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Angles on angels: financing technology-based ventures - a historical perspective

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This paper reviews 20 years of research on the angel segment of the venture capital market. A lot has been learnt from one-shot studies of the attitudes, behaviour and characteristics of business angels. Taxonomies have been developed. However, we now need systematic insights into the dynamics of the angel market. The paper calls for longitudinal studies of angel and entrepreneurial behaviour, information flows, links to other market segments, information quality, formal and informal networks and the latent angel problem. The research base needs to be put on a solid theoretical and conceptual foundation. This research will provide the guidance required by public policy to unlock the capital and know-how of the millions of latent angels.

Keywords: entrepreneurship; venture capital; informal venture capital market; investment risk; funding gap

Introduction

Why is research into the financing of entrepreneurial technology-based ventures so important? We believe that there are three compelling reasons. First, the technology-based entrepreneurs and venture investors of the United States constitute a vital competitive edge in world markets. Second, private investors (business angels) are the primary source of equity financing for start-up and early stage entrepreneurial technology-based ventures. Third, the capital and the know-how of self-made high-net-worth individuals are two of the least understood and largely under-utilized economic resources in the United States and, indeed, in other countries. Despite twenty years of research, we still know very little about the angel

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segment of the venture capital markets-about how to unlock more of the available capital of active angels and, of far more significance to our entrepreneurial economy, about how to convert latent angels into active investors.

We have learned about all we can from one -shot studies of the attitudes, behaviour and characteristics of business angels. What we need now are systematic insights into the dynamics of the angel market. These insights are critical not only because of the central role played by angels in the farm system where technology-based ventures are spawned, but also because of the multi-faceted differences between the inefficient, idiosyncratic angel market and the visible and relatively efficient institutional venture capital market.

Entrepreneurs, risk, rewards and markets

Entrepreneurial venture creation is a dynamic process undertaken by entrepreneurs founding high-growth, often technology-based ventures. It is defined less by absolute size, more by growth and the potential for future returns. Commonly, however, entrepreneurial ventures with high growth potential require funding far beyond that supplied by the founders. The ventures must seek funding, therefore, from other sources. Finance markets provide a means of bringing together investors and entrepreneurs - at a price.

The willingness and the prices at which potential investors and entrepreneurs will be brought together will be determined by their various perceptions of risk and return, and by the availability of reliable data about available investment opportunities. Generally, most people are averse to risk. They require compensation for taking on additional perceived risk. Attitudes to risk vary from individual to individual. Some (risk takers) require less compensation than others (risk avoiders) for taking a given amount of risk.

Risk has several components. One is time related: the longer the period of exposure, often the greater the risk. Another is related to the nature of the business, the quality of its management, its financial position, its competitive position and its market strength. These factors, in combination, are known as 'alpha' or firm-specific, risk. Where there are highly efficient capital markets, alpha risk may be diversified away by portfolio decisions. Risk that is more general, or systematic, is known as 'beta' risk, and cannot be diversified away, depending as it does on national and international conditions that affect all companies. The analogy sometimes used is that arising tide raises all boats (beta risk) except, presumably, those that are leaking badly (alpha risk). Consequently, where highly efficient markets exist, the investor seeks reward only for the risk that cannot be removed - beta risk. Where markets are less efficient, and where investors do not diversify, alpha risk remains a significant and material component of total (alpha plus beta) risk. The many financial instruments that offer different risk/reward blends satisfy the differing risk/reward preferences of a variety of lenders and investors. These instruments range from low-risk debt contracts secured by mortgage on real property through to high-risk equities and derivatives.

What are the consequences of risk profiles and attitudes for financing? Early stage (seed and start-up) entrepreneurial ventures are likely to begin in a small way but have a high-risk profile. Initially, many such ventures will be financed from 'internal' sources, principally using the resources of the founders and their families and friends. 'Bootstrapping' is defined as highly creative ways of acquiring the use of resources without borrowing money or raising equity financing from traditional sources (Freear *et al.* 1995b, 1995c). It may be divided into two overlapping parts, product development and business development. The more common business development bootstrapping techniques include reduced or deferred compensation for the founders, founders' savings, credit card debt, home equity loans, low rental space and working out of the home. Special deals on hardware access, prepaid licenses, royalties or

advances from customers, customer-funded research and development and turning consulting projects into a commercial project represent the most common forms of product development bootstrapping. High technology entrepreneurs, particularly software entrepreneurs, appear to rely more frequently on business bootstrapping than on product development bootstrapping (Freear *et al.* 1995b, 1995c).

Among the external sources are bank loans. Usually, loans are secured on personal assets, as the venture has few assets early in existence, and, of course, has no track record of earning net free cash flow. Formal corporate alliances are another popular method. The entrepreneurial venture forms an alliance with a larger corporation to develop complementary products and services, in exchange for funding and/or other support. The evidence, at least as far as software entrepreneurs are concerned, is that alliances are popular because they boost revenues. About three-quarters of the respondents to a survey of software entrepreneurs had formed alliances. More than half of those in an alliance indicated that the alliance accounted for more than 30% of their revenues (Freear *et al.* 1995b, 1995c).

The remaining two sources are venture capital funds and private investors (angels), both of which use equity as the primary financing vehicle. In the Freear *et al.* (1995a) survey, one quarter of the respondents had used external equity financing. The respondents showed a distinct preference for angel financing over venture capital fund financing. As is the case in other surveys (for example, Avery and Elliehausen 1986, Wetzel 1987, Gaston and Bell 1988, Freear and Wetze1 1989, 1990, and Sullivan and Miller 1990), angels were found to be the primary source of external equity financing at the high-risk, early stage (seed and start-up) of an entrepreneurial venture's existence.

To offset the high alpha risks, angels will tend to invest in entrepreneurial ventures as part of a total portfolio that contains investments with differing risk characteristics. By working with formal and informal groups of angels, they will be able to spread their investments, and therefore their risk, across a larger number of investments, a similar strategy to that adopted by mutual funds and venture capital funds. The early stage ventures that grow sufficiently quickly and robustly may become attractive enough to investors to enable their founders to cash-out through an initial public offering or to be acquired by a larger company.

There are inefficiencies and funding gaps in the all of the above financing sources and their associated markets (Wetzel 1987, Haar *et al.* 1988, Riding and Short 1988, Gaston 1989, Freear *et al.* 1990, 1994b). In this paper, we concentrate on the last two, venture capital funds and private investors (angels). Venture capital funds invest in larger ventures, and often make repeat investments in the same ventures, and so make little impact on the early stage financing of entrepreneurial ventures. The high fixed costs of the due diligence that must be performed by active partners in venture capital funds to protect their own interests and those of the other partners, inhibit investment in smaller ventures.

Venture capital funds are more visible, command more resources, and tend to be more organized than angels (Timmons and Sapienza 1992, Meyer, *et al.* 1995, Timmons and Bygrave 1997). Angels, on the other hand, have been much less visible, much more difficult to find, and they have invested much smaller amounts than have venture capital funds, although their total financing impact has been much greater. They have tended to have a longer exit horizon than venture capital funds. At the seed and start-up stages, there is a funding gap between the approximately $US100000 upper limit of internal financing and the approximately $US2 million lower limit of venture capital fund financing (Seymour and Wetzel 1981, Obermayer 1983, Wetzel 1983a, Wilson 1984, Freear and Wetzel 1992, Freear *et al.* 1994b). It is here that angel financing becomes significant. The private investor market, in particular, is very inefficient from another point of view. In addition to a financing gap, there is also an information gap. Angels generally try to walk a fine line between their desire for anonymity so as to avoid constant funding requests, and their wish to maintain an

adequate flow of potentially worthwhile deals. Other inefficiencies and gaps include the delay, which is commonly about six months, between the decision to seek financing and finding it, the desire to protect confidentiality and the need to persuade investors to invest (Freear *et al.* 1994a, Freear and Sohl 2001).

As recently as 1998 an additional new funding gap has emerged in the United States' equity markets (Sohl 1999). This secondary market gap occurs in the early stage of equity financing. As the venture capital industry has progressed to larger and later stage financing, and the informal market has remained active below the $US2 million threshold, an ensuing capital gap in the $US2-5 million range has developed. The funding gap is more of a capital gap than the capital/information gap in the seed and start-up stage, and it has been steadily increasing. These larger capital requirements, still considered early stage deals, have spawned a new hybrid of angel financing - the angel alliance. These alliances represent relatively large groups of business angels willing to fund some second round, early stage deals. In addition, some of the capital requirements in this secondary gap have been met through co-investment between private investors and early stage financing entities. However, both the angel alliances and the co-investment strategies do not appear to be sufficiently satisfying the early stage equity capital needs of the high growth sector. As such, high-tech companies fortunate enough to secure seed and start-up financing still face formidable hurdles as their equity requirements progress to the $US2-5 million range. Of course, without seed and start-up capital, many of these high-tech ventures do not even get past their initial stages of development (Sohl 2003).

Learning about angels

Today, no-one doubts that private investors exist. Their existence has been amply demonstrated by many studies (see the reference list at the end of this paper). It was not always so. Their reticence made them difficult to find, let alone study. An early technique used to establish their existence was what might be called the 'black hole' approach. Using a broad-brush, aggregated, statistical approach, researchers discovered that much early stage funding of entrepreneurial ventures was not accounted for by banks, venture capital funds or other known funding sources (Birch 1979, Directorate of Economic and Policy Analysis 1984, Congressional Office of Technology Assessment 1984, Wetzel 1986, Gaston and Bell 1988, Gaston 1989, Ou 1987, 1993. For UK data, see Harrison and Mason 1992 and Mason and Harrison 1992). Some other source had to exist.

A second approach revealed how high-risk (often high-technology) start-ups in a particular geographical region were financed (see below for references). These early studies found that private investors were a significant source of early stage equity financing. Once the existence of such individuals had been established, other approaches were developed, notably by seeking to discover the investment behaviour of high-net-worth individuals. These individuals were identified through where they lived, their life style and possessions (such as large houses, expensive cars, boats etc.), or through their membership of investment round tables, breakfast clubs, informal angel networks and the like (Freear *et al.* 1994a).

The research into the angel phenomenon has been based mostly on convenience samples rather than representative samples of the population of individual investors. Some research has concentrated on the conceptual and theoretical issues (Brophy 1986, Bygrave 1987, 1988, Giammarino and Lewis 1988, Norton 1990, Sullivan and Miller 1990, Fiet 1991, 1995a, 1995b, Norton and Tennenbaum 1993a, 1993b). The majority of the research output, however, has been empirically based, seeking to learn more about the attitudes, behaviour and characteristics of the angel population (often known as the 'ABCs' of angels). At the national, United States, level, there have been statistical studies, for example, of start-up

ventures and wealthy individuals (Ou 1987, 1993) and studies of private and limited offerings under Regulation D of the Small Business Investment Incentive Act of 1980 (Directorate of Economic and Policy Analysis 1984).

Most of the studies have employed survey techniques. At the local or regional level, there have been surveys of investors and entrepreneurial ventures in particular cities or regions (Rubenstein 1958, Baty 1964, Hoffman 1972, Seymour and Wetzel 1981, Hekman and Miles 1982, Brophy 1982, Wetzel 1983b, Shapero 1983, Tymes and Krasner 1983, Schel11984, Bruno and Tyebjee 1984, Wilson 1984, Harr *et al.* 1988, Aram 1989, Birch *et al.* 1993. For the UK, Mason and Harrison 1994; for Canada, Short and Riding 1989). There have been surveys of ventures receiving venture capital funds and/or making initial public offerings, which included tracing earlier funding sources (Charles River Associates Inc.1976, Bruno and Tyebjee 1984). Formal networks were set up to bring together angels and entrepreneurs. In some cases, they were willing to supply data about their activities (Freear *et al.* 1993, 1994b). Several studies have focused on (often high-technology) entrepreneurial ventures, and particularly on seeking ways of facilitating the financing of innovation and its commercialization by improving the quality and reliability of the technology assessment (Sohl and Wetzel 1996). Yet other studies have sought access to private investors through the ventures in which they invest (Aram 1987, 1989, Gaston and Bell 1988, Gaston 1989, Rhunka and Young 1991, Ehrlich, *et al.* 1994, Freear *et al.* 1995a. For the UK Mason and Harrison 1992). In addition, there have been public policy studies on urban renewal, and regional and national economic revitalization (Romeo and Rappaport 1984, Wetzel 1995. For the UK, Hay and Abbott 1993, Mason and Harrison 1995a, Harrison and Mason 1996, Mason 1996. For Finland, Lumme *et al.* 1998. For Belgium, Manigart and Struyf 1995).

The findings of these studies are well documented, as the preceding paragraph demonstrates. 'Typical' angel profiles have been developed over the past few decades (see the section on Taxonomy, below). Angels are significant suppliers of equity risk capital at the early stages of an entrepreneurial venture's life. Angels are predominantly affluent, self-made men in their forties or older, with graduate degrees, who tend to invest in the industry in which they made their money. They invest for more than just financial return, although that is an important factor. Examples of other motivations include: the fun and excitement of being involved in the early stage growth of a new business, job creation, urban renewal, and assisting women and minority entrepreneurs. They expect to be involved actively in the ventures in which they invest, as informal consultants or board members. Consequently, they have tended to invest close to home, typically within a day's drive. They tend to exhibit a clear preference for technology-based ventures.

Angels find out about investment opportunities through friends and business associates, and often operate in 'loosely joined networks' in 'hot spots' such as California, Chicago and Boston (Hoffman 1972, Seymour and Wetzel 1981, Brophy 1982, Tymes and Krasner 1983, Shapero 1983). They invest patiently, for at least five to seven years, often longer, although exit provisions are commonly included in the initial investment agreement. Each year, they consider seriously and reject two or three investment opportunities, and accept, at most, one or two opportunities each year. They perceive significant risk differences between early stage and later stage investments, and these differences are reflected in their return expectations. Frequently, they express dissatisfaction about the poor channels of communication between investors and entrepreneurs. They often prefer not to invest alone, but rather with other individuals, and/or a respected lead investor (Baty 1964, Shapero 1983, Wetzel 1983a, Freear *et al.* 1990, 1993. For the UK, Mason and Harrison 1995a). The trend towards a form of syndicated investment has gathered momentum in recent years.

Angel taxonomy

In the literature of the informal venture capital there has developed in the last few years a taxonomy or classification of angels, sometimes resulting in unfortunate terminology. We have seen virgin angels, latent angels, wealth-maximizing angels, street-walking angels, entrepreneur angels, income- seeking angels, corporate angels, archangels, and corporate and institutional archangels (Seymour and Wetzel 1981, Aram 1987, Gaston and Bell 1988, Gaston 1989, Freear and Wetzel 1989, 1992, Postma and Sullivan 1990, Freear *et al.* 1990, 1992, 1994a, 1994b, 1997, Sullivan 1991, Kelly and Hay 1996. For the UK, see Harrison and Mason 1992, Stevenson and Coveney 1994, Mason and Harrison 1995b. For Sweden, see Landstrom 1993).

Perhaps fortunately, the spate of new terms, once in full flood, is drying up. The fact that researchers in the field have attempted a classification system for angels is a clear indication that the generalizations of the previous section, while useful, are also dangerous. Stereotyping must be avoided. The very use, or abuse, of such taxonomies may force us to place angels in particular boxes (or on particular clouds?). Such activities are the clearest indication yet that the research on the attitudes, behaviour and characteristics of angels has reached or exceeded its limits.

Yet, despite all the good work that has been done, we still do not know how the angel investing process really works over time, or whether or not it is the same for all industries or regions, let alone countries.

Future research questions

At least, compared with three decades ago, we have now some sense of what we do not know, and this is a significant advance. It is clear, for example, that more work is needed on longitudinal studies of angel and entrepreneurial venture behaviour. We must conduct studies of the degree of efficiency and effectiveness of the informal venture capital market, especially relating to problems of information flow, links to other market segments, information quality, formal and informal networks, and the latent angel problem. High quality research is taking place in several countries, as well as in the USA. We need to improve communication among researchers, to learn from one another methodologically, and to obtain new insights into the processes of angel investing in ways that often only comparative studies can provide. Further, we need to base our research more firmly on a solid theoretical and conceptual foundation.

Past studies have examined a variety of efforts to create more efficient angel capital markets. Neither individually nor collectively can these efforts be considered acceptable solutions to the obstacles encountered by promising entrepreneurs in their efforts to raise angel financing.

It is our firm belief that angel investors are a breed apart. We liken them to wild flowers. They are going to do their thing despite our most imaginative efforts to organize them into a traditional garden-variety *efficient* market. However, that belief does not lead us to the conclusion that we are powerless to create a more *effective* angel capital market. To stretch the wild flower analogy one step further, we are convinced that we can blow the pollen around more vigorously to the benefit of both angels and entrepreneurs. Data collected systematically over an extended period of time can provide the insights needed to tell us in which directions to blow and how hard. Public policy can play a catalytic role in creating more effective angel capital markets, but only if it is based on sound theoretical foundations and reliable data.

What kind of longitudinal data do we need? Future research must seek to answer at least ten sets of questions.

1. We find that angels typically invest in clusters. Find one angel and you have found half a dozen or more. We need to understand how these clusters form, by tracking new clusters as they come to light and by asking questions about the conditions that enhance or impede the creation of groups of active angels. Clusters of angels are organic bodies. Tracking groups of angels will reveal how, and how frequently, new players join the group and why existing players drop out. What determines which members of a 'cluster' participate in any given deal? How and why does the composition of the investing group change from deal to deal?
2. Is there a 'lead' angel in most deals? Does that role depend upon the background of one or more group members?
3. What role does the group play, beyond investing capital, in each deal in their portfolio? Does that role change according to key characteristics of the ventures they back?
4. How powerful is their appetite for deal flow? Do they actively seek new opportunities or is the process essentially passive? Does their appetite for deal flow change over time? If so, why? For example, how is their appetite for deal flow dependent on the conditions in the public equity markets?
5. Through what channels do promising deals come to the attention of a group of angels? Does the source of deal flow change over time?
6. In creating deal flow what is the relative significance of friends, business associates, gatekeepers (bankers, attorneys, accountants, professional venture capitalists), formal venture capital networks (e.g. Technology Capital Network at Massachusetts Institute of Technology), and venture capital forums?
7. Since business angels tend to invest close to home we need to know about regional differences in angel behaviour in the United States and other countries, and what factors determine changes on that behaviour over time. Conversely, we need to know what factors tend to diminish the significance of geography in the investment decision.
8. Since angels are known to be patient investors, are there factors that raise or lower their exit horizons? Is their holding period dependent upon capital gains taxes, for example?
9. Why are not more than 20% of qualified investors actually active investors? How do we convert latent angels into active angels? Is it a function of their felt level of confidence and competence in their ability to deal intelligently with the 'central mysteries' of venture investing - pricing, structuring and exiting the deal? Are latent angels interested in on-the-job training by co-investing with experienced angels? How do interested latent angels handle this issue? For example, how much interest do latent angels have in learning the craft through local workshops? There is a wealth of war story wisdom, how-to-do-it and how-not-to-do-it information available on the Internet. Would a single website containing an annotated set of links to these sources provide an effective solution to latent angels' need to learn the 'tricks of the trade'? Would such a source of quality information be of equal value to entrepreneurs seeking their first round of outside equity?
10. What are angels' 'return on investment' expectations and do they change as conditions in the capital markets change? What non-financial factors influence angels' investment decisions? What are the realized financial and non-financial returns on angel portfolios? How and why do they change over time?

Conclusion

Reliable answers to these questions and many more will provide the guidance required by public policy as it chooses when and how hard to blow around the wild flower pollen required to unlock the capital and the know-how of this country's millions of latent angels. Finding these answers will require systematic and imaginative study over an extended period of time. In venture capital jargon - the upside reward is well worth the risk.

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