in contrast to the United Kingdom, where information technology (IT), life sciences and media activities were singled out as the main sectors in which a venture capital gap exists. This contrast seems to reflect the rather different investment patterns in the two countries in recent years, in that in Germany a higher proportion of venture capital has consistently gone into high-technology activities than has been the case in the United Kingdom which until recently, has had one of the lowest proportions of any European country (Martin et al, 2002).

It is instructive to relate these views on deal-size, stage, and sectoral gaps to the main constraints on investment activity identified by the firms surveyed (table 7, over). In Germany the most important constraint is the risk of investment proposals. This is slightly more important in Germany than in the United Kingdom and may reflect the relative immaturity of the German venture capital industry and the high sense of uncertainty in the current, depressed, state of the economy. The importance attached

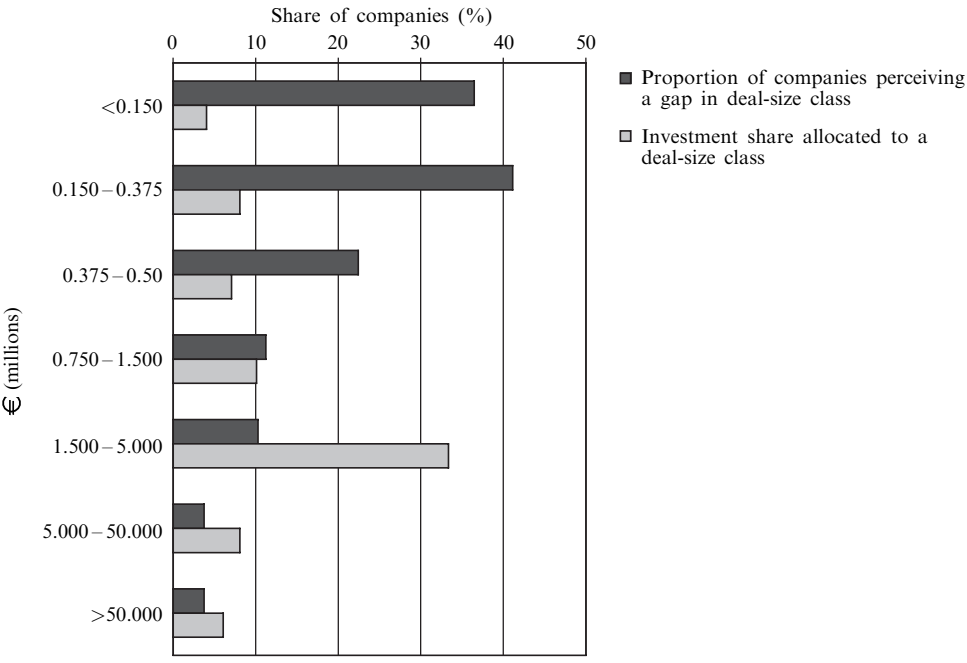

Figure 4. Perceived gaps and investment activity by deal size, Germany, 2002 (source: authors' survey).

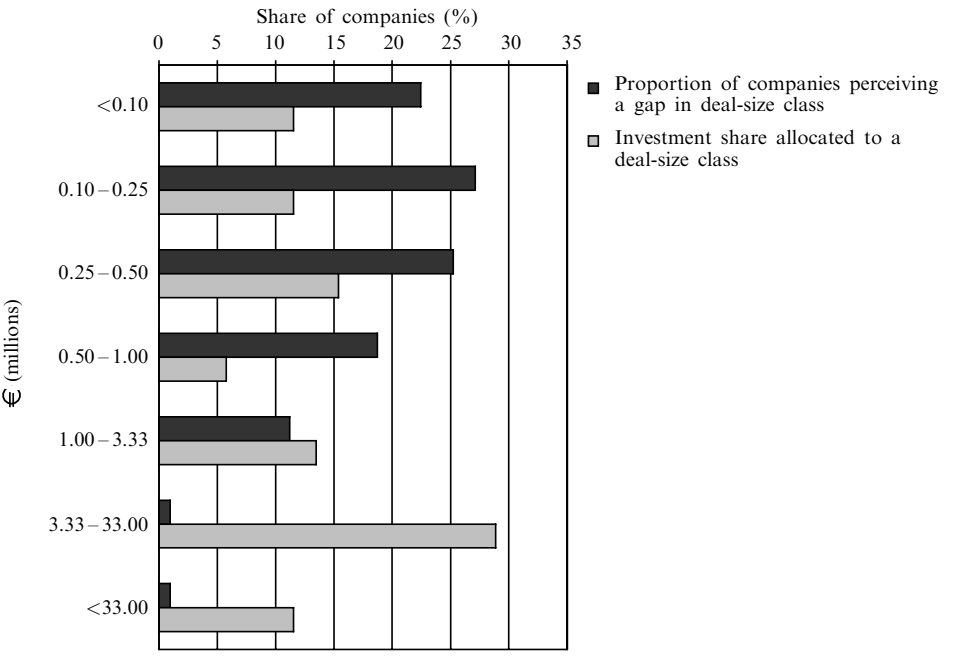

Figure 5. Perceived gaps and investment activity by deal size, United Kingdom, 2002 (source: authors' survey).

Table 7. Major constraints on investment activity cited by German and UK venture capital firms, shown as weighted averages (1—very important, 6—not important) (source: authors' survey).

Constraint	Germany	United Kingdom
Perceived risk is prohibitively high	2.4	3.6
Lack of good-return proposals	2.6	2.8
Difficulties of exit	2.8	3.4
Difficulties in monitoring investee companies	3.6	4.8
Lack of information on potential investee companies	3.9	4.5
High due-diligence cost	4.1	4.5
Low deal flow	4.1	4.3
Geographical remoteness of investee company	4.2	4.8
Problems in fundraising	4.2	4.2
Shortage of staff with venture capital experience	4.3	5.0

to difficulties of exit is not surprising in the light of recent stock market devaluations and the collapse of the Neuer Markt. However, the other prominent constraint—the most important in the United Kingdom and the second most important in Germany—is the lack of proposals with prospects of decent returns.

These findings may seem to run counter to the prevailing view that there is some sort of equity gap. However, the two may be compatible in the sense that the lack of small, early-stage, investments is often explained in terms of their perceived high costs and risks relative to their expected returns. The constraint is neither simply demand side nor supply side, but emerges at the intersection of market processes with collective and individual perceptions, giving rise to highly uneven outcomes. What this suggests is that the majority of our respondent venture capital firms accept that there is an undersupply of equity in small deals for early-stage companies, and that they see this as primarily caused by the perception that the prospective returns will not be sufficient to compensate for the high costs and risks associated with such investments. This perception may, of course, be partly a result of the poor quality of some investment proposals and their lack of 'investment-readiness' (for a discussion of this notion, see Mason and Harrison, 2003). From the point of view of the venture capital firms the reluctance to invest may be profit based and entirely rational, but from the point of view of SMEs, and also perhaps from that of general economic growth, this produces an undersupply of venture capital relative to need.

But what of regional gaps? The evidence from our survey firms would appear to be negative. For both countries, the majority of venture capital firms did not perceive there to be any significant regional funding gaps: typically less than 10% of respondents thought that such gaps existed, and no clear regional patterns were discernible. Indeed, venture capital firms accorded low importance to the 'geographical remoteness of investee companies' as a constraint on their investment activity (table 7). This appears to run counter to the findings reported in table 1, in which 'geographical nearness to investee companies' was relatively important. However, the two tables are not necessarily inconsistent in that venture capitalists may not view the location of potential investee firms as a constraint on their investment activity precisely because they locate (or are already located) in or near to regions where there is a high rate of new-firm formation and a buoyant demand for risk equity. Indeed, to the extent that venture capitalists prefer to invest locally (the spatial proximity effect), as our earlier evidence indicates, provided sufficient local opportunities for investment exist, venture capitalists are unlikely to feel limited to and constrained by geographically remote investment opportunities. Furthermore, table 7 does not tell us whether venture capitalists are

actually receiving proposals from more distant companies or whether local knowledge and access to information in local networks make a difference to the perception of the risk/return of any particular proposal. More distant investment proposals, other things being equal, are likely to be perceived as more risky and as having a lower potential return than more local ones, in part because of the greater information on and greater potential regular contact with more local projects compared with more distant ones.

Our interviews with venture capital firms and investment managers suggested that the perception of gaps reflect, amongst other things, the interplay of incomplete knowledge and customary investment practice. As one interviewee put it:

"It is difficult to detect a gap in a clear-cut way, whether it is demand or supply . ... But there is a knowledge gap!" (interview, Barclays Bank, London).

Venture capitalists operate within a market environment that is characterised by uncertainty, volatility, and constant change—an environment that creates a constant need to update information and to close what the respondent above termed the 'knowledge gap'. Confronted with a volatile world, people normally attempt to create stability by eliminating sources of uncertainty. Some achieve this by putting faith in typically 'common-sense' beliefs derived from professional experience:

"All I can say to you is I've been in equity investment for a very long time and there is a gap" (UK fund manager).

To this one has to add limited evidence of more direct discriminatory practices due to stereotypical representations of certain regions by key market actors. In Germany this includes prejudices against the former East Germany by West German venture capitalists (interview with 3i Frankfurt); in the United Kingdom the same might hold for the relations between London and more remote regions.

At the same time, market perceptions are shaped by customary investment practice and behaviour. Venture capitalists tend to define a 'core market' that they regard as their 'normal domain'. The definition of this domain is thus of key significance in determining investment managers' perceptions of the market for investment, and whether and in what form gaps exist inside or outside this domain. It is obvious that the core of the market, as seen by investment managers, may be easier to define in some dimensions than in others. At first sight, our survey results provide little evidence that venture capitalists tend to perceive the venture capital market in explicitly regionally differentiated terms: most argued that they consider the national economic space as a single market, and that they do not actively discriminate between investees in different regions. But this may be a direct reflection of their tendency to think of the venture capital market—and hence gaps—first and foremost in terms of deal stages and sizes, and possibly sectors, rather than as regionally segmented. How, then, does this square with the fact that investment in both countries is distributed unevenly across regions? For, notwithstanding the impact of regional variations in industrial structure and public sector venture capital policy initiatives, our empirical results suggest that a regional 'herd effect' (*Mitläufereffekt*) does seem to characterise the venture capital market: both in the United Kingdom and in Germany investment has tended to concentrate around the main clusters of venture capital firms and to concentrate in 'winner' regions, such as around Munich or London. And as we argued above (section 3), the interaction of demand and supply may well operate effectively to conceal gaps in less favoured regions with low investment rates and few local venture capital firms. That is, what may be perceived by venture capital firms as a lack of demand for equity capital in certain regions may in fact be gaps in supply that operate to depress demand.

6 Conclusions

Our discussion of equity gaps in the venture capital market, and of regional gaps in particular, has been focused on investment outcomes and the perceptions of venture capital firms. This, of course, is but a partial perspective on what is a complex issue. A more complete analysis would also have to include the demand side as captured by the perceptions and experiences of enterprises and entrepreneurs seeking risk equity, as well as the patterns and reasons for regional differences in proposal-rejection rates. Nevertheless, three main conclusions follow from the foregoing analysis of the regional dimensions of the UK and German venture capital markets.

First, notwithstanding the fact that venture capitalists do not appear to acknowledge—or think in terms of—regional gaps specifically, there is clear evidence of what we have labelled a 'spatial proximity effect' in venture capital investment activity. Venture capital firms would appear to focus a significant proportion of their investment in enterprises in their own immediate region. This is consistent with the often-made comment that venture capitalism is very much a relational form of investment, with regular hands-on involvement in the management of the investee firms—a process that works most effectively when venture capitalists are near to their investments. It is also consistent with the argument that incomplete information and risk aversion on the part of venture capitalists increase with distance between the venture capitalists and potential investment opportunities.

By its very nature, venture capital investment is a unstandardised financial activity: each investment is unique in its risk/return profile, type of investee business, and so on. Spatial proximity is much more important in unstandardised transactions than it is in standardised ones. Physical distance between parties in unstandardised transactions reduces their 'relational' proximity, by reducing the frequency of communication, information flow, and trust. In an age of modern mass communications technology, the most important 'friction of distance' is that the *quality* and usefulness of certain types of information may still decline rapidly with separation between market participants. In the venture capital market, the quality of information on potential investees, sources of equity, and performance of the firms funded by venture capitalists, is of paramount importance. Thus it is likely that relative location matters.

Second, what our data certainly confirm, however, is that the regional distribution of venture capital investment is shaped by the locational geography of the venture capital industry itself. Now it can be argued that the locational geography of the venture capital industry is merely a market response to regionally differentiated economic growth and demand for risk capital in the first place, so that the operation of spatial proximity effects in no way implies the existence of regional equity gaps or spatial bias in investment on the part of venture capital firms (Mason and Harrison, 2003). But there are grounds for believing that demand and supply may interact in such a way as to disguise underlying regional mismatches. The growth of venture capital in local economies involves a learning process in which investees learn about the uses of venture capital and the best ways to secure this finance, intermediaries learn how to encourage demand and connect investors and investees, and venture capital firms learn about the risks and trends in their potential markets. A lack of venture capital firms in a region may mean that these knowledge chains are weak and incomplete, and this may depress local demand for risk capital which, in turn, may deter additional venture capital firms from setting up in that region, and lead venture capital firms located elsewhere to see the problem as one of lack of local demand rather than a lack of local supply. Conversely, the existence of a sizeable cluster of venture capital firms in another region may itself stimulate local demand for venture finance, and this in turn may encourage other venture capital firms to set up or move there. In this case a

virtuous circle operates. In other words, what may indeed start out as a market-led response of venture capital to actual regional differences in demand for venture capital may then operate to produce a self-reinforcing regional imbalance that might appear outwardly, and be perceived, as a market equilibrium rather than an underlying induced market failure. In this sense, regional gaps may be very difficult indeed to observe directly, and may well not be perceived to exist on the part of venture capitalists who, as our survey respondents indicated, appear to perceive market gaps in more conventional deal-size and enterprise-stage terms.

Yet, the clear importance that venture capitalists attach to being near to their investee companies (table 1) is wholly consistent with a spatial proximity effect in investment decisions, so that once a particular locational geography of venture capital becomes established—whether initially linked to local clusters of new-enterprise formation, or to existing financial centres (and the two may, of course, coincide)—it will tend to reproduce a similar pattern of venture capital investment. Both in the United Kingdom and in Germany, the geography of venture capital industry, and the regional distribution of investment, are closely associated with the location of the main financial centres. In the UK case this is essentially London (with a smaller presence in Manchester); whereas in Germany the industry is more evenly spread amongst six financial centres. In both instances, however, there is evidence of spatial proximity effects in investment behaviour. In this sense, the geography of the industry itself may well create regional mismatches in demand and supply of equity capital along the lines suggested by the OECD (1996) referred to in the introduction.

Third, this possibility raises a number of issues for policy. In particular, there are strong grounds for arguing that some form of intervention or support is needed if venture capital markets are to develop and thrive in regions which are not near to the main centres of the venture capital industry and which have few local venture capital firms of their own. This, at least in part, is the logic behind the UK government's new Regional Venture Capital Funds and is implicit in some of the Länder initiatives designed to draw national funding to particular regions in Germany (see Sunley et al, 2005).

The problem is that it could prove quite difficult to establish sizeable local venture capital markets in regions that do not have significant financial centres or emerging clusters of innovative, new-enterprise-based growth, or that lack the panoply of supporting specialist business, legal, advisory, and related services that are so essential for SMEs and for a well-founded local venture capital market to function. In a sense, the notion of a gap implies a relatively straightforward policy response: namely, a financial 'infilling', with possible 'demonstration effects' on the private market. But, as we have seen, the gap idea is not only an elusive notion, it is also a simplification of the dynamics in which low supply and demand may interact to constrain the development of venture capital learning and knowledge in less-favoured regions. Thus, simply establishing a publicly financed regional venture capital fund may be necessary but is unlikely of itself to be sufficient for building up local institutional capacity and boosting local venture capital activity (Florida and Kenney, 1988; Florida and Smith, 1993; Harding, 2002; Hellman and Puri, 2002; Powell et al, 2002). In such areas, venture capital policy needs to be coordinated and integrated with other aspects of local economic policy, and especially the promotion of innovative new-business formation. Moreover, if demand and supply do become set into regional equilibrium gaps in the manner we have suggested, then this implies that short-term pump-priming public interventions are unlikely to work; or that at best they will simply end up reinforcing existing geographical mismatches in the demand for and supply of venture capital (Mason and Harrison, 2003). To reduce these regional equilibrium gaps may require

concerted efforts to create the knowledge and institutional networks needed to facilitate the necessary localised learning about venture capital possibilities. This is unlikely to be a long-run endeavour. It may be unrealistic, therefore, to expect notable policy impacts in the short term (see Sunley et al, 2004).

What is clear is that more research is needed on these issues. Neither aggregate regional data on investment patterns nor surveys of investment by venture capital firms of themselves provide a sufficient basis on which to determine the scale and nature of any equity gaps. In-depth analyses are required both on the demand side and on the supply side of the market. Detailed discussions with venture capitalists on the location and character of the funding proposals they receive, on their rejections of proposals, and on the information networks that venture capital firms use to search for potential investment opportunities are all needed. Likewise, on the other side of the market, research is needed to ascertain whether and to what extent the low rates of venture capital investment in 'noncore' regions derive from a local lack of viable projects and proposals (and why this may be the case), and whether and to what extent actual and potential entrepreneurs in such regions encounter real problems accessing the venture capital market. Detailed in-depth regional studies are required to throw light on these questions. The value of intensive regional case-study research of this kind in revealing the nature and extent of local equity gaps, in identifying policy actions to promote both the demand for and supply of venture capital, and, indeed, in activating a local risk capital culture, is well illustrated by the recent Regional Access to Finance initiative implemented by Advantage West Midlands, the regional development agency for the West Midlands in the United Kingdom (Deloitte and Touche, 2002). Not only has this initiative identified significant equity gaps in the West Midlands SME economy, especially in high-tech sectors, it has also shown how these gaps derive both from the legacy of an old, large-scale manufacturing-orientated economic base and weak small firms enterprise culture on the one hand, and from a local financial community not well geared to the needs and risk/return profiles of small dynamic enterprises in high-tech, media, and other 'new economy' activities, on the other. The West Midlands case seems to illustrate well the complex (in this case negative) interplay of localised demand and supply factors and feedbacks of the sort discussed in this paper.

In Germany, the Munich case provides a more positive illustration of this interaction. The Munich subregion is host to a sizeable number of high-tech firms and research centres, above all within the biotechnology sector. The cluster crucially depends on venture capital, and to a large extent this demand has helped stimulate a large and dynamic agglomeration of venture capital firms located in and around Munich. It was the national government with its BioRegio competition, together with regional government money generated by the privatisation of Land assets, that provided the crucial impetus behind the biotech cluster and that set in motion a virtuous circle between the demand for and local supply of venture finance. Further, as our data illustrate, Munich is also the most significant destination for funds from venture capital firms based in other regions of Germany—a fact that illustrates how a dynamic region can pull in funds from elsewhere. It may well be argued that the success of the Munich region rests in part on its ability to raise capital not just from its own cluster of venture capital firms but also from firms located in other centres. However, essentially what we have in Munich is an example of a virtuous interaction between the demand for and locally based supply of venture capital. Research into how these dynamics play out differently in different region-specific settings would thus seem to offer considerable promise for understanding the evolving geographies of venture capitalism.

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Appendix

A brief note on the questionnaire survey

In this paper we draw upon a larger research project that included a postal questionnaire of formal venture capital (private equity) firms in Germany and the United Kingdom that was conducted over the summer of 2002. Questionnaires were sent to all of the head offices of firms listed as members of the German and British Venture Capital Associations. The six-page questionnaire covered a range of issues, with sections on the characteristics of the firm, its investment practices and strategy, its sectors and stages of operation, its views and perceptions of the venture capital market, its opinions on the problems in the venture capital market, and its views and experiences of policy initiatives and measures.

The questionnaire was kindly professionally printed by the Kreditanstait für Wiederaufbau (KfW, or Reconstruction Loan Corporation) in Frankfurt, which also not only provided advice on the operation of the German venture capital system, and on the phrasing of certain questions to ensure their consistency with UK definitions and types of venture capital, but in conjunction with the German Venture Capital Association, helped to promote the questionnaire amongst German venture capital firms—a fact that certainly encouraged a high rate of response there. Some 107 German firms (49%) completed the questionnaire, compared with 60 (39%) in the United Kingdom (where the British Venture Capital Association declined to provide any support or assistance). Given that venture capital firms are rapidly becoming 'oversurveyed', especially in the United Kingdom, these response rates were considered to be high.

The survey samples appeared to be representative in both countries in that in neither country did we detect any significant deviations of the samples from the sectoral, deal-stage, or regional distributions of the industry as a whole. The respondent firms also spanned a wide size range in terms of the scale of their investment portfolios. Firms with branches were asked to provide information on the operation of those offices, and their location. The information from the completed questionnaires was transcribed onto SPSS files for use in various analyses.

Copies of the questionnaire (in German or English) may be obtained from the authors.