MBA
Final Project

Influence of Venture Capital Funding on High-Tech Start-Ups in Grenoble Area

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1. ACKNOWLEDGMENTS

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Special thanks also go to my mother who retrieved so many articles from the University of Washington libraries. Unfortunately, the GGSB library proved woefully inadequate for this research, and it was easier and faster to get information from a library thousands of miles away than from the GGSB library. At the GGSB library, I was unable to gain access to many of the most common journals in the business-school literature, and to have articles transferred from another library in France required a written request from a member of the faculty and would have taken on the order of weeks to arrive! I was also obliged to go to the Ecole de Management at Lyon to gain access to the database DIANNE because this database is not available at the GGSB library. The inadequacies of the GGSB library are noted here in the hope that, by adding to the weight of opinion, it will contribute to convincing those in charge to commit more resources to the library.

Finally, I thank Murielle for putting up with the constraints on my time imposed by this project, and for helping me to write the various emails in French to give them a more polished tone. Also I want to thank Romie and Pacôme for being so cute and funny and joyful, and now that this project is finished I want to spend more time with them.

2. EXECUTIVE SUMMARY

This study looks at the results of young, growth-oriented high-technology companies in the Grenoble region and the influence of venture capital funding on the performance of these companies. It consists of two parts:

1. A study of the financial results of these companies to determine if any difference in performance can be found between those that received VC funding and those that did not, and to see if any eventual difference can be attributed to the method of financing, and
2. A survey of the directors of these companies to get their opinion on the added value offered by different financiers (banks, VCs, business angels, state agencies, private persons).

The financial data indicate that the companies financed by VCs posted superior financial results compared to those not funded by VCs.

I also found that the company directors gave VCs the highest marks among the various financiers (listed above) for their contribution to the development of the company. However, in spite of this VC financing was the least utilized source of financing.

Finally, I found that companies in the Grenoble region that were financed by VCs from Paris or Grenoble posted superior financial results than those companies in the same region that were financed by VC firms without offices in Paris or Grenoble.

3. INTRODUCTION

For entrepreneurs, the decision of how to finance their company is an extremely important decision with ramifications throughout every aspect of their enterprise. The entrepreneur may chose self-financing if he or she has the means or search for external funding. External sources of funding are multiple and include bank loans, government grants or loans, venture capital or business angel funding, corporate sponsorship, or strategic partnerships. Each form of funding has its corresponding advantages and drawbacks, and the entrepreneur must understand these and weigh them wisely before deciding which funding route to take. To reach a sound funding decision the entrepreneur needs detailed and accurate information regarding the different forms of added value that different funding sources may or may not provide. Indeed, as the seasoned entrepreneur Tim Kavanagh[a] stated in what he jokingly refers to as "Kavanagh's Law,"

> "It is far more important whose money you get than how much you get or how much you pay for it. "

The aim of this study is to provide a realistic picture of the added value brought by venture capitalists to the firms in the region of Grenoble, France, in which they invest. An effort is made to distinguish between perceived added value, which is based upon the impressions of the entrepreneurs, and objective added value, which is based upon the financial results of firms.

To better understand the factors an entrepreneur must consider when searching for funding, consider the following examples. Financing by angel investors is typically available in return for equity and most often only for the early stages of a company[1]. As a consequence, uncertainty hangs over the company regarding the financing of the later stages of development. In addition, angel investors may or may not become actively involved in the companies in which they invest. Small business government loans (often with a below-market interest rate) and grants also are typically used for the early stages of development, and the use of such loans or grants will leave the founders in control of their company. However, the effectiveness of these agencies to provide value-adding services to the money, such as networking, market knowledge, or recruitment services, is doubtful at best. The use of bank loans as a financing means also leaves the control structure of the company unmodified, but suffers from the same drawback mentioned above for government loans. Self-financing by the founders of course allows them to retain complete control over their company but obliges them to bear the full burden of the risk as well.

Venture capital (VC) is a financing mechanism whereby investors provide capital to a firm in return for a share of equity (in the USA it is typically a controlling share[2]). The VC industry provides capital for companies in their late as well as early stages of development, at a point where the risk involved is often too great to interest other financial institutions such as commercial banks, savings and loan institutions, or large investment houses.[3] Since venture capitalists (VCs) participate directly in the typically considerable business risk of the companies that they finance, they aim for high rates of return to compensate for this risk. Thus they concentrate their investing in young, growth-oriented private firms, most often in high-technology sectors. To invest wisely in these sectors demands significant knowledge of the business (technology, markets, competition, etc.), and for this reason most VCs typically invest in sectors in which they have significant experience.[4]

There are many ways in which a venture capitalist may contribute to the development of a company,[5] be it in the domain of finance, networking, managing, strategy, or other. In the financial domain, VCs may aid in securing additional funding for later stages of development, or in the financial management of the company, or again with the strategy of going public or of merging with another company. VCs also bring to bear their network of contacts, which may be put to use for such

[a] Tim Kavanaugh is the founder of NBI in Boulder, Colorado, USA.

things as identifying accountants and lawyers with the requisite specialization, or again for locating new funding sources. In the managerial domain, VCs often are called upon to assist in recruiting managerial talent, and the presence of VC funding frequently makes it easier to convince top talent to accept the risky proposition of leaving a stable position for a start-up company.[6] The list of roles VCs may play in the development of a company is long,[7,8] but the added value that they bring to a company in filling these roles is debated, with some studies even finding both positive and negative associations between VC involvement and venture performance.[9]

Although a significant body of literature is devoted to this debate, the majority of it deals with US companies and VCs. For France, fewer studies are available, and considering the cultural, regulatory, and institutional differences between France and the USA, it is not prudent to apply the results of American studies to the French situation. A small sampling of such differences illustrates this difficulty.[10,11] To begin with, as a percentage of gross domestic product (GDP), US VC investment is at about three times the level of French VC investment (1.07% versus 0.38% in 2000). In the US, a much higher proportion of VC funding goes to high-technology firms compared to the EU (80% versus 26% in 2002). On the other hand, networks between business people in the EU are generally considered stronger than those in the US since the need to be part of a network is considered of higher importance in the EU. Legal standards also differ between the US and the France, with legal protection of shareholders stronger in the US than in France, and the enforcement of laws, an extremely important consideration for investors, is reported to be higher in the US than in the EU. The general business attitude towards risk also differs between the US and the EU. In the US, an entrepreneur with a failed business venture to his or her name is considered to be experienced and hence to present less risk in terms of financing than a first-time entrepreneur. This is not the case in the EU.[b] Indeed, while the US ranks number one in availability of VC financing, France does not figure on the list compiled by the World Competitiveness Yearbook in 2004[12].

Hence the need exists to study the French situation specifically to see what added value, if any, VCs bring to companies in France. To address this issue the present study focuses on companies in the Grenoble region. This region of France boasts several internationally renowned scientific research centers in fields ranging from fundamental physics to information technology and has a long history of support for the development of new, high-technology enterprises. To encourage the creation of a high-technology cluster à la Silicon Valley, the French government recently chose Grenoble as a "Pole de Competitivité," resulting in more money becoming available for regional projects such as Minatec[c] that are designed to contribute to the creation of high-technology enterprises. Thus the economy of the region provides an excellent environment in which to study the influence of VC funding on French high-technology companies.

3.1 ORGANIZATION OF THESIS

Before discussing the results of the research conducted for this thesis, the specific question to be addressed is presented, and its pertinence is explained. Following this is a brief discussion of the role filled by venture capitalists in a modern economy, including a discussion of how they may or may not add value to the firms in which they invest. At this point the research methodology is presented and explained. The research consisted of two parts: first, a study of the financial data of high-technology companies in the Grenoble region and, second, a survey of the directors of the various companies included in this study to probe their experience pertaining to the financing of their

[b] In a personal communication a successful French entrepreneur who had spent over 10 years in the US describe how he had succeeded in the US in raising $1.5 million in VC funding after 3 months and had hired 8 people, but upon his return to France he had not been able to secure funding for a similar project after 3 years (and counting) of effort.

[c] Minatec is a newly created research center that will specialize in nanotechnologies and will also serve as an incubator to aid in the creation of new companies. See http://www.minatec.com.

companies. The methodology for conducting the survey of the company directors is included in this study. Following this, the results of the research are presented and discussed. The results of the study of the financial data are presented first, followed by the results of the survey, with the correlation between the two discussed last.

4. RESEARCH QUESTION

This study concentrates on providing a detailed answer to the following question:

In the Grenoble region, do venture capitalists bring an added value to the high-technology start-up companies in which they invest?

4.1 WHY THIS TOPIC IS IMPORTANT

A healthy and active VC industry is good for the economy, and this is especially true for mature economies. Because VCs fund fledgling enterprises, they create new jobs, often in industries that are based on new technologies that rely heavily on human capital (as opposed to physical capital). The jobs thus created typically provide a high level of added value and the industries typically are less polluting compared to traditional industries, leading to significant wealth creation for the economy with a minimum of negative externalities. A software engineer, for example, creates wealth at a rate ten times greater than a coal miner,[13] with far less direct pollution and healthcare costs.

That the entrepreneurial economy creates new jobs is borne out by the statistics. If the economy of the USA depended solely on Fortune 500 companies, it would currently be in a dire situation, because these companies have decreased employment by 4 million jobs between 1979 and 2004. The entrepreneurial economy, fortunately, created some 20 million jobs during the same period.[14] VC funding in the USA has played an important role in fostering innovation, in the development of industries, and in regional economic growth.[15] Intel, Microsoft, eBay, Amgen, Intel and many others are examples of companies that got their start with VC funding. Of course, not all ventures prove as successful as these, but a study of American firms reported that, historically, VC-backed firms have a lower rate of failure than non-VC-backed firms[16] and are more likely to become public companies.

In the EU the situation is similar. A survey in 2002 by the European Venture Capital Association[17] of companies funded by VCs claims that 95% of the 364 companies surveyed would either no longer exist or would have developed more slowly had it not been for VC funding, and 72% of these companies claim that they would never have come into existence without VC funding. The impact of this is clear when you consider that each company surveyed created an average of 46 new jobs.

With results like these and so much at stake it is clear that nurturing the VC industry constitutes wise public policy. Yet, as of 1999, despite the large flows of money into the VC market (primarily from institutional investors such as retirement funds or insurance companies), relatively few companies have tapped into this source of funding. In France, for example, only 8% of start-ups accessed venture capital funding in 1998.[18] This indicates that the market is not functioning properly, and a portion of the blame has been assigned to the information asymmetry between supply and demand, resulting in risk aversion on the supply side and resistance to VC funding on the demand side (the "vulture" capital syndrome). It is further reported that to redress the situation, it is most effective to concentrate public policy on the demand side; that is, to increase the information available regarding the VC industry to entrepreneurs.

It is hoped that this study will play a part in increasing the understanding of the VC industry among entrepreneurs, and thus contribute to the economic advancement of the Grenoble region.

5. WHAT IS A VENTURE CAPITALIST?

Venture Capitalists make equity investments in companies, often acquiring a significant or even controlling share of the company. As such, they are not passive investors. Typically they work alongside management to increase the probability of success of their investment. In the words of one VC, they are "entrepreneurs first, and financiers second."[19]

VCs may be grouped into two categories: corporate or independent. Corporate VC firms are subsidiaries of non-financial companies and typically look for investment opportunities that are congruent with the parent company's strategy or that would provide synergy or cost savings when combined with the parent company, or that would provide a window on technology for the parent company. Because they often seek investment for strategic reasons, corporate VCs are often less price sensitive than independent VCs, and typically have longer time horizons as well. Many companies have VC subsidiaries, including Intel, Schneider Electric, IBM, Microsoft, and a host of others. Independent VC firms are generally private partnerships or closely-held corporations, and will often specialize in a specific business sector, such as photonics, biotechnology, or information technology.

Whether corporate or independent, VCs generally search to finance new and rapidly growing companies through the purchase of equity securities.[20,21] High-technology companies represent the largest segment in which they invest since these companies most often present the high growth rate that VCs seek.

Since the risk involved with early-stage investing in a business is quite significant, VCs expect higher returns from their investments. Of course, the risk is mitigated by investing in a portfolio of companies for a single venture fund, and many VC firms manage several funds simultaneously. The funds managed by VCs may come from private or public pension funds, endowment funds, corporate funds, wealthy individuals, foreign investors, or the VCs themselves.

VCs carefully review investment opportunities before deciding whether or not to fund them. Only a small percentage of the projects that are proposed to them are funded and, of those, only a minority of those funded will actually post a positive return on the investment. Fewer still will make a large return on investment, but it is expected that the top-performing investments will compensate for the non-performers. In a typical portfolio, between 30% to 40% of the firms fail, either through bankruptcy or by going out of business. Of the remainder, approximately 30% to 50% provide a modest return. The remaining 10% to 20% of the companies provide an excellent return on investment, and it is these companies that pay for the rest and provide the 30% to 40% internal rate of return on investment for which VCs aim.[22] Historically, this strategy has allowed VCs in the US to outperform the Standard & Poors Index throughout the 1980s.[23] Since the largest returns on investment will come typically by going public or by being bought out, the VC's mindset is often oriented towards this goal. Indeed, the industries most attractive for VC funding are those that have a shorter time to an initial public offering (IPO), and VC-backed firms (in the US) are, on average, significantly younger when they go public compared to non-VC-backed firms.[24]

To reach this goal of going public or being bought out, VCs work actively with the companies in their portfolio by using the business knowledge gained from experience, often including the VC's own experience as an entrepreneur as well at that gained from working with other companies in similar situations. Since most VCs were entrepreneurs themselves prior to becoming VCs, they typically possess a deep level of technical and business knowledge in their chosen business sector. Thus VCs tend to specialize in particular business sectors so that they can exploit their knowledge and experience to better judge the investment projects presented to them to pick out those most likely to succeed. In addition, their knowledge and experience enables them to provide the most pertinent aid and advice to the management teams of their portfolio companies.

There are numerous manners in which VCs attempt to nurture the companies in which they invest.[d] These include (in no particular order)[25,26,27]

- serving on the board of directors,
- helping to obtain further alternative sources of equity financing,
- helping their portfolio firms attract alternative sources of debt financing,
- interfacing with investor groups,
- monitoring financial performance,
- monitoring operating performance,
- contributing to the recruitment process to build the management team,
- developing a compensation scheme (typically for upper management),
- providing contacts with clients, suppliers, or for professional services (i.e. lawyers, accountants, consultants, ...).

One study (in the US) found that, for an average portfolio company, VCs spent 10 hours per month coaching senior management, 6 hours per month recruiting management talent, and 6 hours per month securing additional financing. VCs in Europe have been found to concentrate more on the financial aspects of the business compared to their US counterparts.[28]

VCs will often demand a place on the board of directors as a condition for investment in a firm, since being on the board of directors allows them to play an integral part in the formulation and evaluation of the firm's strategy.[29] This practice is all the more common when VCs are dealing with entrepreneurs who, although unquestionably talented, often lack solid business experience. For example, the VC that invested in NBI took a place on its board of directors. The participation of the VC consisted of, among other things, weekly discussions with management where the VC would pose tough questions, a favorite of which was "What decision did you make last week that you were most uncomfortable with?" The founders of NBI credit their VC for getting their company to think long-term (i.e., strategically) from a very early point in their company's development.

The founders of NBI also credited their VC with establishing "a sense of clarity about what it takes to develop and perpetuate an entrepreneurial climate and commitment," which involved, among other things, establishing an incentive scheme that encouraged teamwork over individual success. This is another area in which VCs often contribute, and may involve setting up not only more traditional incentive schemes for management and employees, but things such as stock option plans as well. VCs may also work to establish the criteria by which managerial performance is evaluated,[30] which is also an integral part of an incentive scheme.

Another area of heavy involvement by VCs is in personnel recruitment (normally recruitment for top management positions). This aid may be in the form of providing contacts or through providing the reassurance needed to convince talented individuals to accept the risk of joining a risky venture. The proposition is often made more difficult since talented management people often have to be lured away from stable, comfortable positions to join the fledgling start-up. This was the case for Jim Barksdale who, in the late 1980s, was CEO of McCaw Cellular Communications, then AT&T Wireless Services. John Doer, a VC that had invested in Netscape, convinced Barksdale to join first the board of directors of Netscape, then become its CEO, all before Netscape was even one year old.[31]

[d] The real *value* of their aid is of course a subject of continued debate (witness this thesis).

6. HOW DO VENTURE CAPITALISTS ADD VALUE TO FIRMS IN WHICH THEY INVEST?

The principle product that VCs supply, namely money, is a commodity. Therefore, VCs that provide added value to the firms in which they invest can differentiate themselves and thereby increase their chances of attracting and wining the most lucrative and promising investment opportunities. This is because savvy entrepreneurs seek out VCs that can add value to their firm through the contacts and the industry experience that the VCs can bring.[32] However, as mentioned in the introduction, it is hard to quantify the added value offered by VCs, making it difficult to evaluate the real worth of this aid and its affect on the firms in which VCs invest.

This issue of what added value VCs bring with them was recognized early in the development of the VC industry. In 1972, for example, the VC firm Kleiner, Perkins, Caufield, and Byers (KPCB) stated[33]

> [We] began offering entrepreneurs a broader philosophy of value-added investing: not merely access to capital, but access to people. A partnership with experienced industry leaders who recognize, challenge, and even improve on a brilliant idea. We believe that we must earn the right to advise entrepreneurs on a daily basis, by intellectually committing to deliver the best ideas of which we are capable. We are here to build on your vision. Strengthen strategic thinking. Tap the industry network. Access talent. Pull strings. Sew up financing. And stick with you through every challenge along the way.

Indeed, in this excerpt already is present many of the types of nurturing roles that we touched on in the previous section. It also displays the two main categories of added value that VCs may bring: that based on social capital and that based on knowledge (or experience).

6.1 ADDED VALUE BASED ON SOCIAL CAPITAL

In his article "The Forms of Capital"[34] Pierre Bourdieu defines social capital as

> the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.

In simpler terms, one can think of social capital as the advantages that one can extract from one's network of contacts. Inkpen further refined the concept by identifying three dimensions of social capital[35]:

1. Structural;
2. Cognitive;
3. Relational.

The structural dimension involves the pattern of relationships among actors in the network. This may involve, for example, the type of network, which may be it an intracorporate network where relationships are stable and hierarchical, or of the industrial district type, where relationships are dynamic, with new members constantly joining and leaving the network, and where relationships are nonhierarchical in nature. The cognitive dimension involves resources that are shared between members in the network and which contain a shared meaning among the members. This may involve such things as shared goals or culture, with again the intracorporate network, where goals and culture

are shared among the members of the network, representing one extreme of the spectrum, and industrial districts, where the opposite is true, representing the other extreme. Finally, the relational dimension is concerned with roles played by the various members of the network, and the outcomes of the interactions between members in terms of the trust that is established or of the common norms or perspectives that are set.

The social capital brought to bear by VCs is built from their network of contacts in their business sector, and may include not only people in their chosen industry, but professionals such as lawyers, accountants, or financiers who have themselves extensive experience working with the industry, as well as clients of the industry and suppliers to the industry. As such, the social capital is structurally quite diverse, spanning multiple corporations and professions. The entrepreneur typically is specialized in a single domain and may have contacts within this domain with which he has a high level of cognitive and relational affinity, but outside of this domain the cognitive and relational aspect of his social capital, if he has any, is typically quite meager. The VC in principle brings a higher degree of social capital—one that is quite diverse structurally yet retains a high degree of cognitive and relational value, allowing him to span boundaries between the different worlds.[36] The schematic below summarizes the situation.

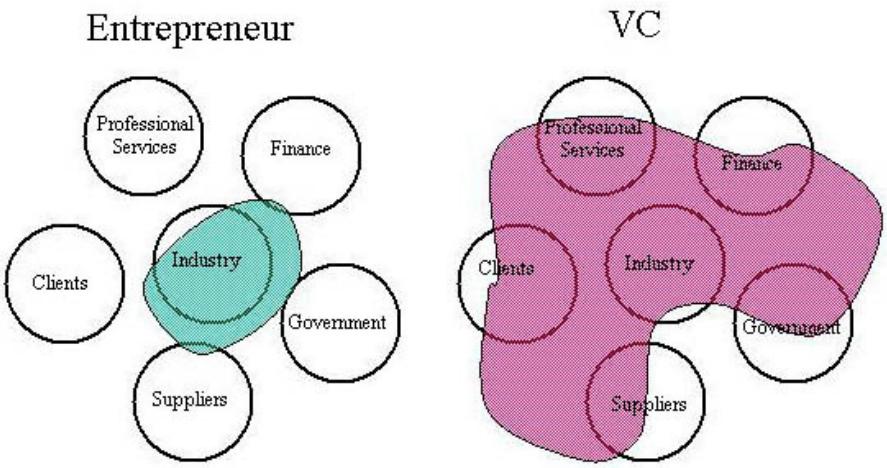

FIGURE 1: SCHEMATIC INDICATING TYPICAL STRUCTURAL EXTENT OF SOCIAL NETWORKS, (BUSINESS AND PERSONAL, REPRESENTED BY THE SHADED REGIONS) OF ENTREPRENEUR AND VC THAT MAKES UP SOCIAL CAPITAL OF EACH.

The power of social capital is hard to underestimate. It brings, for example, privileged access to knowledge, influence over others, and preferential treatment in many situations.[37] Some go so far as to claim that[38]

> a network of contacts, and the ability to broker these relationships are the main traits of a successful venture capitalist.

The contacts that a VC can bring to bear on a business issue give him a perspective that most entrepreneurs cannot match. This network of relationships can prove extremely useful in a variety of situations, including, notably, recruitment, where the numerous contacts can provide leads, reliable intelligence, or verification of information; all of which is invaluable in the art of recruiting top management talent. Other advantages come in the area of securing clients, often an extremely difficult proposition for new companies, especially those that are proposing a new technology. For example, the VC may already know who are the key lead users,[39] or flagship customers, in a market, or again how to cross the chasm that typically separates the early new-technology market from the high volume market by their knowledge of who the pragmatists are that they can use to establish a

beachhead in the high-volume market.[40] Social capital also proves vitally important in locating and negotiating with suppliers and dealers, an area where having high quality intelligence gives one a powerful advantage. At NBI, for example, the VC is credited with playing a key role in all these areas: securing suppliers and dealers and, most importantly, customers.[41] The value of social capital can also be seen in this description in the Financial Times of Silver Lake, a top-tier American VC firm:

> ... undoubtedly in technology they are plugged in. They know the suppliers to telecom groups, they have cultivated a lot of very senior relationships in industry, which gives them great access.

The article continues by stating that Silver Lake "has cultivated an enviable network of industry contacts over many years."[42]

Another, often overlooked, aspect of social capital is its value in preserving one's competitive advantage in an increasingly globalize market. With a thorough knowledge of the local business climate, including such things as the motivations that drive key actors, the relationships between influential people, or the local politics, local players can have a substantial advantage over distant rivals.[43] Hence social capital does not travel well, and many VCs, including Schneider Electric Ventures,[44] recognize this and have a policy of taking local partners when making non-local investments. Some VCs go so far as to have a policy to not invest in any company that is headquartered more than two hours away by car from their office.[45]

Geographical proximity also has an effect on the amount of influence a VC may have over a company. One study shows that VC firms with offices within an easy drive of a company are twice as likely to be board members than those that are required to take a plane to attend board meetings (this study was conducted on US companies, so in France one may substitute "train ride" for "drive").[46] Interactions with local authorities and institutions create a feedback mechanism as well, leading to a synergy where the whole is worth more than the sum of the parts.[47] This effect is also seen in some studies to contribute to VC added value, and is another argument in favor of geographic proximity between VCs and their portfolio companies.

However, as for all things, social capital comes with a cost. Of course, developing the network of contacts takes time, and the costs to maintain such a network can be significant. Furthermore, being overly embedded within a network may actually restrict the inflow of information from new sources,[e] making one prone to miss new possibilities. Consider Mr. Gates who initially did not appreciate the power of the internet, or the Swiss watch industry who failed to see the threat posed by the new quartz technology until their entire industry lay in ruins.

But even with this caveat taken into account, the value of social capital is impossible to deny and is demonstrated again and again by entrepreneurs who seek out the VCs who have significant contacts in their given industry.[48] Consider how the social capital of John Doerr, a VC that invested in Netscape, was put to use to aid the development of that company. As mentioned above, he was able to convince Jim Barksdale, then CEO of AT&T wireless, to leave that company and join Netscape before Netscape was one year old. This would not have been possible had not Doerr counted Barksdale in his network of contacts. Another example of the value assigned to social capital is to be found in Grenoble, where one motivation for creating the ZIRST[f] was to create a zone in which people could more easily build up a network of contacts among professors, entrepreneurs, industrialists, and professionals, since all would be working within a few minutes drive of each other. These networks are credited with playing an important role in winning research contracts for companies in the ZIRST.[49]

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[e] This is often referred to as "group think."

[f] ZIRST stands for Zone pour l'Innovation et les Réalisations Scientifiques et Techniques. This is a bit of a mouthful, so the name of the industrial zone was recently changed to "Inovallée."

Hence social capital provides one arm with which VCs may distinguish themselves from their colleagues. As such, it can give be used in the battle to attract the most promising investment projects and to make them succeed.

6.2 ADDED VALUE BASED ON EXPERIENCE

That a VC must have an in-depth knowledge of the business sector in which they invest is hardly a controversial statement. Since they participate directly in the business risk by acquiring equity shares in the companies that they finance, investing in sectors in which a VC does not have significant knowledge, in both the technical and business sense, would be foolhardy, to say the least. This is why VCs restrict their investments to projects for which they have a very deep understanding, from both a technical and a business standpoint.[50] Possessing such an understanding of a business sector can be critical to a firm's success, and as such it comprises a significant added value that VCs can offer to attract the best investment projects. Such knowledge can be useful in a variety of ways, from setting short- and long-term strategy, to recruitment, to choosing suppliers or technology.

In the development of strategy, VCs will often play an important role. The contribution made by the VC can start as early as the development of a credible business plan, since knowledge of an industry is crucial to ensure that the business plan is realistic. Also, since VCs look for investment projects that offer a high rate of return, it is necessary that the firm in which they are investing be addressing a big market. But big markets necessarily attract competition, and this can quickly make profits dry up. Hence start-up companies can benefit greatly from the experience of a seasoned VC that can keep them on a timely track and coach them not only through the difficult start-up period, but beyond, hopefully (from the point of view of the VC) to the buyout or IPO stage. Thus the VCs knowledge is self-serving in the end, since they leverage it to ensure, to the maximum degree possible, a proper return on their investment.

There exist numerous studies on the topic that support the claim that VC-backed companies progress faster than companies financed through different means. For example, NBI credits its VC for getting it to think long-term, or strategically, from an early point in the venture, a decision they believe allowed them to survive in the fast-moving IT marketplace.[51] Hellmann and Puri report in a study of 170 companies in Silicon Valley that companies that were financed by VCs brought their product(s) to the market faster than companies who were not VC funded.[52] Another study shows that companies that are backed by venture capital go public sooner than companies financed otherwise, and that VC-backed companies are more highly valued during their IPO,[53] and this was in almost every industry studied. In fact, it is found that VC-financed companies also benefit from lower direct and indirect issuance costs at IPO, increased upward price adjustments, and shorter lockup periods[54]. This indicates that VCs play a role in certifying for the marketplace that the company is a good value. That they can play this role is a direct consequence of the knowledge and experience they have in the business sector in question, and is part of the added value that they can offer companies looking for VC backing.

Experience and knowledge of an industry is vital as well to survive difficult economic periods. Gorman and Sahlman report that VC firms with the most experienced partners perform the best when the economy is in a downturn,[55] and that these firms continually outperform the others even when the economy is doing well. In these cases, and, to a lesser extent, in general, VCs with operating experience in the business sector in which they are investing (as opposed to VCs whose expertise is restricted to financial management), or who were entrepreneurs themselves, wield more influence over the companies in which they invest,[56] a fact that may be due to the trust that they engender with the management team. Overall, VC experience in, or knowledge of, an industry is positively and uniformly related to the value added, and the correlation is significant in both the US and in the EU.[57]

Interestingly, however, this form of value added losses some of its appeal as a firm matures.[58] A likely explanation for this phenomenon is that, while entrepreneurs are certainly very talented in their chosen fields, they often do not possess the business acumen and experience needed to make a company successful. Therefore, an experienced VC is especially desirable at this stage, and it is at this stage that they typically yield the most influence[59]. For later stage ventures, one study found that advice from the most experienced VCs was not rated higher than less experienced VCs, indicating that the advice received from their VCs did not earn particularly high marks for these companies. This aspect is seen as well in the amount of time VCs typically spend working with firms in their portfolio. The difference can be remarkable, with one study reporting that VCs spend an order of magnitude more time working with the management of early-stage ventures compared to late stage ventures,[60] although this statement must be tempered with the caveat that face-to-face interaction is more strongly correlated with added value than total hours worked.[61]

7. RESEARCH METHODOLOGY

To address the research question posed in §4, a number of companies in Grenoble region were selected based on criteria that are explained below in § 7.1. To the extent possible, the financial results of these companies over the last ten years were obtained from various public databases to analyze their financial positions. In addition, the heads of the companies were surveyed regarding their experiences with VCs, as well as with other financing professionals, to analyze the role played by the financiers in the development of the company. The financial results are compared to the survey results to develop an understanding of the added value brought by VCs to these companies.

7.1 SELECTION OF COMPANIES TO INCLUDE IN THE STUDY

7.1.1 Business sector

The business sectors included in this study, along with their APE[g] codes, are given in Table 1, which also shows how many companies in the Grenoble region were created in each sector over the period from 1994 through 2005 (third column from left). The data were kindly provided by the Chambre de Commerce et de l'Industrie (CCI) of Grenoble[h] from the database that they maintain on some 24,000 companies of the region. In all, 1,441 companies were identified at this stage.

The activity of each of the 1,441 companies in this set was reviewed, either through a visit to their web site, or through telephone contact, or both. For companies that were no longer in existence, an effort was made to find a trace of their activity through such things as a web search or through direct contact with the director(s). Of the 1,441 companies identified, 40% (574) were listed as inactive in the database of the CCI, sometimes for technical reasons such as a change of legal status or name, but most often because the company had ceased operations. An effort was made to include these companies in the study because their exclusion would prejudice the results of the study since the results would not reflect a random sample of companies, but only those companies that achieved a minimum of success. This being said, however, it proved extremely difficult to include such companies in the study, as discovering their activity constituted a time-consuming and most often fruitless process.

[g] The APE code indicates the "activité principale exercée," or the principle activity, of a company.

[h] The author gratefully acknowledges the aid of Cécile Bauchiero and Isabelle Roda of the CCI in providing the data.

TABLE 1: BUSINESS SECTORS AND CORRESPONDING APE CODES INCLUDED IN THIS STUDY. IT ALSO SHOWS THE NUMBER OF COMPANIES FOUND IN EACH SECTOR (COLUMN 3), AND OF THOSE THE NUMBER OF COMPANIES RETAINED (COLUMN 4), AND OF THOSE THE NUMBER OF COMPANIES FOR WHICH FINANCIAL DATA WERE AVAILABLE (COLUMN 5).

Column 1	Column 2	Column 3	Column 4	Column 5
Business Sector	**Code APE**	**Total Number of Companies**	**Number of Companies Retained**	**Number of Companies with Financial Data**
fabrication of stoves and burners	292A	1	1	1
fabrication of office machines	300A	2	0	0
fabrication of computer and peripherals	300C	13	1	1
fabrication of active electronic components	321C	23	9	7
fabrication of medical and surgical equipment	331B	1	1	1
fabrication of scientific and technical instruments	332B	42	4	4
fabrication of process control equipment	333Z	1	1	1
fabrication of optical and photographic equipment	334B	10	1	1
non-audiovisual telecommunications	642C	1	1	1
computer systems consulting	721Z	301	19	12
professional software	722A	160	39	29
other activities related to software	722C	265	57	37
data treatment	723Z	50	3	2
database treatment	724Z	57	8	6
other activities related to computer systems	726Z	3	0	0
R&D in physical and natural sciences	731Z	26	12	5
management consulting	741G	1	1	1
engineering	742C	483	18	13
analysis, tests, and technical inspections	743B	1	1	1
		1,441	**176**	**123**

A company was retained (column 4) for use in this study if its business activity involved photonics, electronic hardware, biotechnology, integrated circuits, software development, information-technology services, or web hosting. The category termed "electronic hardware" refers to manufacturers of electronics that are not integrated circuits (i.e. electronics that are typically manufactured on printed circuit boards using multiple electronic components). The category "other" includes such things as manufacturers of clean rooms and associated equipment, intelligent video surveillance, advanced temperature control systems, wafer etching and deposition equipment, and scientific instrumentation. The software development category includes end user applications,

professional software ("progiciels" in French), and embedded systems software. The number and percent of companies in each category is given in Table 2.

TABLE 2: BUSINESS SECTORS USED IN THIS STUDY, ALONG WITH THE NUMBER OF COMPANIES IN EACH SECTOR, AND OF THESE THE NUMBER OF COMPANIES FOR WHOM FINANCIAL DATA WERE AVAILABLE.

Business Sector	Number of Companies Retained	Percent of Total	Number of Companies with Financial Data	Percent of Total
Biotech	13	7%	6	6%
Electronic Hardware	5	3%	3	2%
Software Development	88	47%	61	50%
IT services	22	12%	15	12%
Integrated Circuits	19	11%	14	11%
Other	10	9%	8	7%
Photonics	7	4%	6	5%
Web hosts	12	7%	10	8%
	176	**100%**	**123**	**100%**

For example, many of the companies in the category 742C (engineering) were excluded from this study because they worked in the construction domain, or were specialized consulting firms in matters of civil engineering. In another example, many companies in the category 721Z (computer systems consulting) were involved in computer retail or repair, and so did not qualify for inclusion in the study. This reduced the number of companies included by 88%, leaving 177 companies. Of these, 18 (10%) were listed as inactive in the database of the CCI. Finally, of these 177 companies, financial data were available for only 123 (70%), with 8 of the 123 (7%) being listed as inactive. Table 3 gives the percent of companies that were inactive in each business category, and for each step in the selection process.

TABLE 3: FRACTION OF COMPANIES THAT WERE INACTIVE FOR EACH BUSINESS CATEGORY AND FOR EACH STEP IN THE SELECTION PROCESS.

Code APE	Total No. Companies	No. Inactive Companies	Percent Inactive	No. Companies Retained	No. Inactive Companies	Percent Inactive	No. Companies with Financial Data	No. Inactive Companies	Percent Inactive
292A	1	0	0%	1	0	0%	1	0	0%
300A	2	1	50%	0	0	0%	0	0	0%
300C	13	3	23%	1	0	0%	1	0	0%
321C	23	11	48%	9	3	33%	7	2	29%
331B	1	0	0%	1	0	0%	1	0	0%
332B	42	20	48%	4	1	25%	4	1	25%
333Z	1	0	0%	1	0	0%	1	0	0%
334B	10	1	10%	1	0	0%	1	0	0%
642C	1	0	0%	1	0	0%	1	0	0%
721Z	301	111	37%	19	2	11%	12	0	0%
722A	160	99	62%	38	5	13%	29	2	7%
722C	265	84	32%	57	4	7%	37	2	5%
723Z	50	32	64%	3	0	0%	2	0	0%
724Z	57	37	65%	8	1	13%	6	0	0%
726Z	3	2	67%	0	0	0%	0	0	0%
731Z	26	7	27%	12	0	0%	5	0	0%
741G	1	0	0%	1	0	0%	1	0	0%
742C	483	166	34%	18	2	11%	13	1	8%
743B	1	0	0%	1	0	0%	1	0	0%
	1,441	**574**	**40%**	**176**	**18**	**10%**	**123**	**8**	**7%**

The fact that only 7% of the companies with financial data were listed as inactive in Table 3, whereas 40% were so listed for the initial selection of companies, is a weakness in this study. It can be argued that any results arrived at by using the financial data are biased since they are based on a sampling of companies with a higher than average rate of success. This point will be addressed below in § 9.

7.1.2 Date of company formation

The first criteria for including a company in this study was its date of formation. The companies included were all formed between January 1st, 1994 and December 31st, 2005. Several factors influenced the choice of these dates. First, using public data bases it becomes increasingly difficult to find financial data that is over one decade old. Even if one manages to locate the data, the reporting periods are often longer than the standard quarterly reporting period one finds for more recent data, making comparisons more difficult. Second, since this study is focused on high-technology companies, it is difficult to compare the experience of companies that predate the "New Economy,"

which started around 1990, with those that were created after its establishment. In any case, using data from the only the most recent decade provided a sufficient number of companies with which to work.

The temporal distribution of company founding's is shown in Figure 2, which also shows the founding rate for companies that eventually got VC financing, and those that did not.

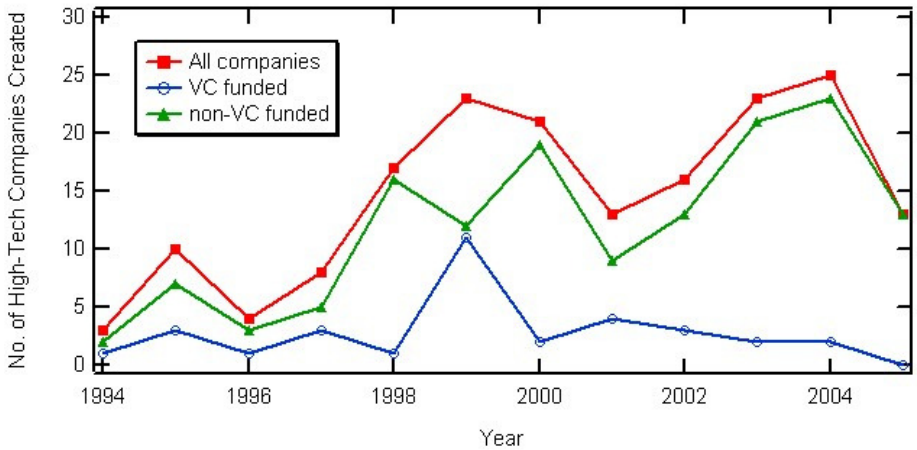

FIGURE 2: TOTAL NUMBER OF HIGH-TECHNOLOGY COMPANIES FOUNDED FOR THE YEARS FROM 1994 TO 2005 IN GREATER GRENOBLE REGION. ALSO SHOWN ARE THE TOTALS FOR COMPANIES THAT EVENTUALLY GOT VC FINANCING, AND THOSE THAT DID NOT.

7.1.3 Geographic criteria

The companies included in this study all originated in the Grenoble area, although some have since expanded to national, and even international, level. The distribution of companies by community is given below in Table 4.

TABLE 4: GEOGRAPHIC DISTRIBUTION OF COMPANIES INCLUDED IN THIS STUDY.

City	Number of Companies
Allevard	1
Bernin	3
Biviers	1
Chapareillan	1
Corenc	1
Crolles	7
Domene	1
Echirolles	3
Entre Deux Guiers	1
Eybens	4
Fontaine	1
Grenoble	56
La Pierre	1
La Tronche	1
Le Versoud	1
Meylan	32

Moirans	4
Monbonont St. Martin	9
Pommiers la Placette	1
Renage	1
St. Cassien	1
St. Egreve	3
St. Etienne de St. Geoirs	3
St. Hillaire du Rosier	1
St. Ismier	2
St. Jean de Vaulx	1
St. Laurent du Pont	1
St. Marcellin	1
St. Martin d'Heres	9
St. Martin le Vinoux	5
St. Vincent de Mercuze	1
Sassenage	3
Seyssinet Pariset	3
Sessins	2
Veurey Voroize	3
Villard de Lens	1
Voiron	5
Voreppe	1
Total Number of Companies	**176**

For those who are not familiar with the Grenoble area, a map showing the locations of the companies is shown in Figure 3. The map shows the distribution of companies retained in the study, as opposed to just the companies for which financial data was available, because it was from this selection of companies that the survey of directors was done (this survey will be discussed below in § 7.5).

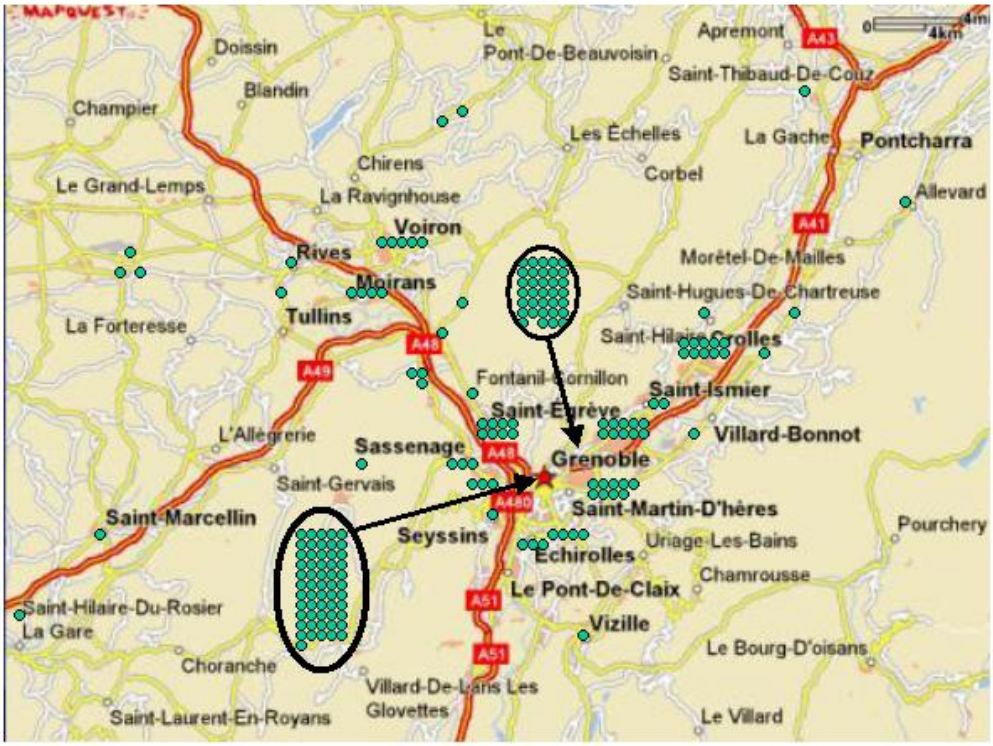

FIGURE 3: MAP OF GRENOBLE AREA SHOWING THE LOCATION OF COMPANIES THAT WERE INCLUDED IN THIS STUDY (SOLID CIRCLES). THE LARGEST CONCENTRATION OF COMPANIES OCCURS IN GRENOBLE AND IN MEYLAN, WHICH IS A SUBURB OF GRENOBLE. THE SCALE OF THE MAP IS SHOWN IN THE UPPER RIGHT CORNER.

Two communities, Grenoble and Meylan, contain over 50% of the companies. The remainder of the companies are, for the most part, concentrated very close to Grenoble (within a 20 minute drive). There are seven companies that are approximately one hour away from Grenoble by car.

The geographic concentration of the companies around Grenoble is significant in that it implies that all the companies could potentially benefit from the same regional sources of aid or financing, that the management of the companies had essentially equal access to professional and personal networking possibilities, and that the macro-economic climate for each company was similar.

7.2 ACQUISITION OF FINANCIAL AND OWNERSHIP DATA

To acquire financial data for the green companies, the following databases were exploited:

1. Kompass.com
2. Guide ECO
3. Societe.com
4. Diane

Kompass was found to be inaccurate more often than not and so was not used. The Guide ECO contains data for companies with a turnover greater than one million euros, and so did not contain many of the small companies studied here. It was therefore little used as well. Societe.com proved

useful for finding the social capital and the location of a number of companies, although not all. Finally, Diane proved a gold mine and provided essentially all of the financial data even though, as noted above in §7.1.1, many of the green companies simply do not appear in this database.

The database Diane renders data in the form of rich text files, with one file for each company. To enter these into an Excel file manually for analysis would have been a time-consuming and error-prone process (there were 123 files to inspect). I therefore coded a short Java program to parse each file automatically to harvest the data needed into a comma-separated file that could then be loaded into Excel for analysis. Several individual rich text files chosen at random were inspected manually to verify the integrity of the program. This approach had the additional advantage that it was scalable, so if new data needed to be included in the study, it was a simple matter to do so.

In addition to the financial data, the Diane database provides the ownership hierarchy of each company. This aspect of Diane allows one to determine which companies were financed by VCs, and to what extent. Since Diane renders the hierarchy as a .jpg image, the harvesting of this data was done manually. Of the 123 blue companies, 27% (33) were identified as having VC funding, with the average equity share held in 31 of these 33 companies[i] by the VCs being 31 ± 26 %. The distribution in companies with a given equity share being held by VCs is shown in Figure 4.

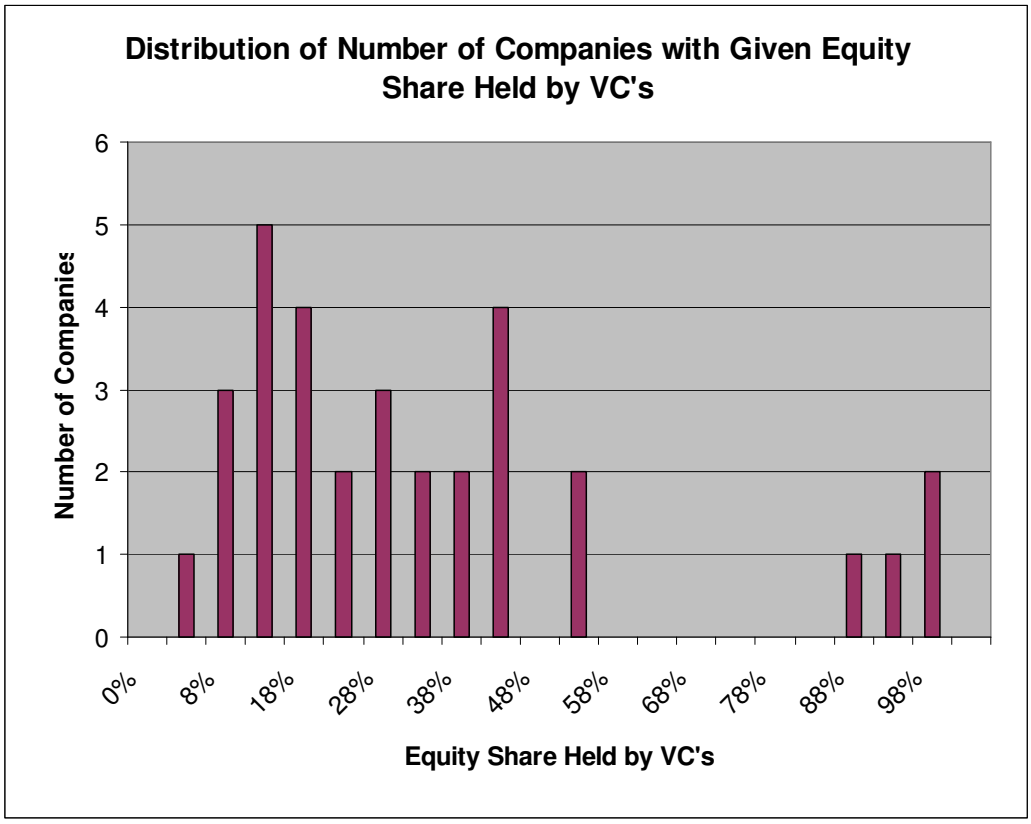

FIGURE 4: DISTRIBUTION OF COMPANIES ACCORDING TO EQUITY SHARE HELD BY VCS.

[i] Two companies were found to have used VC financing, but the amount of equity held by the VCs was not indicated.

For the majority of the companies with VC financing, the percent equity held by VCs is less than 50%. If we neglect the three companies with a VC equity share over 80%, the average VC equity share reduces from 31 ± 26 % to 24 ± 15%.

The distribution of companies that had VC participation in the equity is given in Table 5. Of the 19 APE categories, 8 categories do not contain any companies with VC participation. For the remaining 11 categories, the distribution is fairly even.

TABLE 5: THE NUMBER OF COMPANIES FOR WHOM INFORMATION ABOUT THE OWNERSHIP HIERARCHY WAS AVAILABLE. THE NUMBER OF COMPANIES WITH NO VC PARTICIPATION IN THE EQUITY IS SIMPLY THE DIFFERENCE BETWEEN COLUMNS 2 AND 3.

Code APE	Number of Companies with Financial Data	Number of Companies with VC Equity Participation	Percent
292A	1	0	0%
300A	0	0	0%
300C	1	0	0%
321C	7	5	71%
331B	1	1	100%
332B	4	2	50%
333Z	1	1	100%
334B	1	1	100%
642C	1	1	100%
721Z	12	2	17%
722A	29	8	28%
722C	37	4	11%
723Z	2	2	100%
724Z	6	0	0%
726Z	0	0	0%
731Z	5	3	60%
741G	1	0	0%
742C	13	2	15%
743B	1	1	100%
	123	**33**	**27%**

The distribution of the companies with ownership data in the business sector space is given in Table 6. The IT sector dominates, with 15 companies with ownership data, followed by the micro-electronics sector with seven companies. The biotech, IT services, other, photonics, and web host sectors are minimally represented with one or several companies each, and the electronic hardware sector is not represented at all. This distribution will be taken into account in the analysis of the data.

TABLE 6: DISTRIBUTION OF THE COMPANIES WITH OWNERSHIP DATA IN THE BUSINESS SECTOR SPACE. THE NUMBER OF COMPANIES WITH NO VC PARTICIPATION IN THE EQUITY IS SIMPLY THE DIFFERENCE BETWEEN COLUMNS 2 AND 3.

Business Sector	Number of Companies with Financial Data	Number of Companies with VC Participation	Percent
biotech	5	3	60%
electronic hardware	3	0	0%
IT	58	15	26%

IT services	15	1	7%
micro-electronics	14	7	50%
other	12	2	17%
photonics	6	3	50%
web hosts	10	2	20%
	123	**33**	**27%**

7.3 SURVEY OF COMPANY DIRECTORS

The director of each of the 176 green companies were contacted to uncover their experiences regarding the financing choices made by their company. The survey was done online, with the invitations to participate emailed to the directors. The goal of the survey was to shed light on the roles played by the different financial players in the development of the company being financed, and in particular to find what added value, if any, was attributed to the different financial sectors.

Those being surveyed were assured in the invitation letter that the results would be completely anonymous, would only be used for statistical and other analysis, and in no way would the names of their companies figure in the results of this study. The text of the invitation, which was written in French, is given in the appendix. Of the 176 directors contacted, 51 responses were garnered, but one director neglected to indicate his or her company name. For the 50 respondents that did identify their company, their distribution among the companies retained for this study is given in Table 7.

TABLE 7: DISTRIBUTION OF RESPONDENTS TO THE SURVEY AMONG THE COMPANIES RETAINED FOR THIS STUDY..

Code APE	Number of Companies Retained	Number of Companies that Responded to Survey	Percent
292A	1	0	0%
300A	0	0	0%
300C	1	0	0%
321C	9	1	11%
331B	1	0	0%
332B	4	1	25%
333Z	1	0	0%
334B	1	1	100%
642C	1	1	100%
721Z	19	4	21%
722A	38	10	26%
722C	57	20	35%
723Z	3	1	33%
724Z	8	2	25%
726Z	0	0	0%

Code APE	Number of Companies Retained	Number of Companies that Responded to Survey	Percent
741G	1	1	100%
742C	18	3	17%
743B	1	1	100%
	176	**50**	**28%**

The most highly represented category in the survey is 722C, which is "other activities related to software," and accounts for 40% of the respondents. The next highest category is 722A, which is "professional software," with 20% of the respondents. For the remaining categories, the directors that responded are fairly evenly spread.

The distribution within the business sector space is shown in Table 8. Two sectors (micro-electronics and other) have no respondents, and two sectors (biotech and web hosts) have a response rate of 80%. In sheer numbers, the IT sector dominates, accounting for 54% of the total responses.

TABLE 8: DISTRIBUTION OF COMPANIES RESPONDING TO THE SURVEY IN THE BUSINESS SECTOR SPACE.

Business Sector	Number of Companies with Financial Data	Number of Companies that Responded to Survey	Percent
biotech	5	4	80%
electronic hardware	3	2	67%
IT	58	27	47%
IT services	15	6	40%
micro-electronics	14	0	0%
other	12	0	0%
photonics	6	3	50%
web hosts	10	8	80%
	123	**50**	**41%**

To respond to the survey, the recipients of the invitation letter had only to click on a hyperlink in the invitation email that took them to the survey web site. The title of the survey (translated from French) was "Confidential survey on the financing of young high-technology companies in the Grenoble region," and figured on each web page of the survey (each web page contained one question of the survey). A progress indicator also appeared on each web page, displaying the percent of the survey completed to that point. The survey questions, translated into English, are given below, along with screenshots of the relevant web page.

7.3.1 Survey questions

1. Please indicate the name of your company. This will allow us to study the relationship between our responses and the financial results of your company. Your responses will remain confidential and will in now way figure in any publication or communication.

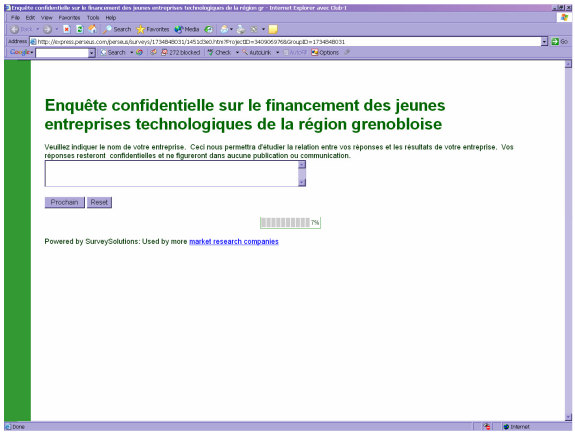

FIGURE 5: SCREEN SHOT OF WEB PAGE FOR FIRST QUESTION OF ONLINE SURVEY OF COMPANY DIRECTORS.

2. Please indicate the year that your company was founded.

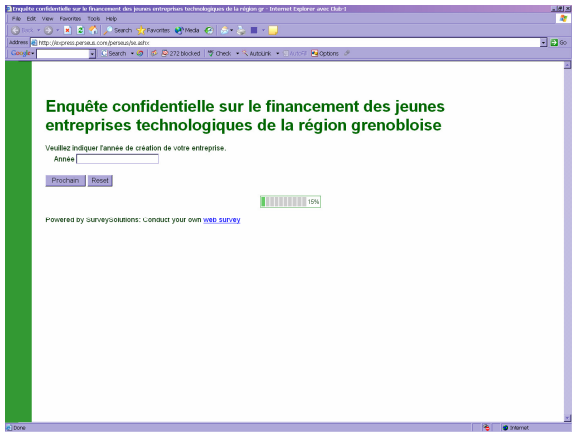

FIGURE 6: SCREEN SHOT OF WEB PAGE FOR SECOND QUESTION OF ONLINE SURVEY OF COMPANY DIRECTORS.

3. Please indicate if your company benefited from an start-up incubator.

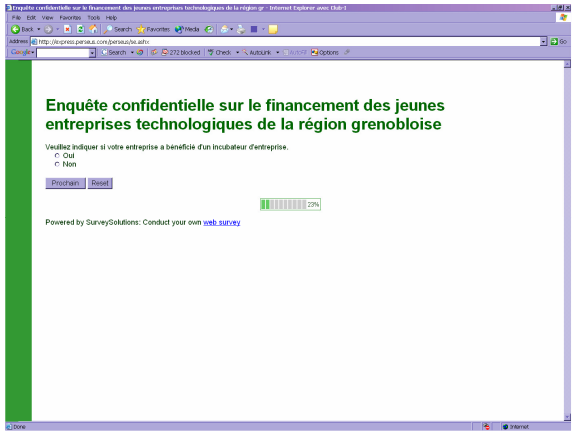

FIGURE 7: SCREEN SHOT OF WEB PAGE FOR THIRD QUESTION OF ONLINE SURVEY OF COMPANY DIRECTORS.

4. (If the previous answer is affirmative) Please indicate the name of the start-up incubator that your company used.

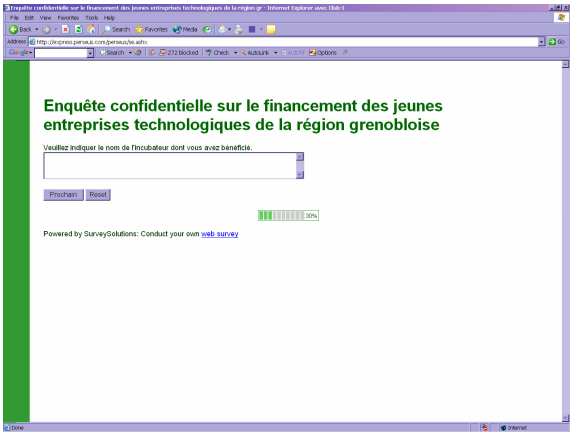

FIGURE 8: SCREEN SHOT OF WEB PAGE FOR FOURTH QUESTION OF ONLINE SURVEY OF COMPANY DIRECTORS.

5. If your company no longer exists, please indicate the reason.

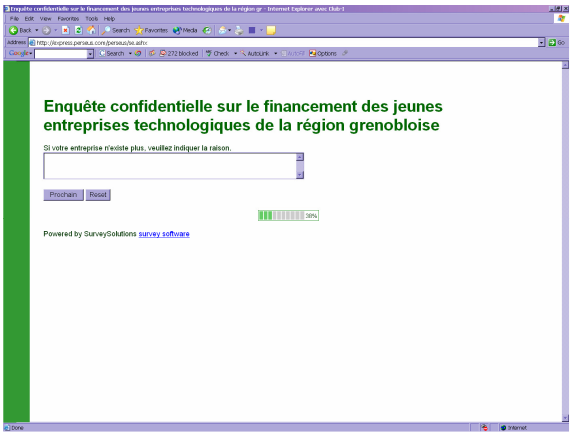

FIGURE 9: SCREEN SHOT OF WEB PAGE FOR FIFTH QUESTION OF ONLINE SURVEY OF COMPANY DIRECTORS.

6. For each year please indicate the financing received by your company (ignore the years preceding your company's founding).

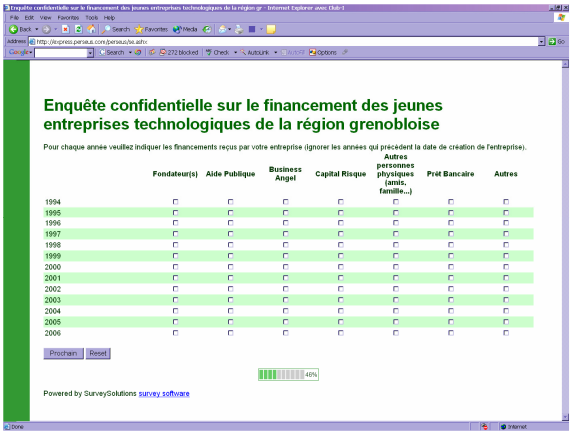

FIGURE 10: SCREEN SHOT OF WEB PAGE FOR SIXTH QUESTION OF ONLINE SURVEY OF COMPANY DIRECTORS.

For this question, 7 categories of financing were available to chose from. These were:

1. Founders;
2. Public support;
3. Business angle;
4. Venture capital;
5. Other individuals (family, friends...);
6. Bank loan;
7. Other.

The response for each year needed not be unique – the respondents were able to select multiple funding choices for one year. They could also reselect a funding source for as many years as necessary. For each funding choice checked in this question, the survey would ask a question of the following form:

7. Please indicate the contribution of the <funding source> in each of the following roles or activities.

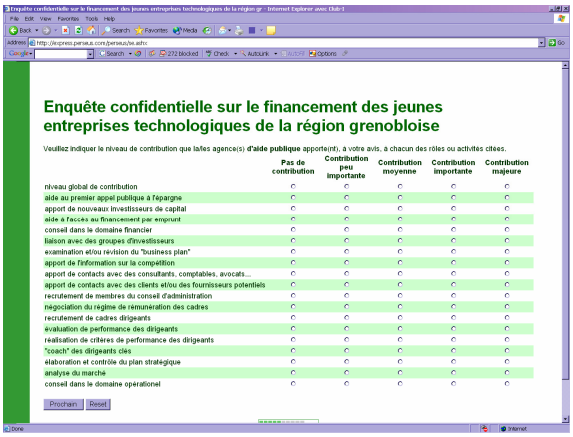

FIGURE 11: SCREEN SHOT OF WEB PAGE FOR SEVENTH THROUGH TWELFTH QUESTION OF ONLINE SURVEY OF COMPANY DIRECTORS. FOR THIS SET, THE QUESTIONS POSED DEPENDED ON THE ANSWERS TO QUESTION 6.

The field <funding source> contained one of the funding sources given in question 6, with the exception of the first choice (self-financing by the founders). This is because we assume that the contribution by the founders to the development of their own company would be extremely important, so that posing this question would not provide any useful information, but would only increase the time it took to fill in the survey. For each funding source there were the same 19 roles or activities given, and for each of these roles or activities the respondent indicated a level of contribution to the development of the company between 1 and 5. Each level was labeled, from lowest to highest, as follows:

1. No contribution;
2. Unimportant contribution;
3. Average contribution;
4. Important contribution;
5. Major contribution.

7.3.1.1 Roles or activities that add value

The 19 roles or activities were:

1. Overall contribution level
2. Aid with initial public offering
3. Aid in finding new investors
4. Aid in accessing debt financing
5. Financial counseling
6. Liaison with investor groups
7. Evaluation and/or revision of the business plan
8. Provision of information on competition
9. Provision of contacts for professional services (lawyers, consultants, accountants...)
10. Provision of contacts with clients and suppliers
11. Recruitment of board members
12. Negotiation of remuneration plan for managers
13. Recruitment of key management personnel
14. Evaluation of management performance
15. Establishment of management performance criteria
16. Coaching of key management personnel
17. Establishment and verification of strategic plan
18. Market analysis
19. Operational advice

The respondents were obliged to make a unique choice for the contribution level for each role or activity.

7.4 ADDED VALUE DEFINED

Since the goal of this study is to examine the added value brought by VCs to companies in the Grenoble region, a working definition of the term “added value” shall be established. There is no one standard definition for added value. In accounting terms, it is the difference between sales income and the cost of goods and bought-in services, adjusted for changes in inventory and work-in-progress. For a company, added value may be defined as the difference between the after-tax earnings and the opportunity cost of capital. In economic terms the added value is the difference in the value of a good or service at the end of a time period with respect to the beginning of the time period.

We will use the economic conception of added value, which is the most relevant to this study and is easy enough to grasp. Therefore, when we speak of the added value brought by VCs to companies in which he or she invests what should be understood is that if two VCs invest identical sums in identical companies, and one of the VCs offers an added value in addition to the financing, then after a period of time the company financed by the VC with added value will be worth more than the company financed by the VC who brought no added value. Of course, the tricky part is hidden in the definition of 'worth', and in determining how the value-adding VC succeeded in creating this extra value, or, indeed, if the extra value of the company can be attributed to the actions of the VC at all.

To determine the added value of a company, use will be made of the financial data, which will give us an objective measure of added value over a given time period. To determine to what extent this added value is attributable to the VC or other financier, we will rely not only on statistics based on the financial data, but on the survey responses as well.

7.4.1 Objective measurement of added value

To arrive at an objective measure of the added value of a company over a given time period, the financial results of that company are entered into a formula to generate a metric. However, developing a metric that gives an accurate reflection of the financial health of a multitude of different companies is not at all trivial, and has even been the subject of numerous articles and theses, and all major financial institutions have developed models of their own.[62]

7.4.1.1 Financial scores

In France, financial databases such as DIANNE use the AFDCC 2 score[63] and the Conan & Holder score[64] to indicate overall financial health of a company. Both scores combine together various financial ratios to form a particular formula. By comparing the score for a given company with a statistical analysis of a large number of French companies, the financial health of the company can be ascertained. Both scores are geared towards lenders; the Conan & Holder score allows one to assign a probability of bankruptcy to a company, as indicated in Table 20 in the Appendix, and the AFDCC 2 score emphasizes the short-term solvability of a company, and is designed for use with medium, small, and extra-small size companies. However, these scores are not well adapted to small high-tech businesses that strive for fast growth, since these companies often privilege development over financial stability. In fact, using data from 1994 to 2006, we find that, among the companies for which ownership data is available, the VC-backed firms have an average Conan & Holder score of –9.95, and an average AFDCC score of 1.30. For the 90 companies for which financial data were available but that were not VC financed (see Table 5), the averages are 15.73 and 3.01 for the Conan & Holder score and the AFDCC score, respectively. These average scores, along with the standard deviation for each average, are given in Table 9.

TABLE 9: AVERAGE CONAN & HOLDER AND AFDCC 2 SCORES FOR THE GREEN COMPANIES, OVER THE PERIOD FROM 1994 TO 2006.

	VC Financed	Non VC Financed
Conan & Holder	-10.48 ± 29.50	15.49 ± 20.37
AFDCC 2	1.08 ± 2.36	2.65 ± 2.45

If one accepts the standard interpretation of these scores literally, one would expect most VC-backed start-ups in the Grenoble area to fail, which is an erroneous conclusion. Therefore these financial scores will not be used in a metric for evaluating the performance of the companies in this study.

7.4.1.2 Turnover

We must develop a metric, or several metrics, that more accurately reflect the true value of young, high-technology firms. Many experts argue that one of the key metrics for success for a high-technology start-up is revenue.[65,66] The most direct indicator of revenue is turnover or gross sales ("chiffre d'affaires" in French). A significant and growing turnover indicates that a company is capturing more and more of its target market – an important factor for small companies that hope to grow. This is all the more true for high-technology companies since they often need to overcome the initial market reluctance to adopting new technology.

We may also be tempted to use net profit (or loss) as an indicator, but this is not deemed reliable for high-technology start-ups since profit is not always an immediate target for these companies. Consider ICOS, a biotech start-up that hit pay dirt several years ago when it developed Cialis, a direct competitor of Viagra in the erectile dysfunction medication market, and that has since captured a significant share of this market. Despite this cash cow, ICOS has yet to post a profit.[j] Amazon.com is another example, which went many years before posting a profit. Start-ups may often invest heavily to capture markets or position themselves strategically with regards to the competition, knowing full well that such a strategy will lead to loses in the near term. The hope, of course, is that such a strategy will bring substantial profits in the far term. Therefore, net profit or loss is not considered a reliable metric for a young high-technology company.

The argument detailed above is not contradicted by the results posted by the companies in this study. The mean annual turnover and average annual profit or loss of the 123 companies for which financial data is available over the years from 1994 through 2005 are given in Table 10. Note that these companies are a subset, or sample, of the 1,441 companies initially identified in this study. If we assume that the 123 companies finally selected for this study constitute a *random* sample of the former listing of companies, then the sample means and standard deviations reported in Table 10 constitute unbiased estimators[k] of the means and standard deviations for the 1,441 companies initially selected.[67]

TABLE 10: AVERAGE ANNUAL TURNOVER AND PROFIT (LOSS) OVER THE YEARS FROM 1994 THROUGH 2005 OF THE BLUE COMPANIES IN THIS STUDY.

Average Annual Turnover	Average Annual Profit (Loss)
1.26 ± 4.70 M €	- 0.57 ± 2.33 M €

As detailed above in §5, the strategy of VC firms is to invest in companies that they believe have a high growth potential. Therefore, if turnover is an important measure of success as argued above, growth of turnover must also be accepted as an extremely relevant measure of success. Thus we will include as metrics in our objective evaluation of the value of firms in this study the following two quantities:

1. Annual turnover;
2. Annual rate of change in turnover.

7.4.1.3 Assets

[j] As of the fiscal end of 2004, ICOS had not posted a profit.

[k] For random samples over 30, the sample mean and standard deviation are considered unbiased estimators of the population means and standard deviation. Since the blue companies number 123, this sample is sufficiently numerous to allow us to use this approximation.

As companies develop, their fixed assets will grow. For example, as their business volume increases, high-technology companies may need to increase their investment in such things as production equipment, quality control equipment, or building space. One may argue that high-technology companies that provide services, such as internet service providers, constitute an exception to this rule, since they rely above all on human assets. However, these companies will need to increase their IT infrastructure as the business grows. Therefore, the growth in fixed assets shall constitute another specific metric to aid in evaluating the value of the blue companies in this study.

7.4.1.4 Employees

High-technology companies are heavily dependent on human assets, which may help explain why employment growth in the high-technology sector in the US increased over twice as much as overall employment for the period between 1996 and 2006.[68] This reasoning suggests that the number of employees employed by these companies is an indicator of business success and growth prospects, and is in fact used as such in many studies.[69] However, the scale of production of goods or services in these sectors can be increased more easily than is the case in the majority of low technology businesses. For example, for an internet service provider, going from 10^3 customers to 10^6 customers does not imply increasing human and physical assets by the same factor of 10^3. In other words, the assets required scale sublinearly with the output, as shown schematically by the blue curve in Figure 12.

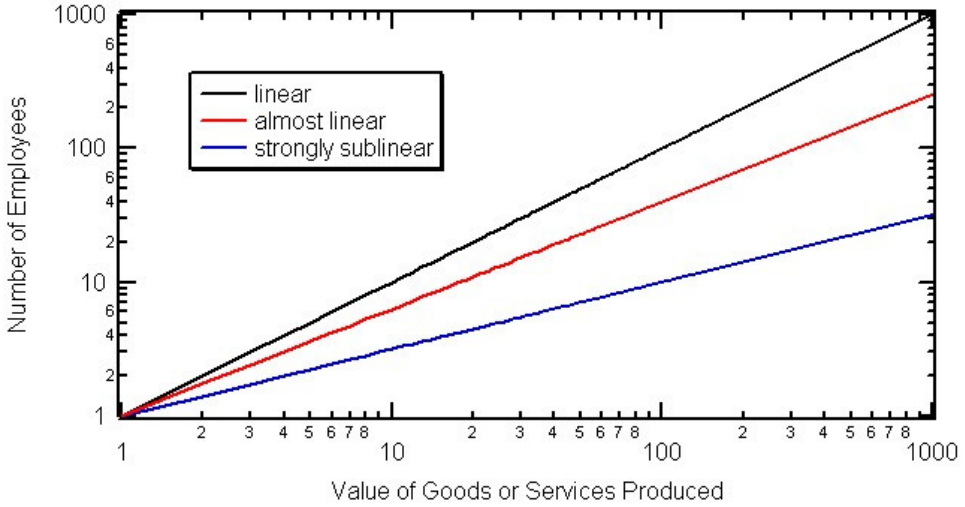

FIGURE 12: RELATIONSHIP BETWEEN LINEAR AND SUBLINEAR FUNCTIONS.

For a car manufacturer or a grocery store, on the other hand, the assets required scale more linearly with the output, as shown schematically by the red curve in Figure 12. Hence, a car manufacturer or a grocery store will require significantly more assets compared to a typical high-technology firm, relative to their current level, to increase production by any given percentage. What this means for the young high-technology companies studied here is that employee numbers are not the most sensitive measure of success. While an increase in employee numbers may indicate growth of the company, the absence of growth in employee numbers does not necessarily indicate lack of growth in the business. Therefore, employee numbers will be used in the metric, with a smaller than average contribution, to evaluate the blue companies in this study, but growth in employee numbers will not be used.

As discussed in § 4.1, high-technology companies produce goods and services with a high level of added value. The example was given of a software engineer who produces wealth at a rate that is 10 times greater than a coal miner. Another indication of this can be seen if one simply looks at the

turnover per employee of a few high-technology firms and compares this with the same thing for some traditional companies. Using an admittingly nonrandom sample of such companies, Table 11 below shows that the turnover per employee for the given selection of historically successful high-technology businesses is nearly twice that of the selection of historically successful traditional businesses.

TABLE 11: NUMBER OF EMPLOYEES AND ANNUAL TURNOVER (FOR 2005) FOR A SELECTION OF HIGH-TECHNOLOGY AND TRADITIONAL COMPANIES.

High-Technology Businesses					
	Employees	Turnover		Turnover/Employee	
Microsoft	63,464	$ 44.28		$	697,718
Sun	31,000	$ 11.07		$	357,097
Google	7,942	$ 6.14		$	772,853
Amgen	16,400	$ 12.43		$	757,927
Apple	14,800	$ 17.30		$	1,168,919
			average	**$**	**750,903**

Traditional Businesses					
	Employees	Turnover		Turnover/Employee	
Wal-Mart	1,600,000	$315.65		$	197,284
Goodyear	145,000	$ 19.70		$	135,862
General Motors	327,000	$192.60		$	589,003
Ford	327,531	$178.10		$	543,765
Nike	26,700	$ 15.00		$	561,798
			average	**$**	**405,542**

This implies that a more relevant measure of success for a young high-technology company is the value created per employee. Furthermore, since these companies are aiming for growth, the growth in the annual turnover per employee is also important. Thus, while we will use employment numbers as a rough measure of success, the more important factor in our measure of success will be the following two ratios:

1) Annual turnover per employee;
2) Annual growth in turnover per employee.

7.4.1.5 Overall metric

The overall metric that we will use, then, shall be built from these specific metrics:

1. m_1 : the annual turnover,
2. m_2 : the annual rate of change in turnover,
3. m_3 : the annual rate of change in fixed assets,
4. m_4 : the number of employees,
5. m_5 : the annual turnover per employee, and
6. m_6 : the annual growth in turnover per employee.

The overall metric, M, is constructed as follows:

EQUATION 1

$$M = \frac{1}{6}\sum_{i=1}^{6}\frac{m_i - \langle m_i \rangle}{\sigma_i}\frac{1}{\left(1+\delta_{i,4}\right)}.$$

In Equation 1 $\langle m_i \rangle$ is the average of m_i taken over the 123 companies for whom financial data were available, and σ_i is the standard deviation from that average. The second factor, $1/\left(1+\delta_{i,j}\right)$, reduces the contribution of m_4 by a factor of two[1] , as explained in § 7.4.1.4. Thus, in domains covered by the specific metrics, a negative overall metric indicates below average performance, while a positive overall metric indicates above average performance. Furthermore, since the overall metric is normalized by the standard deviation from the mean, each unit represents one standard deviation from the mean. For example, a company with an overall metric of 2 has posted, on average, a performance two standard deviations above the mean compared to the rest of the companies.

7.5 SUBJECTIVE MEASUREMENT OF ADDED VALUE

For a subjective measurement of added value, the survey responses are used. This gives information about added value financiers contribute due to various roles that they may fill, as delineated in § 7.3.1.1.

Of the 50 companies that responded to the survey, financial data was available for 35 (70%), and 11 (22%) had used VC financing. These ratios are comparable to those obtained from the initial list of companies retained for this study, where of 176 companies, financial data was available for 123 (70%), for 33 out of 176 had used VC financing (19 %). Of the companies that responded to the survey, the distribution of those that received VC financing is shown in Table 12. The distribution is similar to that found for the companies retained, with a strong representation from the IT sector (APE codes 722A and 722C, compare with Table 1).

TABLE 12: DISTRIBUTION OF COMPANIES THAT RESPONDED TO THE SURVEY.

Code APE	Number of Companies Retained	Number of Companies that Responded to Survey	Number of Companies with Financial Data	Number of Companies with VC Financing
292A	1	0	0	0
300A	0	0	0	0
300C	1	0	0	0
321C	9	1	0	0
331B	1	0	0	0
332B	4	1	1	1
333Z	1	0	0	0
334B	1	1	1	1
642C	1	1	1	1
721Z	19	4	3	1

[1] The delta function is zero when the indices differ, and is unity when the indices are equal.

Code APE	Number of Companies Retained	Number of Companies that Responded to Survey	Number of Companies with Financial Data	Number of Companies with VC Financing
722A	38	10	7	2
722C	57	22	14	0
723Z	3	1	1	0
724Z	8	2	1	1
726Z	0	0	0	0
731Z	12	4	2	2
741G	1	1	1	0
742C	18	3	2	1
743B	1	1	1	1
	176	**50**	**35**	**11**

The distribution in the number of times a given funding source was utilized is shown in Figure 13 (not counting repeat uses).

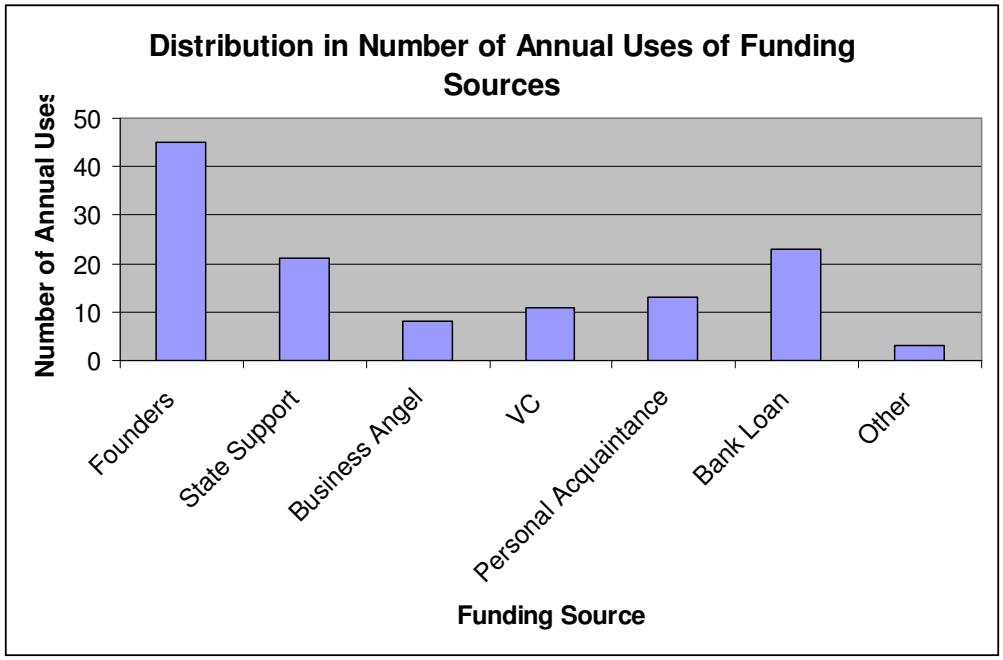

FIGURE 13 : DISTRIBUTION OF NUMBER OF ANNUAL USES OF EACH FUNDING SOURCE. THIS PLOT DOES NOT COUNT REPEAT USE BY THE SAME COMPANY.

The survey data also indicates the number of years each funding source was utilized. The distribution in this data is shown in Figure 14. Thus while 45 of the 50 companies that responded to the survey used their founder's own capital to finance the company, they did so for only two years, on average. While only three companies used the "other" source of financing, on average they used this source for 3.67 years.

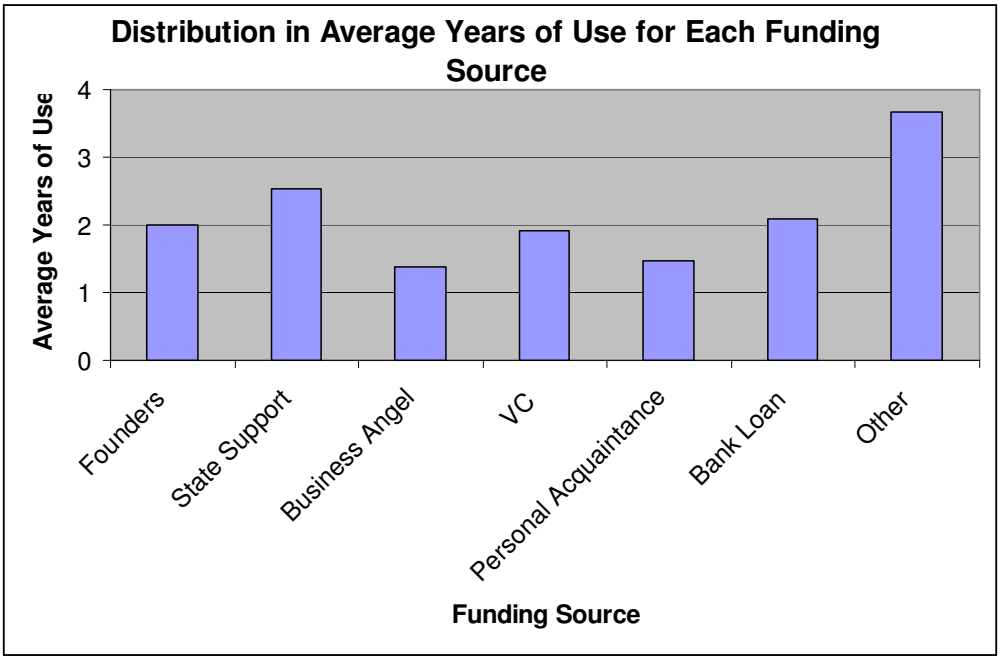

FIGURE 14 : DISTRIBUTION IN AVERAGE NUMBER OF YEARS OF USE FOR EACH FUNDING SOURCE, FOR THE COMPANIES THAT RESPONDED TO THE SURVEY. FOR EXAMPLE, FOUNDERS FINANCED THEIR COMPANIES ON AVERAGE FOR TWO YEARS.

8. RESULTS AND DISCUSSION

8.1 OBJECTIVE MEASUREMENT OF ADDED VALUE BY VCS

What added value, if any, did VCs bring to the companies in the Grenoble region in which they invested? Let us first look at the overall metric for blue companies that received VC funding, and compare it to the overall metric for the blue companies that did *not* receive VC funding. The distribution of both VC-funded and non-VC-funded companies according to the overall metric is given below in Figure 15.

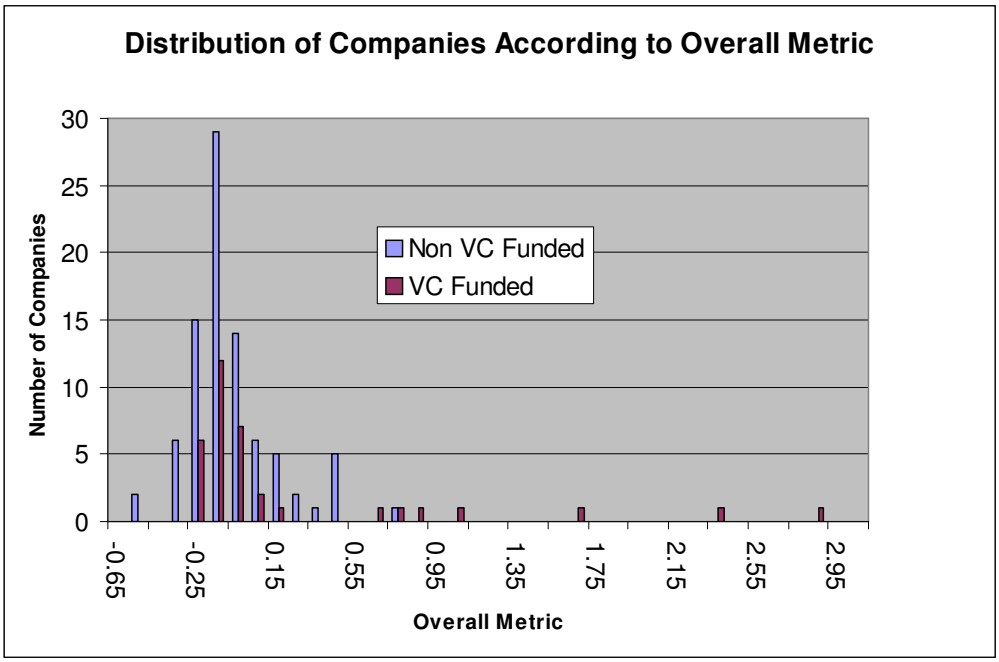

FIGURE 15: DISTRIBUTION OF COMPANIES ACCORDING TO OVERALL METRIC SCORE.

The distributions for both sets of companies have large, positive skews, which shall be discussed later. Table 13 summarizes some key statistics for the overall metric for these companies. Note that VC-funded companies have a higher overall metric than non-VC-funded companies, indicating superior performance in the domains measured by the overall metric.

TABLE 13: STATISTICAL QUANTITIES DESCRIBING THE DISTRIBUTION OF COMPANIES ACCORDING TO THE OVERALL METRIC.

	Companies funded by VCs	Companies not funded by VCs	All companies
Mean ± Standard Deviation	0.19 ± 0.74	–0.08 ± 0.22	0.00 ± 0.45
Median	–0.11	–0.14	–0.12
Skew	2.52	1.29	4.00
Kurtosis	6.06	2.41	19.78

Figure 16 shows the averages of the specific metrics for VC-funded and non-VC-funded companies. The data indicate that VC-funded companies have outperformed non-VC-funded companies in every category except category 5, which is the average annual turnover per employee.

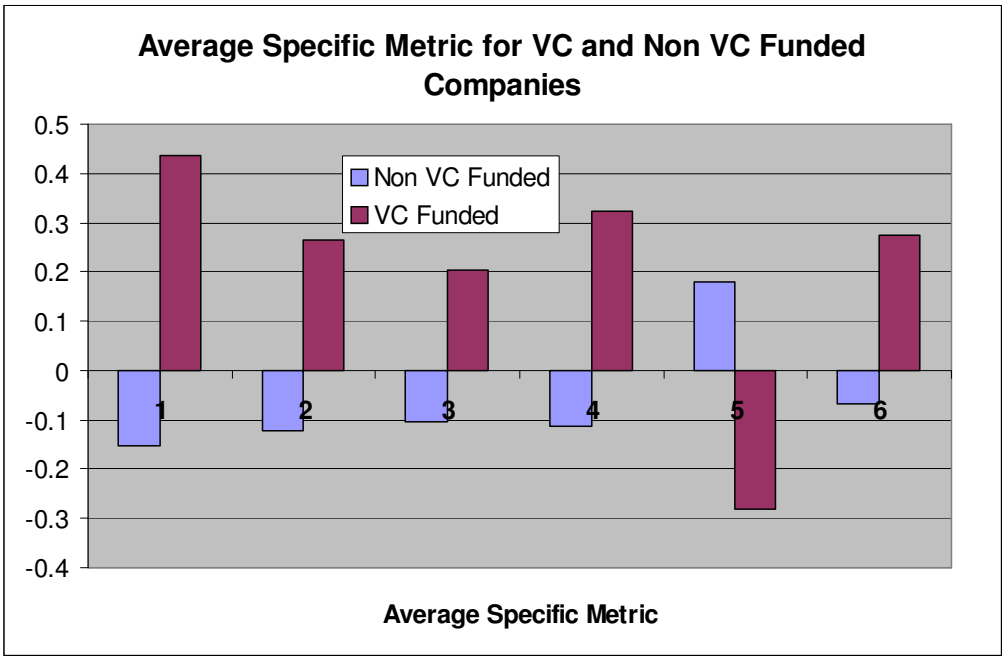

FIGURE 16: AVERAGE SPECIFIC METRICS FOR VC-FUNDED AND NON-VC-FUNDED COMPANIES.

The next figure shows the skew in the distribution of each specific metric.

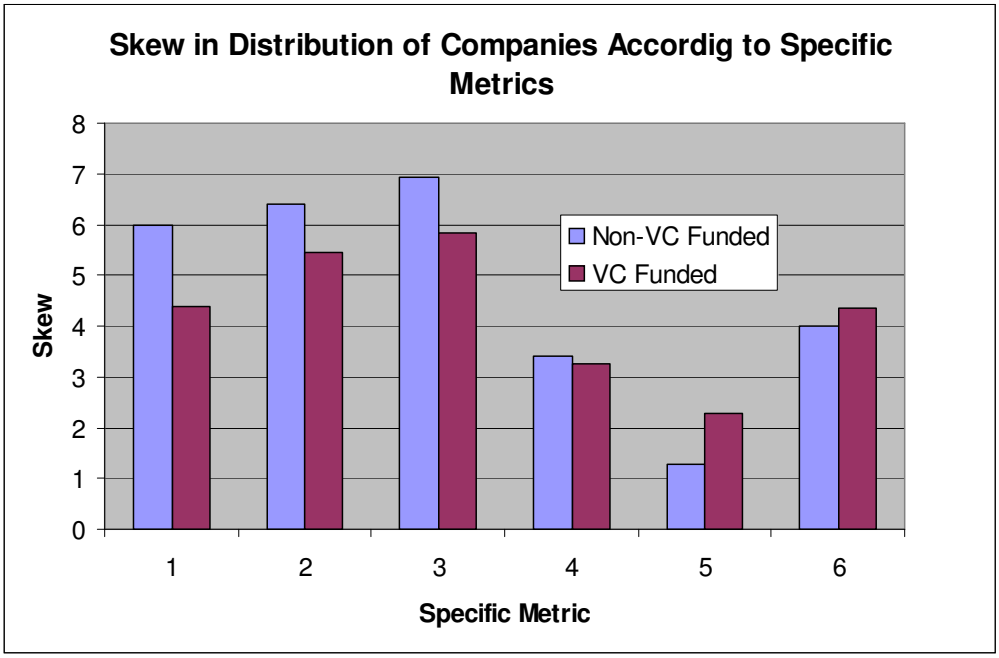

FIGURE 17: SKEW IN DISTRIBUTION OF SPECIFIC METRICS FOR VC-FUNDED AND NON-VC-FUNDED COMPANIES.

The distribution of all the specific metrics are strongly skewed in the positive direction. The annual turnover per employee (specific metric 5), while strongly skewed, is the least skewed of all six specific metrics.

The kurtosis of the distribution of VC-funded companies is quite large, indicating that a significant portion of the variance in the distribution is attributable to large, infrequent deviations from the mean. For non-VC-funded companies the kurtosis is less, indicating more of the variance comes from frequent, but smaller, deviations from the mean. The kurtosis of the distribution of companies according to their specific metrics is shown in Figure 18.

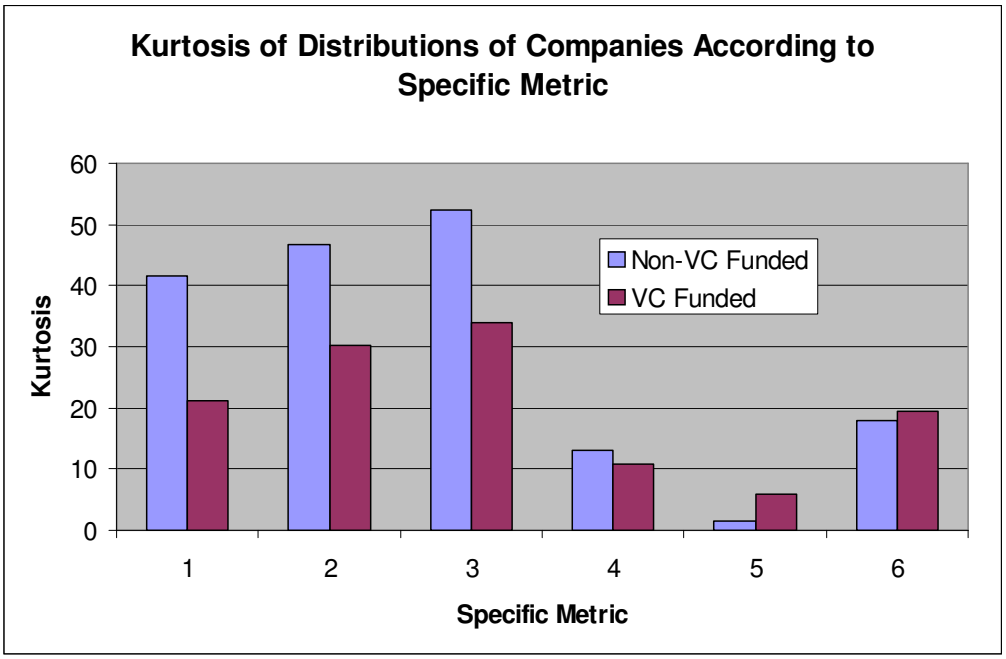

FIGURE 18: KURTOSIS IN DISTRIBUTION OF COMPANIES ACCORDING TO SPECIFIC METRICS.

The distributions according to the first three metrics (the annual turnover, the annual rate of change in turnover, and the annual rate of change in fixed assets) have extremely large kurtosi, while the last three specific metrics (the number of employees, the annual turnover per employee, and the annual growth in turnover per employee) have more modest kurtosi. As is the case for the skew, the specific metric 5 (the number of employees) is the most normally distributed, with the least extreme deviations from the mean.

These data are not easy to interpret because they are distributed in a manner that is highly skewed and that has a large kurtosis. While it is clear that VC-funded companies outperform non-VC-funded companies in all but one category deemed important for young high-technology companies aiming for high growth, the skew and the kurtosis in the data is so large that this picture may be the result of a few extremely successful VC-funded companies.

If we eliminate the top 9 performing companies from our data (7 of which are VC-funded companies, see Figure 15), then the distributions of companies according to the overall metric becomes that shown in Figure 19.

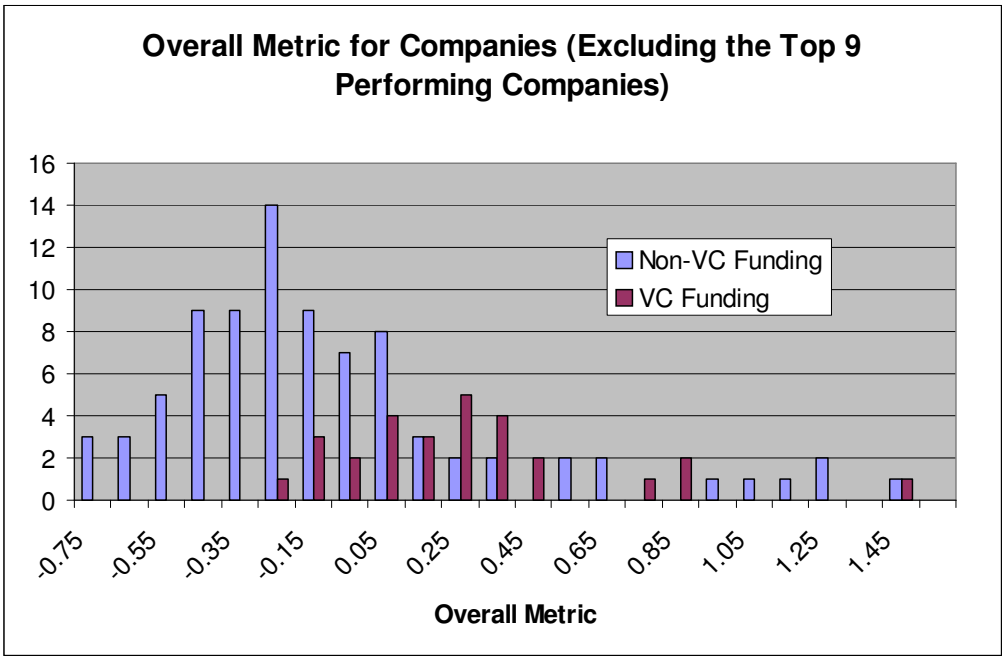

FIGURE 19 : DISTRIBUTION OF COMPANIES ACCORDING TO OVERALL METRIC, EXCLUDING TOP-NINE-PERFORMING COMPANIES.

The statistics corresponding to the distributions of Figure 19 are shown in Table 14, and show that VC-funded companies in this selection still outperform non-VC-funded companies, as measured by the overall metric.

TABLE 14 : STATISTICAL QUANTITIES DESCRIBING THE OVERALL METRIC FOR COMPANIES FUNDED BY VCS, AND FOR COMPANIES NOT FUNDED BY VCS, EXCLUDING THE TOP 9 PERFORMING COMPANIES.

	Companies funded by VCs	Companies not funded by VCs	All Companies (excluding top 9)
Mean ± Standard Deviation	0.26 ± 0.36	-0.09 ± 0.47	0.00 ± 0.47
Median	0.22	-0.21	-0.10
Skew	1.40	1.45	1.09
Kurtosis	2.79	2.15	1.22

The average values for the specific metrics for the companies, excluding the top 9 performers, is displayed in Figure 20. For this selection, the VC-funded companies perform significantly above average for the first four specific metrics (the annual turnover, the annual rate of change in turnover, the annual rate of change in fixed assets, and the number of employees), while the companies not funded by VCs perform better for the last two specific metrics (the annual turnover per employee and the annual growth in turnover per employee).

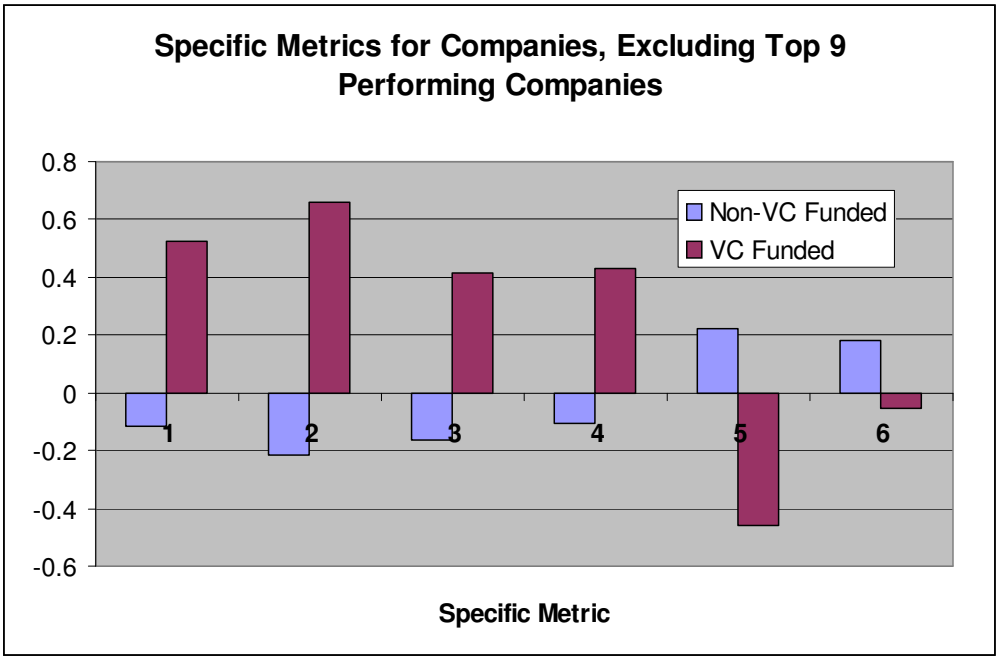

FIGURE 20 : AVERAGES FOR SPECIFIC METRICS FOR COMPANIES, EXCLUDING THE TOP-NINE-PERFORMING COMPANIES.

8.2 DISCUSSION OF OBJECTIVE MEASUREMENT OF VALUE ADDED BY VCS

The data indicate that the companies that had VC funding performed significantly better overall than companies that did not have VC funding (see Figure 15 and Table 13), where performance is defined by the metrics described in § 7.4.1.5, which were chosen to reflect indications of success for high-technology companies with high rates of growth. The only area in which companies not funded by VCs performed better than their VC-funded counterparts is in annual turnover per employee (see Figure 16).

Given that the data were highly skewed in the positive direction and presented a large kurtosis, the top 9 performing companies were excluded from the data set, and the analysis was repeated. The results were essentially the same, with the top performing companies in this reduced set again being those companies that had VC funding. However, in this set, companies that were not VC funded outperformed those with VC funding in two categories (the number of employees and the annual growth in turnover per employee), as opposed to just one category (the number of employees) for the entire set of companies.

A large positive skew and a large kurtosis in the distribution of companies according to the overall metric is found for the 123 companies for which financial data was available, both of which decrease but remain pronounced for both subsets of companies (those that received VC funding and those that did not, see Table 13). However, the skew and the kurtosis is more pronounced for those companies that received VC funding than for those that did not, indicating that the variance in the performance of these companies is strongly affected by relatively few companies that posted extremely good results. Given the data at hand, it is not possible to explain precisely why the VC-funded companies should be thus distributed compared to the non-VC-funded companies, whose distribution presents fewer extreme cases. One may speculate that this occurred because VCs investment strategy calls for investing in companies that promise high growth. Hence the successes for VC-funded companies may be more likely to be significantly above average in performance compared to companies whose priorities lie elsewhere than high growth.

8.2.1 Correlation between VC participation in equity and performance?

The superior performance of the VC-funded companies leads to several questions, one of which is whether or not there is a correlation between the equity held in a given company by VC firms and that company's performance. Of the 33 companies who have VC participation in their equity, information on VC equity participation was available for 31. The overall metric is given below in Figure 21 as a function of the VC participation in the company's equity. Note that VC participation in equity is defined as the total participation by VC firms, and so participation in any given company may consist of one VC firm, or several (the maximum number of VC firms investing in one company was 9).

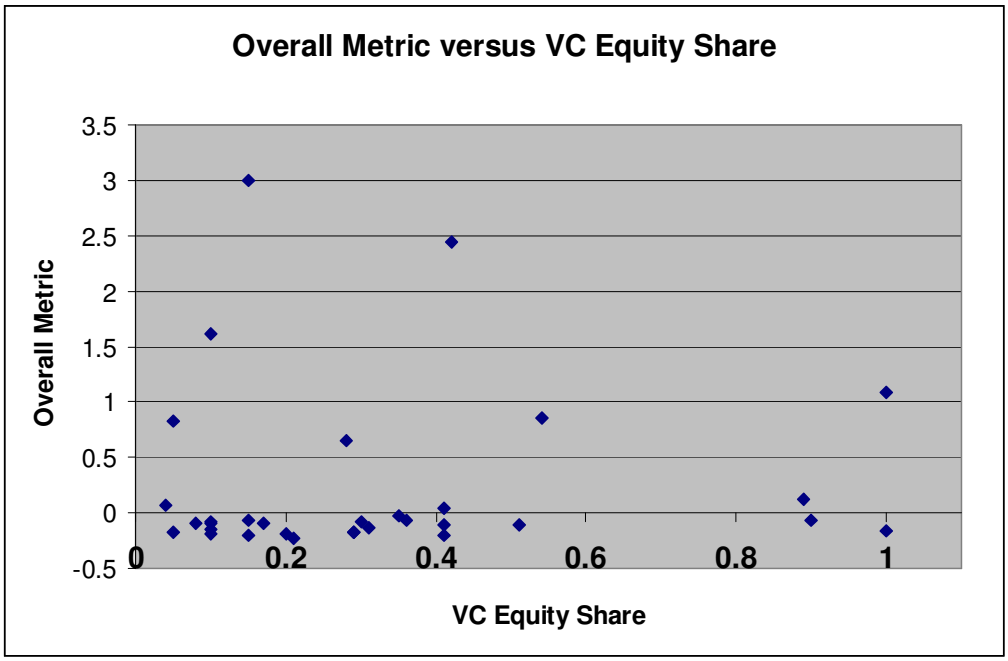

FIGURE 21: OVERALL METRIC FOR VC-FUNDED COMPANIES VERSUS THE EQUITY SHARE HELD BY VC FIRMS IN GIVEN COMPANY.

The result is clear: there is no linear correlation between the two variables (VC equity share and overall metric). The Pearson product-moment correlation coefficient[m] of 0.025 confirms this. Thus the data indicates that there is no correlation between non-zero VC participation in company equity and company performance (as measured by the overall metric used here).

8.2.2 Correlation between number of VC investments and performance?

[m] The Pearson product-moment correlation coefficient indicates the degree to which two random variables are correlated, and ranges from –1 to 1. A coefficient of 0 indicates no correlation.

Furthermore, no correlation is found between the number of firms in a VC's portfolio and the performance of the companies in that portfolio. For example, CEA Valorisation invested in 4 companies used in this study, and the average overall metric over these four companies is approximately 0.9. The Pearson product-moment correlation coefficient for these two variables (the number of firms in a VC's portfolio and the average overall metric for the portfolio firms) is 0.0107. The data is shown below in Figure 22.[n] Thus it is clear that the data does not indicate any correlation between the number of companies in which a VC firm invests, and the success of those companies, as defined by the overall metric.

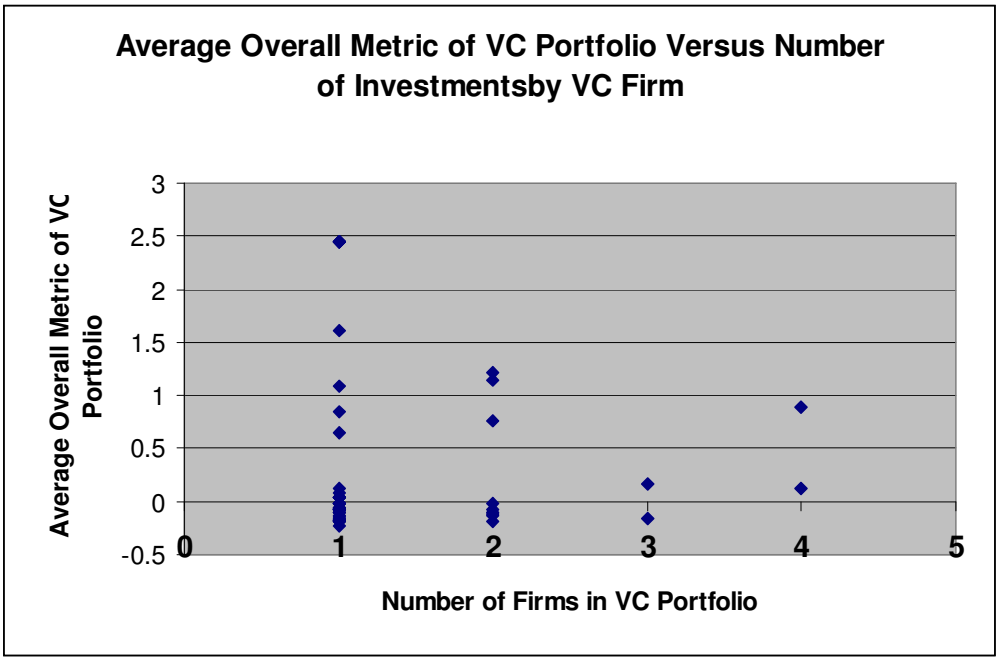

FIGURE 22: AVERAGE OVERALL METRIC FOR VC PORTFOLIOS AS A FUNCTION OF NUMBER OF COMPANIES IN THE VC'S PORTFOLIO.

8.2.3 Correlation between number of VC investors in company and performance?

No correlation is found between the number of VC investors in a company and that company's performance as measured by the overall metric. The Pearson product-moment correlation coefficient is -0.015 and the data is shown below in Figure 23. Thus the data does not indicate that having more (or fewer) VC investors in the company had an impact on company performance (assuming of course that the company had at least one VC investor).

[n] A table listing all the VC firms found in this study and the number of investments they made in blue companies may be found in the Appendix (§ 10.3).

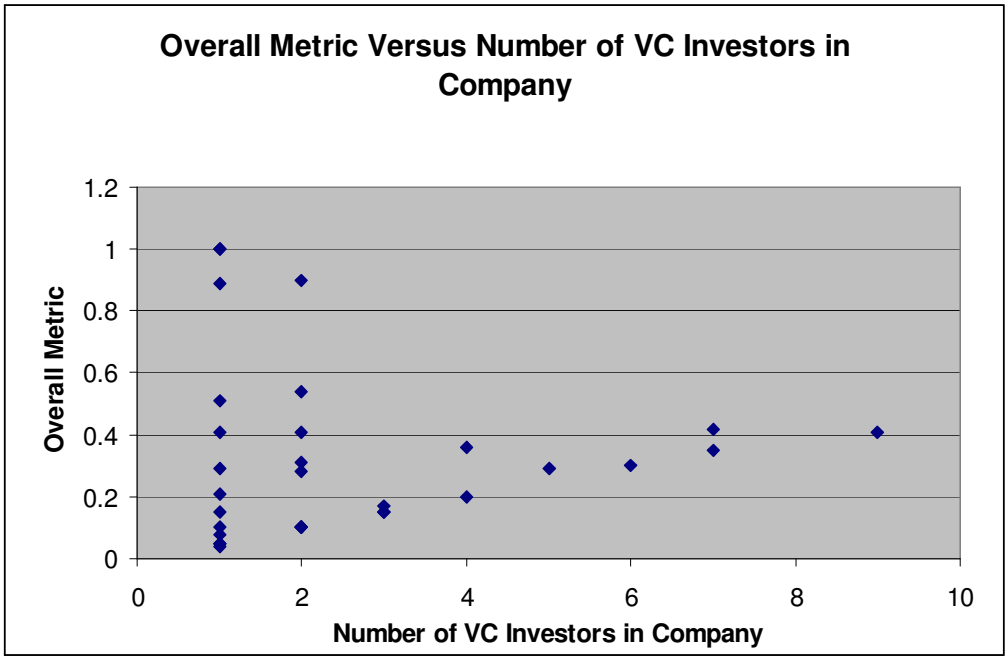

FIGURE 23: OVERALL METRIC AS A FUNCTION OF NUMBER OF VC INVESTORS IN EACH COMPANY.

8.2.4 Correlation between business sector and performance?

The distribution of business sectors (described in § 7.1.1) according to the average overall metric of each is shown below in Figure 24.

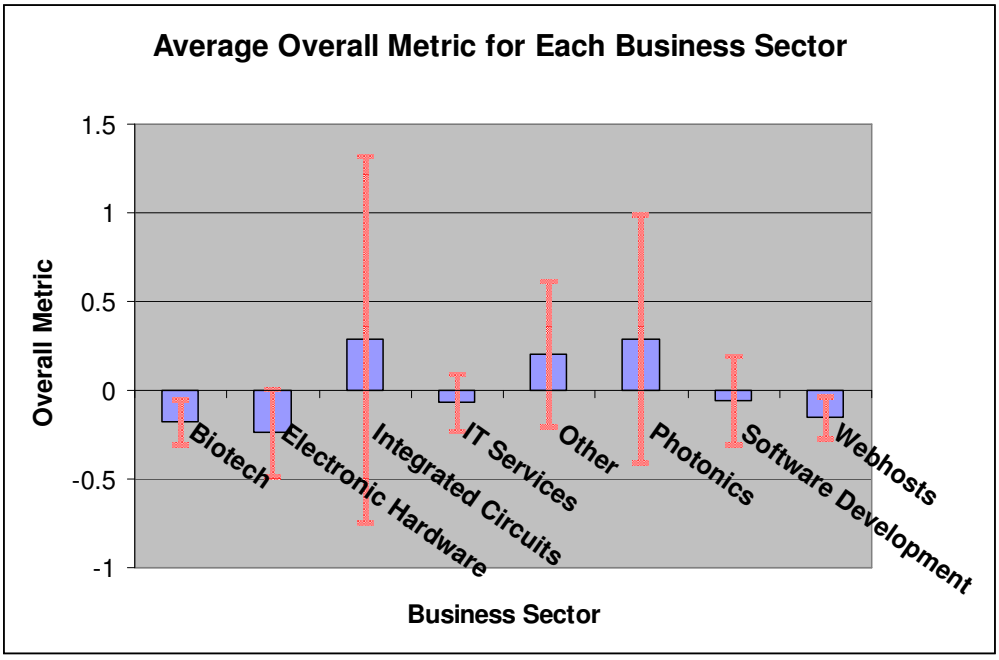

FIGURE 24 : DISTRIBUTION OF BUSINESS SECTORS ACCORDING TO THE AVERAGE OVERALL METRIC OF EACH SECTOR. THE ERROR BARS ARE INDICATED IN RED AND CORRESPOND TO ONE STANDARD DEVIATION IN THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTION.

The standard deviations of the means are quite considerable, making interpretation of the averages difficult. Considering only the averages of the overall metric for each business category, the data indicate that the best performing sectors are integrated circuits, other, and photonics, and the poorest performing sectors are biotech and electronic hardware. However, taking into consideration the skew in the averages, shown in Figure 25, suggests a different conclusion.

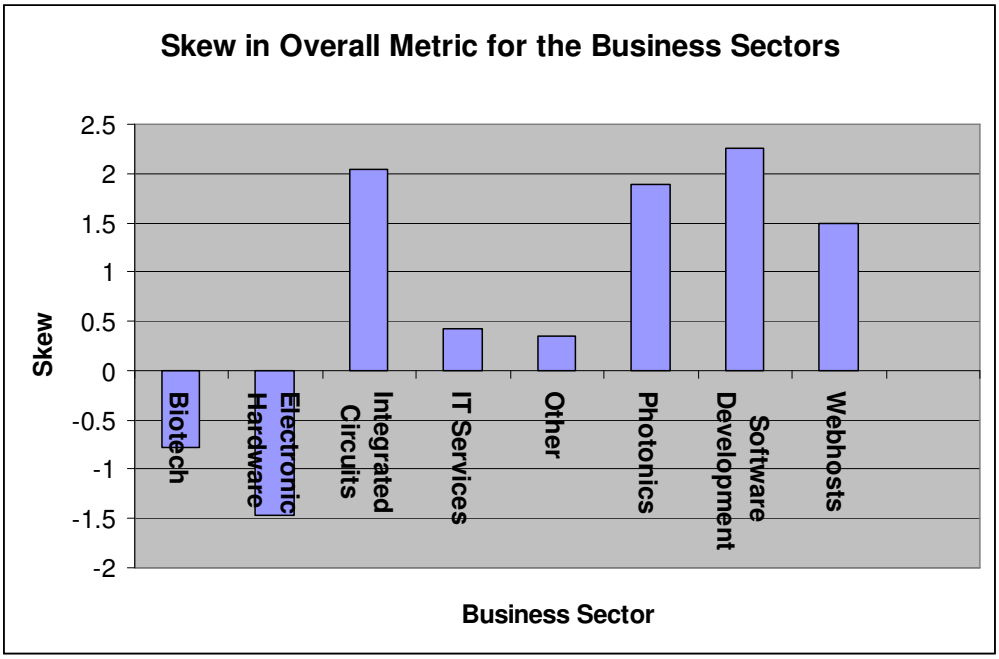

FIGURE 25 : SKEW IN AVERAGE OF OVERALL METRIC FOR EACH BUSINESS SECTOR.

The skews indicate that the average value of the overall metric for the integrated circuit and the photonics sector is heavily influenced by a relatively small number of high performing companies, so that the average value of a larger selection of companies in these sectors is likely to be less than that reported in Figure 24. The business category "other" has a relatively small skew, indicating that its average overall metric is not overly influenced by a few extreme performers. Thus the value of the average overall metric for this category is considered more believable than the values for either the integrated circuits or photonics category.

Other business categories with large skews are web hosts, software development (large, positive skew), and electronic hardware (large, negative skew). This indicates that the averages for these sectors are strongly influenced by extreme performers in the positive direction for the first two categories (web hosts and software development), and in the negative direction for the last category (electronic hardware). This is especially true for the software development category, which counts 61 companies, making it even harder to distort its average with a large skew than a category such as electronic hardware, which counts only three companies. Thus, it is likely that an average over a larger selection of companies in these categories would adjust the average in the overall metric downward for the web host and software development categories, and upward for the electronic hardware category.

Thus, the category "other" is considered as likely to be the best performing category, if one had a large sampling of companies in this category. Its average overall metric is relatively high, and the average is not overly distorted by an unduly large skew. However, it is clear that a larger selection of companies is needed to arrive at a more conclusive result.

8.2.5 Does performance improve after VC investment?

We have seen that the performance as measured by the overall metric is superior for companies that have VC funding. Can we attribute this improved performance to value added brought by the VCs, or is this the result of VCs doing a good job of selecting the companies in which to invest, and choosing only the best companies, who then continue to outperform the rest?

To address this question, one must know when companies first obtained VC financing, and one must obtain data for companies for periods both before and after this date. Of the 123 companies for which financial data were available, data indicating the date of VC financing is available for only 11. These data indicate that, on average, companies waited 2.5 years before obtaining VC financing. Of these 11 companies, financial data covering periods both before and after VC funding is available for only 6, and for none of those companies are the data complete. Table 15 below shows the data that is available for these six companies.

TABLE 15: SPECIFIC METRIC AVAILABLE BOTH BEFORE AND AFTER VC FUNDING FOR THE SIX COMPANIES WHOSE DATE OF VC FUNDING IS KNOWN.

Company	m_1	m_2	m_3	m_4	m_5	m_6
1				X		
2				X		
3	X		X	X		
4	X			X	X	
5	X	X	X	X	X	
6	X			X		

For none of the companies is the last specific metric, m_6, available (the rate of change in employee numbers normalized by the rate of change in annual turnover). The most complete data is for m4, the number of employees, followed by m_1, the annual turnover. Since one needs data for two different time periods to calculate a rate of change, there are very few specific metrics available that reflect growth, be it in annual turnover, fixed assets, or annual turnover per employee (m_2, m_3, and m_5, respectively).

If we ignore the missing specific metrics for calculating the overall metric, we arrive at an overall metric for these six companies for both before and after VC funding. This is given in Table 16 below.

TABLE 16: OVERALL METRIC BOTH BEFORE AND AFTER VC FUNDING, FOR THE SIX COMPANIES FOR WHICH DATA WERE AVAILABLE.

Before VC Funding	After VC Funding
M = -0.162 ± 0.057	M = -0.036 ± 0.126

The change in the overall metric for each company for which data were available is shown below in Figure 26.

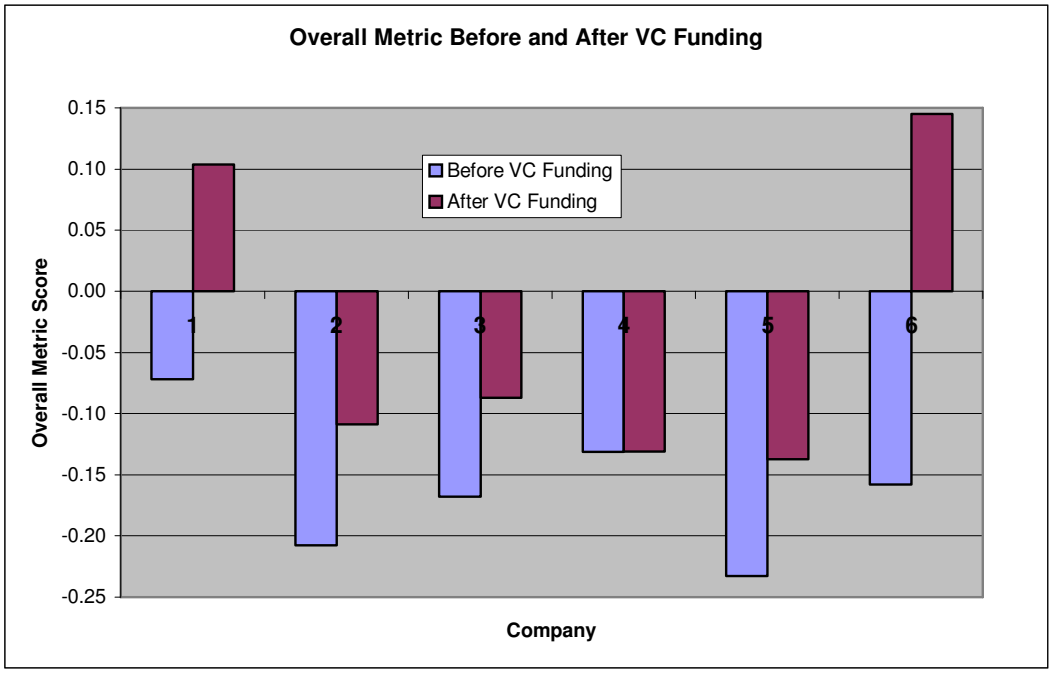

FIGURE 26 : OVERALL METRIC BEFORE AND AFTER VC FUNDING FOR THE SIX COMPANIES FOR WHICH DATA WERE AVAILABLE.

Table 16 and Figure 26 indicate that VC funding is positively correlated with improved performance of each of the six companies for which (albeit limited) data were available.

As indicated in Table 15, this result for the overall metric both before and after VC funding is heavily influenced by the specific metrics m_4 and m_1, which are the number of employees and the annual turnover. To see the influence of these specific metrics we display the specific metrics averaged over the six companies with data for before and after VC funding in Figure 27.

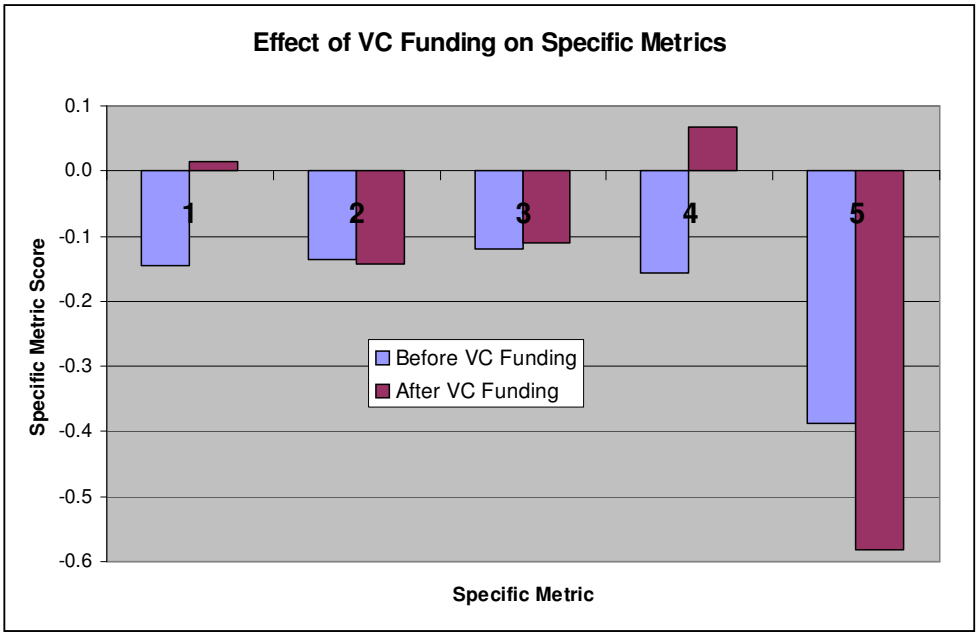

FIGURE 27 : EFFECT OF VC FUNDING ON EACH SPECIFIC METRIC. THE NUMERALS 1 THROUGH 5 CORRESPOND TO SPECIFIC METRICS 1 THROUGH 5 (SEE § 7.4.1.5).

The data show a large change in m_1 and m_4 (-110 % and -144 %, respectively) upon VC funding. Two specific metrics, m_2 and m_3, show very little change upon VC funding, but since only one and two data were available for each metric, respectively, not much can be read into the results for these two specific metrics. The remaining specific metric, m_5 (the annual turnover per employee), shows a large negative change of approximately 50% upon VC funding, although there are only two data points available for this specific metric, as well.

That the number of employees (m_4) increase upon VC funding is not surprising. With new funding, a company that aims to grow is likely to employ more people to increase staff in production, marketing, sales, etc. Therefore the increase in this specific metric is not interpreted as a strong indication that VCs brought significant added value to the companies.

More difficult to increase is the annual turnover (m_1), since it depends on forces external to the company (the market, the competition, the customers...). The four companies who had data for specific metric m_1 were successful in this endeavor and posted above average annual turnovers after receiving VC funding. This fact is not due to one or two of the companies doing extremely well, with the remaining doing poorly (i.e. the data is not strongly skewed, nor is there a large kurtosis). All four companies posted strong positive growth in annual turnover upon VC funding. This is interpreted as an indication that the VCs did indeed bring some added value to these companies, in addition to the financing.

The last specific metric for which we have data, m_5, is essentially the ratio of m_4 to m_1. Thus since m_4 increased proportionally more than m_1, m_5 must decrease. Hence this indicates that the (two) companies for which m_5 data were available increased their staff above the average level, given their annual turnover. Since the data were available only for short periods after VC funding, this may simply be a reflection of expected growth by the part of the managers. The expectation is apparently warranted, since the annual turnover did grow after VC funding, only not enough to raise the level of the annual turnover per employee above the average level for young high-technology firms in the Grenoble area.

Thus the limited data available suggest that overall company performance improves after VC financing is obtained. Although the data are few, they are consistent in their tendency, with the overall metric increasing for every company for which data were available after VC financing.

One may take this result as an indication that VCs time their financing well, and financed these companies just before they began to grow, or that the capital influx from the financing caused the growth, not the VCs.

Regarding the timing of the VCs investment, it is noted above that VCs tend to invest in the early stages of a companies development, and this is corroborated by the data from the survey. For the 11 companies that responded to the survey, it was found that the average time to get VC financing was 2.45 years. This strategy by the VCs to invest early in a company's development places a constraint on the timing of their investment, reducing their liberty in the timing of their investment. It is therefore not considered probable that the improved performance noted above after VC financing is attributable to nothing but the good timing of the VC's investment.

Regarding the argument of improved performance due to an increase in available capital upon securing financing, we can compare the pre- and post-financing performance of VC-financed companies with those financed otherwise. For financing via bank loans, there are nine companies for whom sufficient data exist to compare pre- and post-financing performance. For public support, there are eight such companies. The overall metrics calculated using these companies, for both before and after financing, are shown in : Overall metric for companies financed via bank loans or public support, for both before and after financing.Table 17.

TABLE 17: OVERALL METRIC FOR COMPANIES FINANCED VIA BANK LOANS OR PUBLIC SUPPORT, FOR BOTH BEFORE AND AFTER FINANCING.

	Before Financing	**After Financing**
Bank Loan	M = 0.034 ± 0.104	M = 0.189 ± 0.142
Public Support	M = 0.019 ± 0.105	M = 0.046 ± 0.269

The data indicate that the overall metric increased after financing for both types of financing (bank loans and public support). Therefore, it is not possible to conclude that the increase in the overall metric that occurs after VC financing is indicative of any superior added value brought by the VCs.[o]

8.2.6 Correlation between VC proximity and performance ?

One ingredient in added value is the social capital that VCs may have, as discussed in § 6.1, and part of social capital is the network of personal and professional contacts that a VC may have. It was further argued in § 6.1 that geographic proximity plays an important role in the value of a VC's network of contacts, and in the amount of influence a VC may have over a company in their portfolio.

Therefore we will investigate here whether there is a correlation between company performance and VC location. To do this the VCs are grouped according to the cities or countries in which their office nearest to Grenoble is located. This results in a group of nine geographic regions, which are listed in Table 18 along with the number of investments VCs from each region has made in the 123 companies for which financial data were available.

[o] Note that for bank loans and public support, the overall metric before financing is greater than that for VC financing. This is in accord with the claims made above that VCs tend to finance companies that present a higher business risk than the more traditional financial institutions.

TABLE 18: GEOGRAPHIC LOCATION OF THE VCS THAT INVESTED IN THE BLUE COMPANIES IN THIS STUDY.

Closest Office	Number of Investments in Grenoble Region
Geneva	1
Grenoble	6
Israel	2
Lyon	8
Netherlands	1
Orleans	1
Paris	31
Rouen	1
US	5
Total	**56**

The average overall metric of companies invested in by VCs from each region is shown below in Figure 28. Following that, the performance of companies in which VCs from the various regions invested is shown according to their ranking among the 56 companies for which data were available.

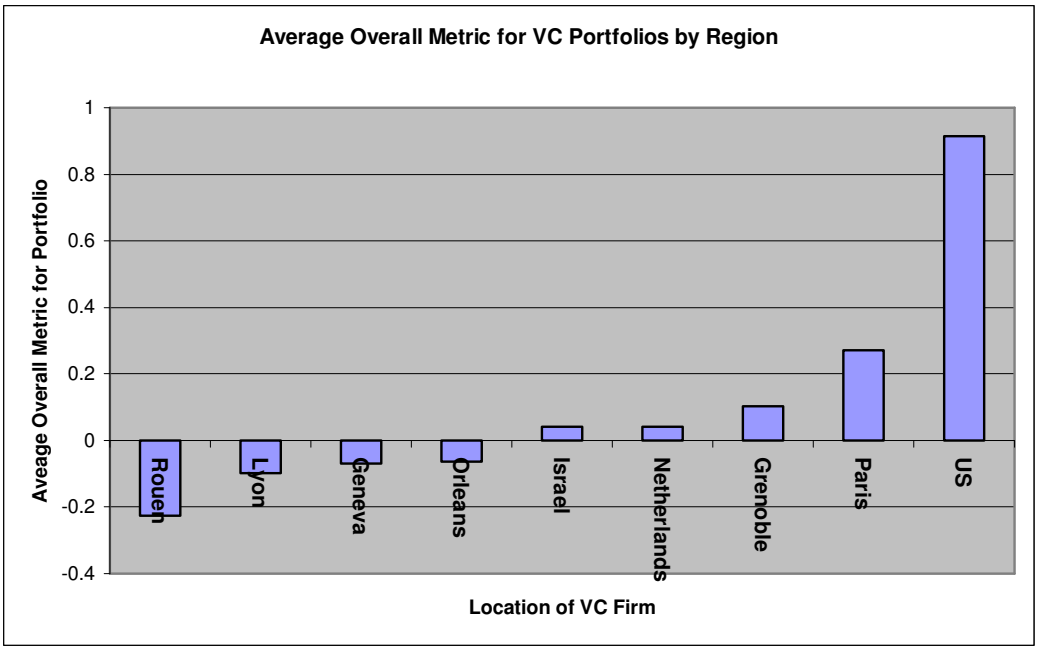

FIGURE 28 : AVERAGE OVERALL METRIC FOR COMPANIES IN WHICH VCS FROM THE NINE GEOGRAPHIC REGIONS INVESTED.

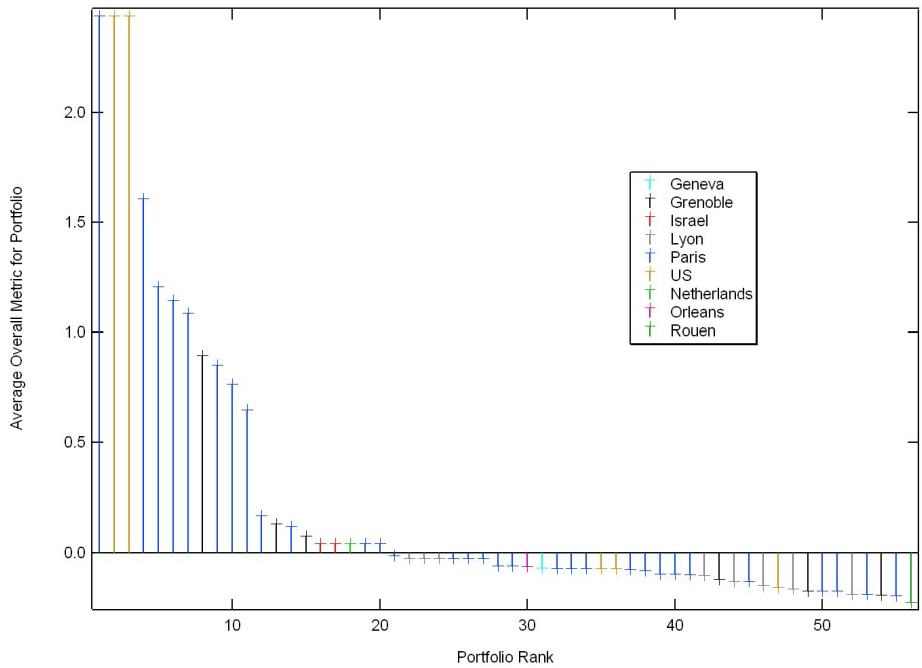

FIGURE 29 : COMPANY PERFORMANCE, ACCORDING TO OVERALL METRIC, FOR COMPANIES IN WHICH VCS FROM GIVEN REGIONS (SEE LEGEND) INVESTED.

The US VCs seemed to do quite well, but this is due to the investment by two VC firms in one company in the Grenoble region that performed exceptionally well. Therefore, it is not taken as an indication of superior added value brought by the US VCs.

The next two top performing regions are Paris and Grenoble. For Paris, a large quantity of data are available, with 31 investments coming from VCs in the Paris region. VCs from the Grenoble region account for only six of the 56 investments considered in this section. The overall performance of the portfolios of VCs from each of these two regions is above average, with the companies in which a Paris-region VC invested posting an average overall metric of 0.27, and the Grenoble-area VC's portfolio of companies posting an average overall metric of 0.12. These results suggest that there is a correlation between geographical proximity between the VC and the company in which the VC invests, and the company performance.

However, further inspection of the data reveals that the portfolio of companies of VCs from Lyon (consisting of eight companies), which is closer to Grenoble than Paris, performed below average, which contradicts the hypothesis suggested above. A possible explanation for this apparent discrepancy is that VCs located in Paris benefit from their proximity to the large financial, professional, and industrial networks of that city, while VCs in Grenoble benefit from the local contacts with local politicians, institutions (such as the GRAIN) and perhaps technical talent from the numerous technical institutions in the Grenoble area. VCs from Lyon may be "stuck in the middle," without any particular advantage from either local connections (like the Grenoble VCs) or national and international connections (like the Paris VCs).

The remaining geographical regions present portfolios of one or two companies – too few to be taken as any indication of a trend.

Thus, the data indicate a possible correlation between geographical proximity of VCs and performance of the companies in their portfolio. Further research in this area is required to draw any more definite conclusions.

8.3 SUBJECTIVE MEASUREMENT OF ADDED VALUE BY VCS

The study of the financial data for the 123 companies for which financial data were available indicate an objective correlation between financing by VCs and company performance, as measured by the overall metric. Now the responses by company directors to the survey described in § 7.3 are considered to determine to the extent possible if there is an awareness on their part of any added value brought by VCs, and if their perception of added value corresponds with the objective analysis of added value.

As indicated by Table 8, the company directors who responded to the survey were spread fairly evenly among the different business sectors, so that no one sector was over-represented. The only exception to this trend comes from the micro-electronics sector, from which not a single survey response was garnered. The catch-all business sector category, termed "other," also failed to garner a single response to the survey, but this category contained several companies, each of which worked in a different business sector, so that no systematic error is expected from their omission in the data.

8.3.1 Funding source utilization

Figure 30 shows the average utilization rate of the various funding sources available for the companies whose directors responded to the survey. The data indicate that the most often source of funding was, unsurprisingly, the founders themselves. On average , company founders contributed capital to their company approximately every two years (or at a rate of 0.44 times per year). The next most frequently used funding source was state support, which may include all levels of public support, including municipal, department, national, and European level support. This source of funding was used approximately once every four years. After this comes debt, which was used about once every five years. The most infrequently used funding sources include business angels, personal acquaintances, and venture capital, which were used on average approximately once every 20 years.

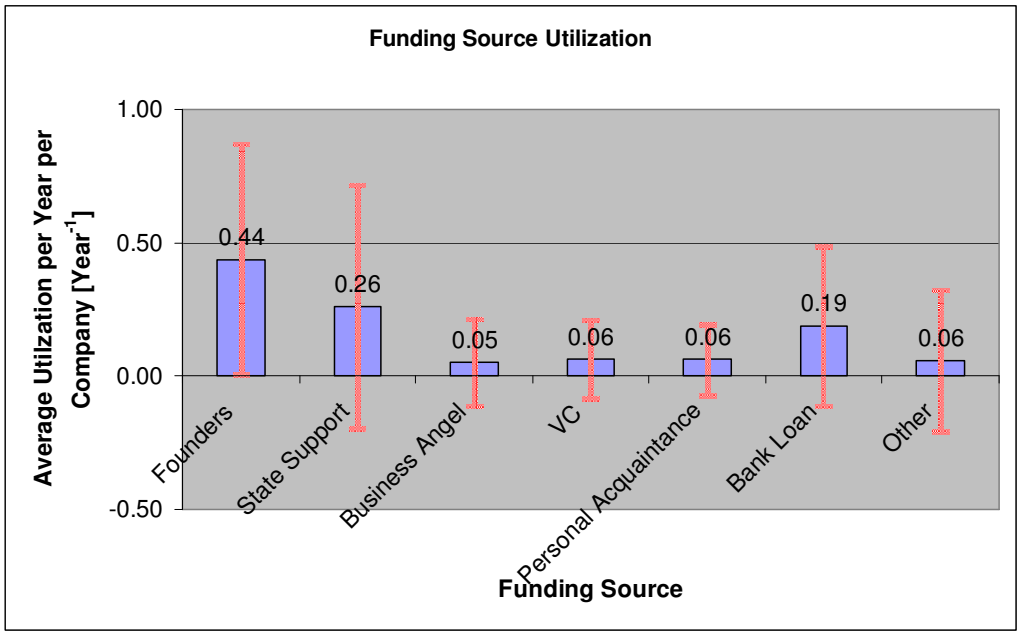

FIGURE 30 : AVERAGE UTILIZATION RATE OF VARIOUS FUNDING SOURCES FOR COMPANIES RESPONDING TO SURVEY. THE RED ERROR BARS INDICATE ONE STANDARD DEVIATION FROM THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTIONS.

The error bars on the figure indicate the standard deviation from the mean for each category of funding. The skew in the averages is fairly small, except for the funding categories of business angel and other, indicating that these averages may be overly influenced by a few companies that used these sources much more often than the rest of the companies.

What is clear is that VC financing is a very infrequently used source of funding. State support and debt financing are much more frequently used.

Considering now only those companies that *did* use VC financing, we find that the rate of use is approximately once every 3.5 years (see Figure 31). This is slightly below the rate of use of the founders own capital and that of state support (approximately once every 3 years and once every 2.3 years, respectively). The data comprising these averages are not significantly skewed, so that these averages are considered normally distributed.

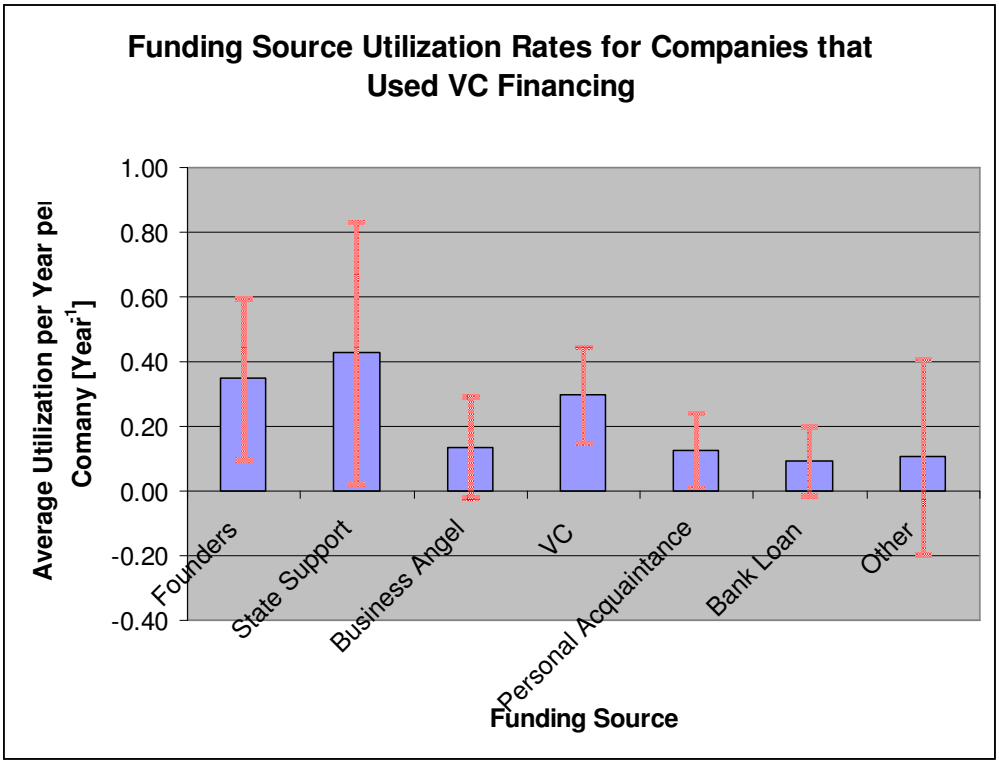

FIGURE 31 : RATE OF UTILIZATION OF VARIOUS FUNDING SOURCES FOR COMPANIES THAT USED VC FINANCING. THE RED ERROR BARS INDICATE ONE STANDARD DEVIATION FROM THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTIONS.

Hence for companies that used VC financing, the most frequent source of capital remained the founders themselves or public support, which were used with a slightly higher average frequency.

8.3.2 Subjective added value for each funding source

Using the survey data, there are two ways to arrive at a general subjective added value score for the various funding sources. The first is the general impression of the directors, who were asked in the survey to give an overall mark for the added value of the funding sources they used (see § 7.3.1). The second method is to take an average of all the marks the directors gave for each role or activity played by the funding source. The results of each method are shown below in Figure 32 and Figure 33.

The data indicate that the company directors judged that VC financiers brought the greatest added value of all the financing options included in this study (excluding, of course, using the founders own capital, since it is assumed that it is difficult to bring more added value to a company than the founders themselves). The financiers who offered the least added value were private acquaintances.

Curiously, when the average is taken over the various roles and activities that a financier may play in bringing added value to a company, private acquaintances leap to the top of the list (see Figure 33), tied with VCs. Debt and state support rank at the bottom in terms of added value in this list. The added value rankings for all the categories (except private acquaintances) decrease notably when the directors are asked how these financiers perform in specific value-adding roles as compared to when the directors are asked to give an overall mark.

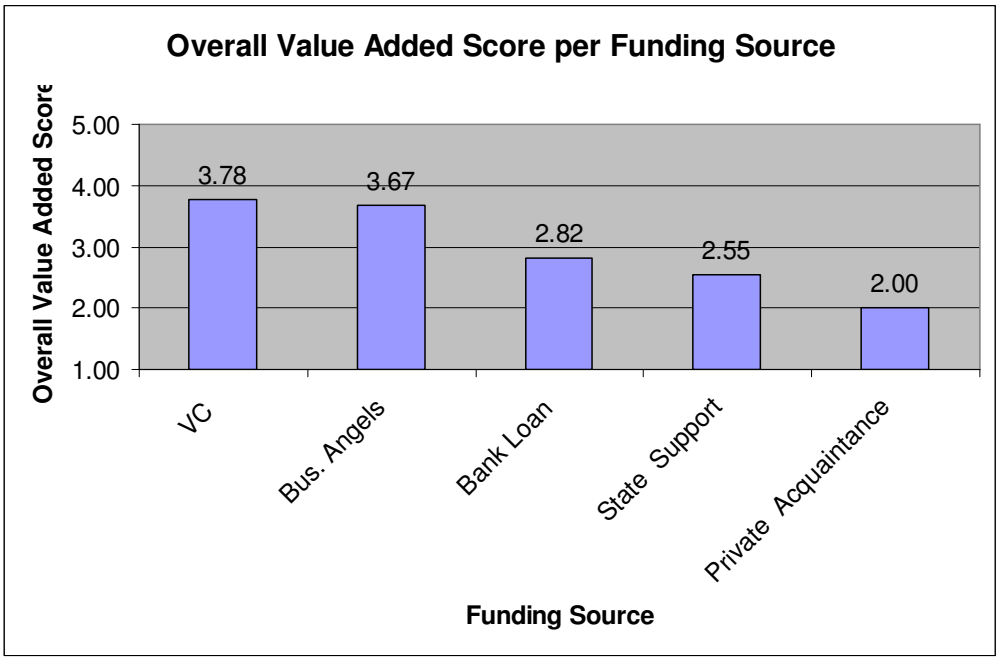

FIGURE 32 : OVERALL ADDED-VALUE SCORE GIVEN BY DIRECTORS OF PURPLE COMPANIES FOR SOURCES OF FINANCING THAT THEIR COMPANY USED.

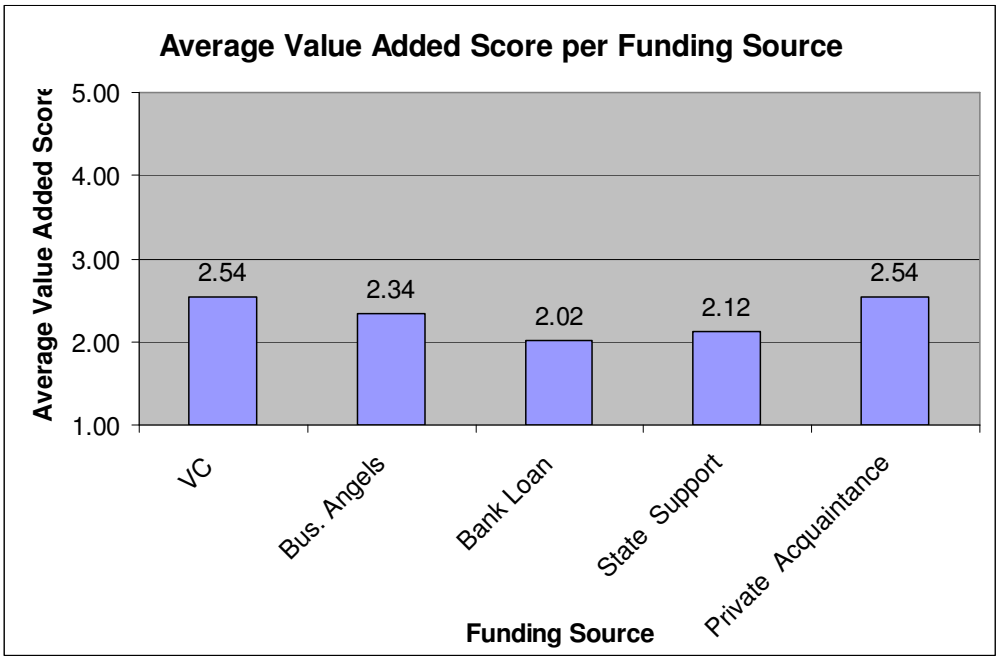

FIGURE 33 : AVERAGE OF ALL MARKS GIVEN BY COMPANY DIRECTORS FOR VARIOUS VALUE-ADDING ROLES AND ACTIVITIES THAT A FINANCIER MAY PLAY IN A COMPANY.

However, in both measures of general added value, VCs are considered to offer the most, according to the directors of the companies in this study that responded to the survey.

8.3.3 Correlation between funding source utilization rate and added value

Curiously, there is a negative correlation between the utilization rate of a funding source, and the added value it is considered to offer. In other words, although the company directors consider that VCs bring the highest added value as a financing mechanism, they make the least use of this option. The data is shown below in Figure 34.

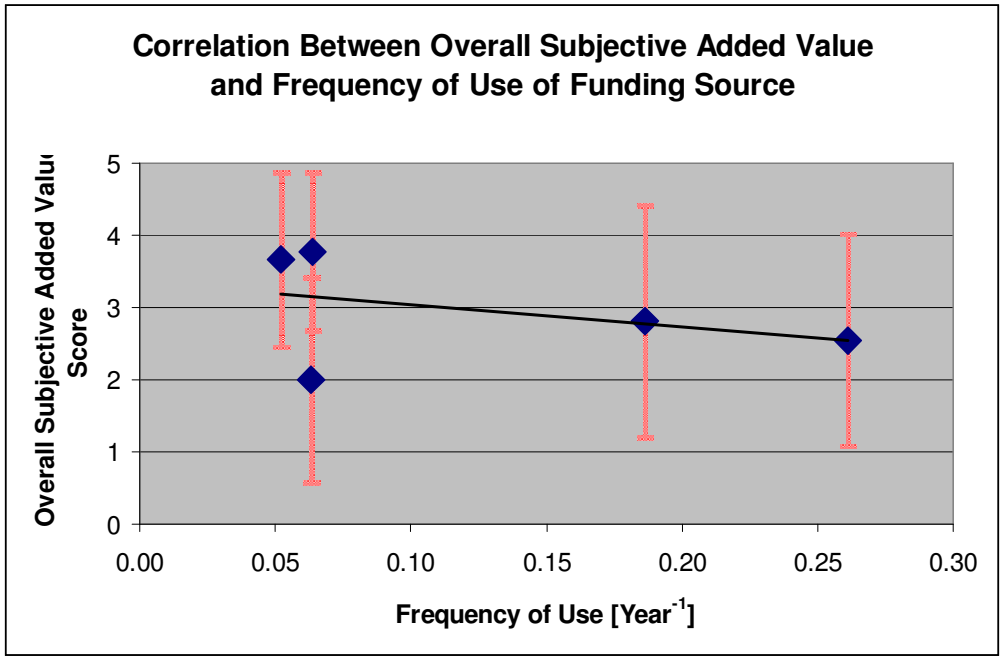

FIGURE 34: SUBJECTIVE OVERALL ADDED-VALUE SCORE VERSUS RATE OF UTILIZATION OF FUNDING SOURCE.

Of course, there are many considerations that come into play in selecting what financing mechanism to use for a company, including availability and the amount of equity, or control, the company must relinquish, to name a few. But one consideration must be the amount of added value that the financing source can offer, as elucidated to by Tim Kavanaugh when he stated that it is more important whose money you get then how much you get (see § 1). The data suggest that, in general, company directors do not fully appreciate the added value on offer from VC firms when making financing choices.

8.3.4 Subjective added value by financing category

In this section is presented the subjective added value scores for the various roles or activities financiers may assume in working with a company in their portfolio. The scores are arrived at by averaging each category over all respondents to the survey. The results are given in the figures below. In each figure, the scores range from 1 to 5, inclusive, so the graphs are all scaled from 1 to 5. The score of 1 indicates no added value, 3 indicates an average added value, and 5 indicates the highest added value score.

Before showing the added value scores for each group individually, the scores for all the groups are shown in Figure 35 for each value-adding role or activity given in the survey.

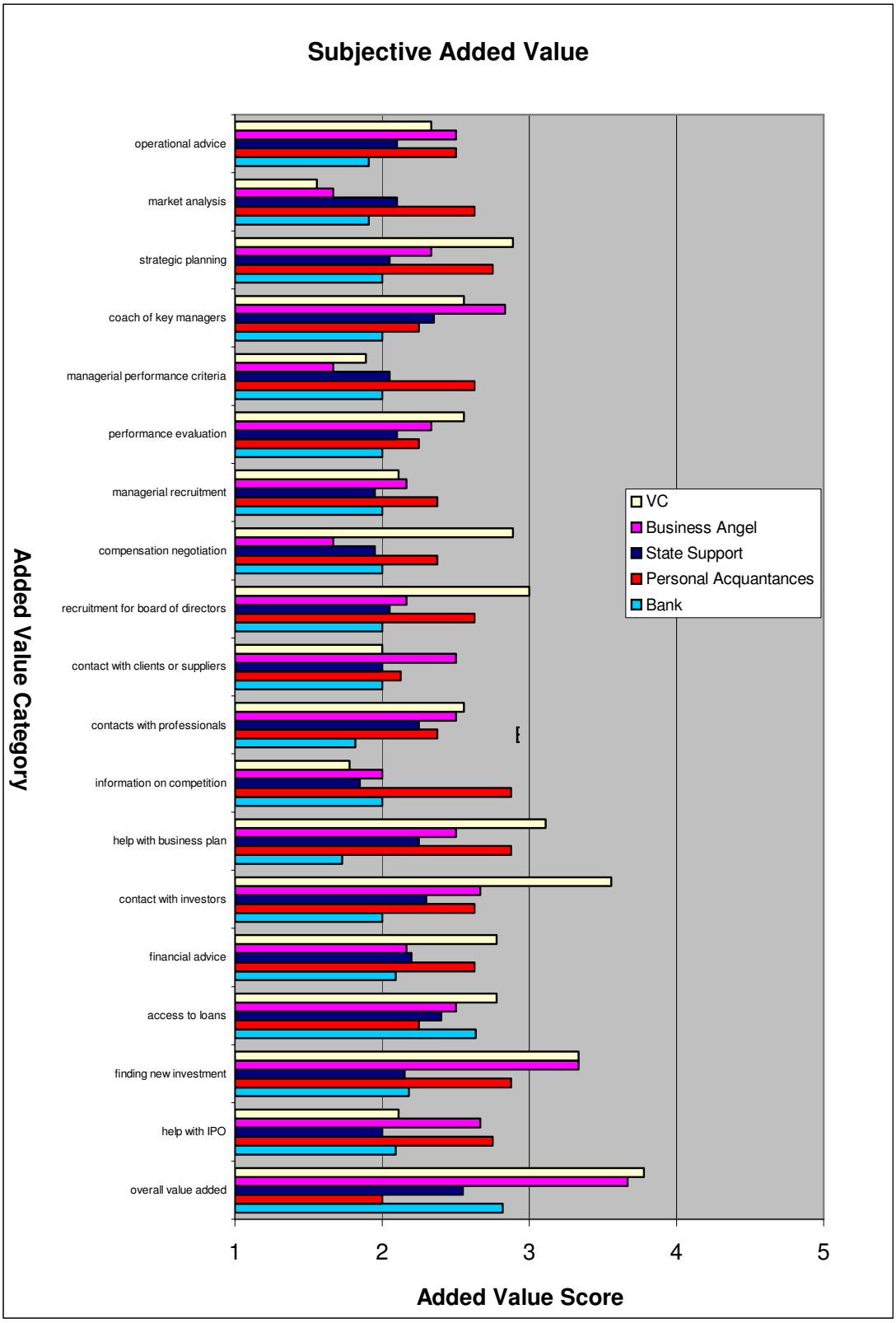

FIGURE 35: SUBJECTIVE VALUE-ADDED SCORE FOR ALL FINANCIER GROUPS AND FOR ALL VALUE-ADDING ROLES OR ACTIVITIES.

The survey results place the contribution of VCs above those of the rest in 10 of the 19 categories (in the category "finding new investment," VCs and business angels were tied for fist place). These ten categories are

1. Strategic planning;
2. Performance evaluation;
3. Compensation negotiation;
4. Recruitment for board of directors;
5. Contacts with professionals;
6. Help with business plan;
7. Contact with investors;
8. Financial advice;
9. Finding new investment;
10. Overall added value.

In this list we find three items that are clearly linked to a VC's social capital—items 4, 5, and 7. Six items are linked with a VC's knowledge-(or experience-) based capital: items 1, 2, 3, 6, 8, 9.

Figure 36 shows the placement of each financing group among its peers.

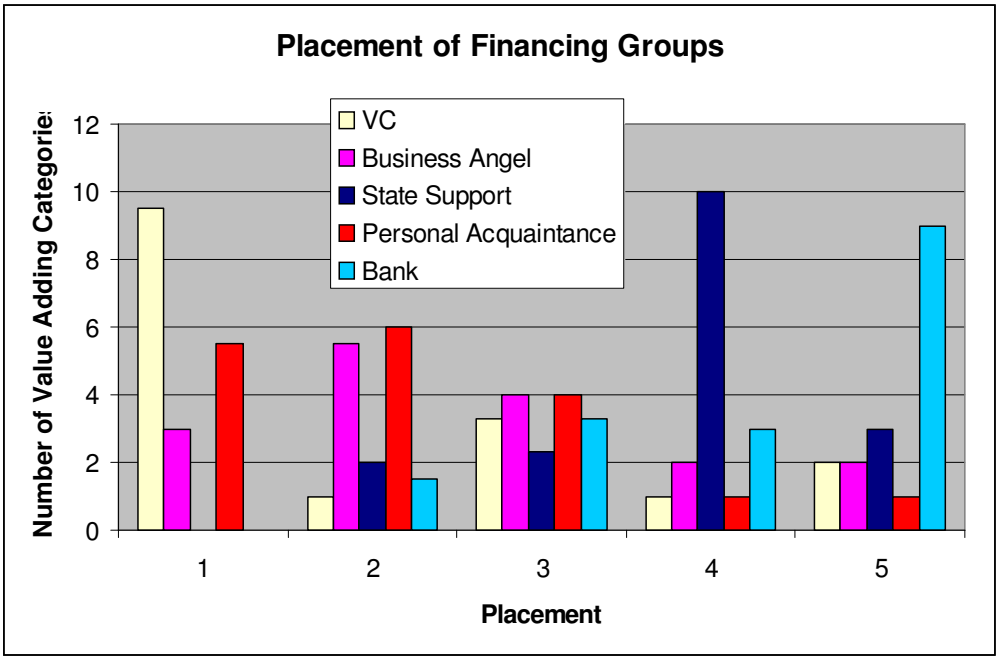

FIGURE 36 : PLACEMENT OF EACH FINANCING GROUP AMONG ITS PEERS. THE FIGURE INDICATES HOW MANY TIMES EACH COMPANY PLACED FIRST, SECOND, THIRD, FOURTH, OR FIFTH AMONG ITS PEERS IN EACH VALUE-ADDING ROLE OR ACTIVITY GIVEN IN THE SURVEY. FOR EXAMPLE, THE FIGURE SHOWS THAT VCS GARNERED 9.5 FIRST PLACE PLACEMENTS OUT OF THE 19 ROLES OR ACTIVITIES GIVEN IN THE SURVEY, AND THAT STATE SUPPORT WERE PLACED 4TH 10 TIMES OUT OF THE 19 ROLES OR ACTIVITIES GIVEN.

As mentioned above, we find that VCs are placed first for the most categories, followed by personal acquaintances, then by business angles. State support agencies and banks are never placed first in terms of contribution for any of the roles or activities given in the survey. However, both of these two funding sources are often placed behind their peers, with 10 4th places for state support agencies, and nine last place placements for banks.

The following table indicates where each financing source places for each category.

TABLE 19: PLACEMENT OF EACH FUNDING GROUP IN EACH VALUE-ADDING ROLE OR ACTIVITY (VC = VENTURE CAPITALIST, BA = BUSINESS ANGEL, PA = PERSONAL ACQUAINTANCE, SS = STATE SUPPORT, B = BANK).

	Best		Average		Worst
Overall value added	VC	BA	B	SS	PA
Access to loans	VC	B	BA	SS	PA
Coach of key managers	BA	VC	SS	PA	B
Compensation negotiation	VC	PA	B	SS	BA
Contact with clients or suppliers	BA	PA	B,SS,VC		
Contact with investors	VC	BA	PA	SS	B
Contacts with professionals	VC	BA	PA	SS	B
Financial advice	VC	PA	SS	BA	B
Finding new investors	BA,VC		PA	B	SS
Help with business plan	VC	PA	BA	SS	B
Help with IPO	PA	BA	VC	B	SS
Information on competition	PA	BA,B		SS	VC
Managerial performance criteria	PA	SS	B	VC	BA
Managerial recruitment	PA	BA	VC	B	SS
Market analysis	PA	SS	B	BA	VC
Operational advice	BA,PA		VC	SS	B
Performance evaluation	VC	BA	PA	SS	B
Recruitment for board of directors	VC	PA	BA	SS	B
Strategic planning	VC	PA	BA	SS	B

8.3.4.1 VC value-added scores

The survey results indicate that the company directors consider the VC's greatest contributions to the business to be in the area finding further financing. As shown in Figure 37, VC's contribution to maintaining contact with investors and with finding new investors ranked between the levels 3 and 4, which correspond to "average" and "important" contributions according to the survey wording. This finding is in agreement with previous studies that found that VCs in the EU concentrate on the financial aspects of their portfolio firms (see § 5).

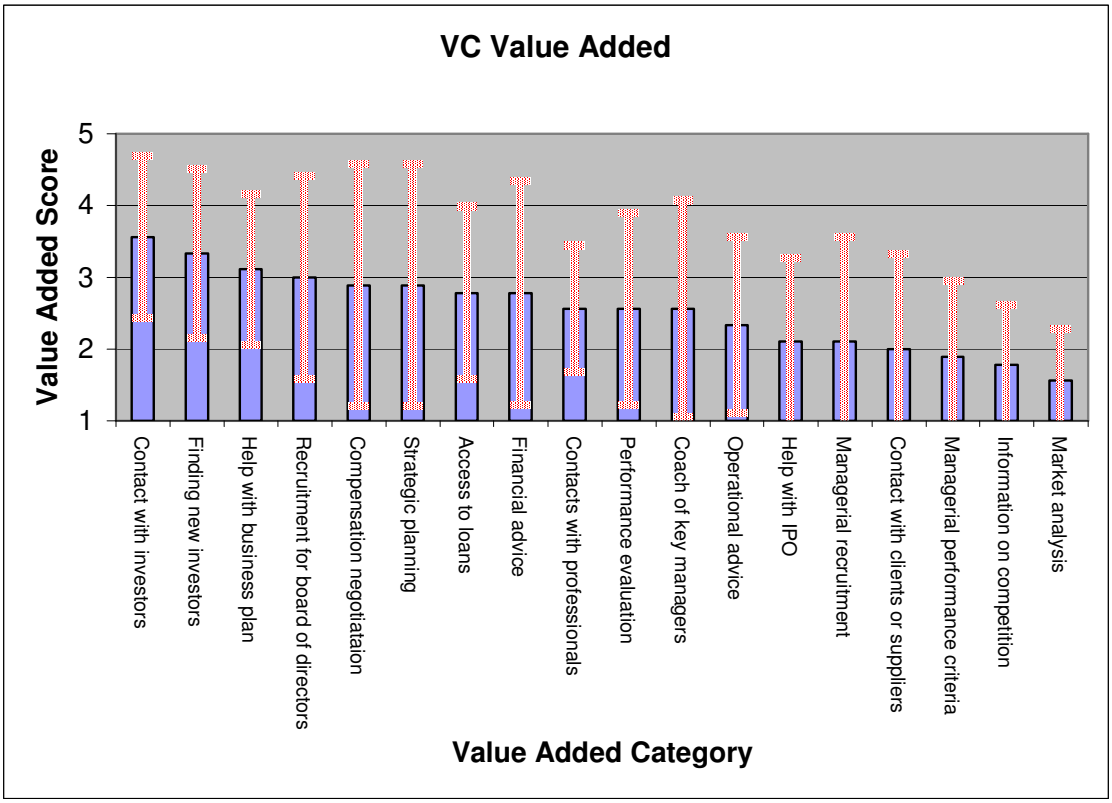

FIGURE 37 : SUBJECTIVE VALUE-ADDED SCORES FOR VCS FOR VARIOUS ROLES AND ACTIVITIES IN WHICH THEY MAY BE INVONVED. THE RED BARS INDICATE ONE STANDARD DEVIATION FROM THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTIONS.

The top three domains in which VCs add the most value are considered to be in the area ensuring continued investments, helping with the business plan, and recruiting board members. For each of these areas, VCs were ranked above average in terms of their contribution. The areas in which VCs are considered to bring the least added value is in establishing performance criteria for managers, obtaining information on the competition, and in analyzing the market. These results are not surprising, given that VCs operate in the world of investments and finance, so it would be expected that they could bring a considerable contribution in this area.

8.3.4.2 Business Angel added value scores

The only area in which business angels were ranked above average was for finding new investors. This may be expected since business angels are often successful entrepreneurs themselves who have extensive contacts in the financing industry. In the remaining categories, the contributions of business angels were ranked below average, indicating that their overall contribution to the company was limited, at best.

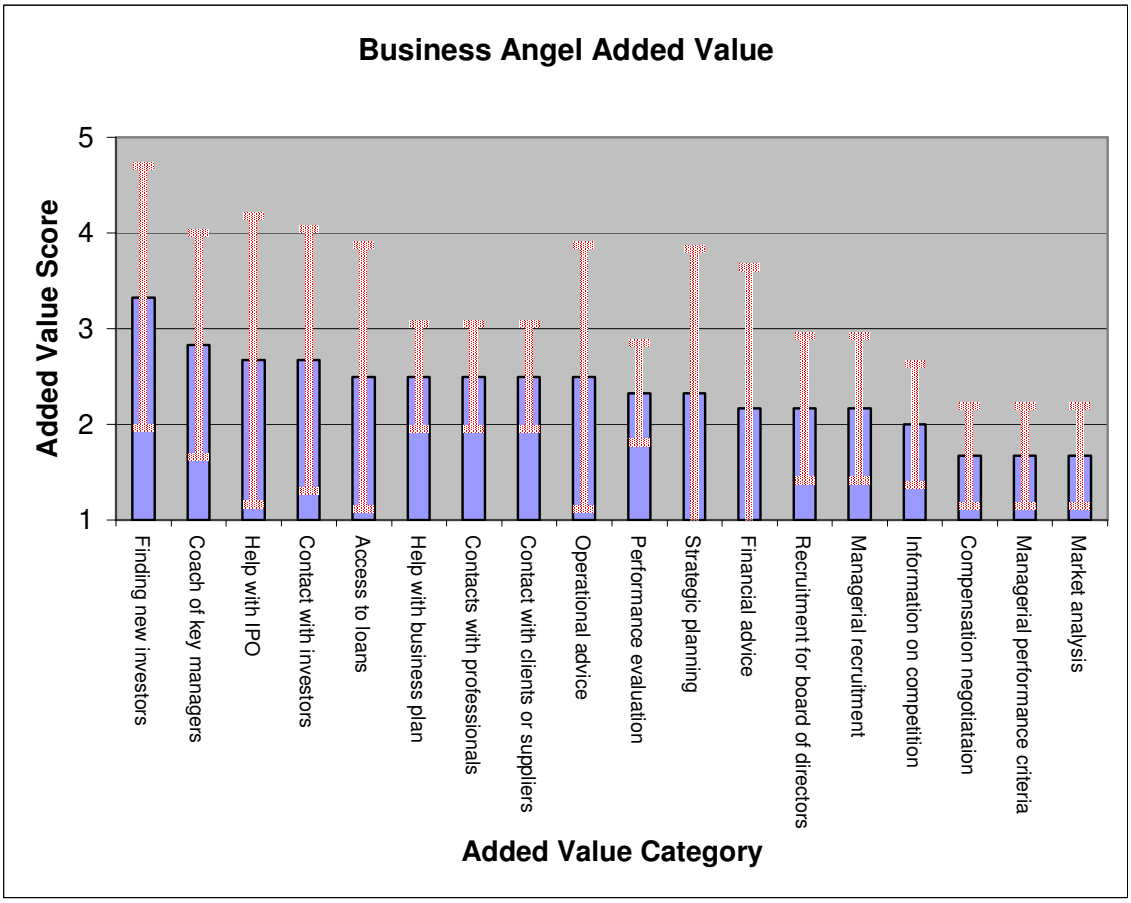

FIGURE 38 :SUBJECTIVE VALUE-ADDED SCORES FOR BUSINESS ANGELS FOR VARIOUS ROLES AND ACTIVITIES IN WHICH THEY MAY BE INVOLVED. THE RED BARS INDICATE ONE STANDARD DEVIATION FROM THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTIONS.

8.3.4.3 Bank Loan added value scores

In all of the categories for value-adding services bankers ranked below average. This is true even for the category of accessing new loans, where one might expect bankers to offer an above average contribution (although if one takes the standard deviation from the mean into account, it is entirely possible for bankers to offer an above average contribution in this area). However, according to the survey results, VCs ranked ahead of bankers in this category, although VCs also ranked below average in this category. In the category of financial advice, VCs also ranked above bankers. This result is quite surprising, and would seem to indicate that VCs may are much more attune to the financing needs of the companies in their portfolios than bankers.

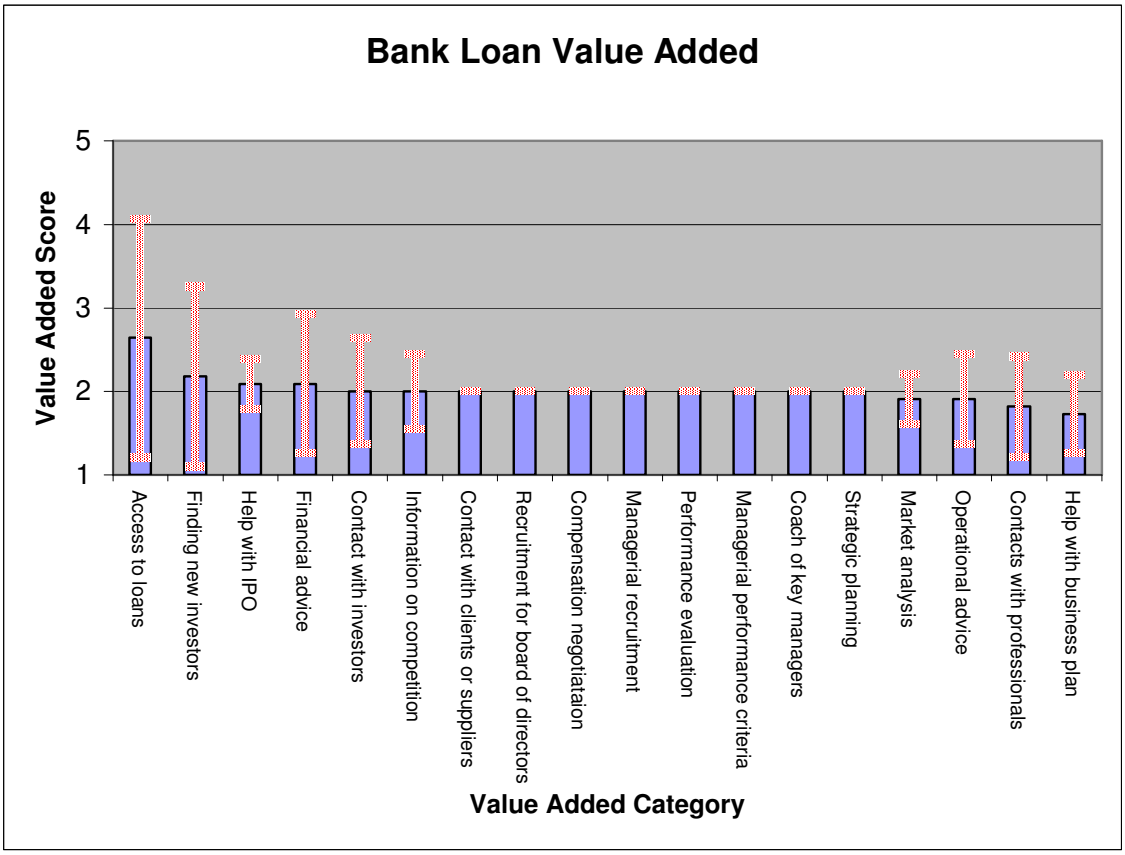

FIGURE 39 : SUBJECTIVE VALUE-ADDED SCORES FOR BANKS FOR VARIOUS ROLES AND ACTIVITIES IN WHICH THEY MAY BE INVOLVED. THE RED BARS INDICATE ONE STANDARD DEVIATION FROM THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTIONS.

8.3.4.4 State support added value scores

The category for which state agencies were given the highest marks for their contribution was in accessing new loans, although, like bankers, they were marked as below average in this category. It is possible that state agencies may provide good contact to public officials, thus contributing to companies in terms of aid in regulatory manners, but this category was not included in the survey.

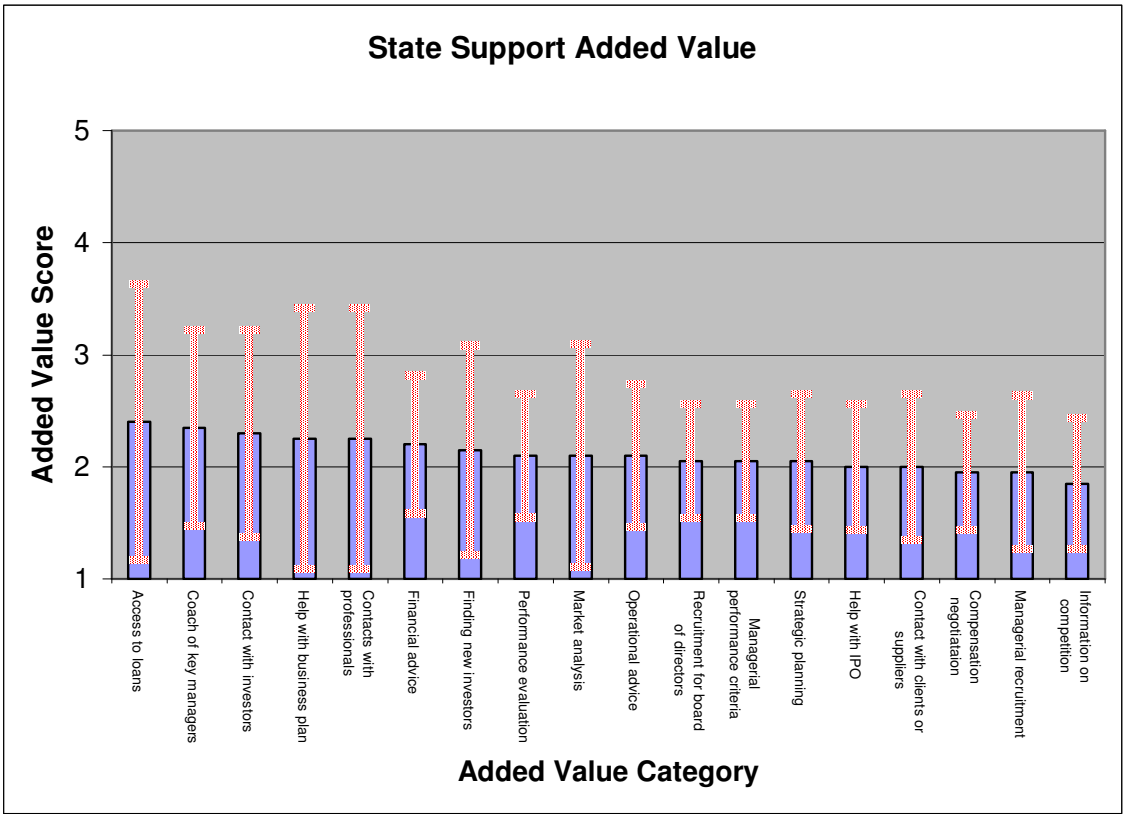

FIGURE 40 : SUBJECTIVE VALUE-ADDED SCORES FOR STATE AGENCIES FOR VARIOUS ROLES AND ACTIVITIES IN WHICH THEY MAY BE INVOLVED. THE RED BARS INDICATE ONE STANDARD DEVIATION FROM THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTIONS.

8.3.4.5 Personal acquaintance added value score

Personal acquaintances were ranked at an equal level (just below average) for the areas of finding new investors, helping with the business plan, and in giving information on the competition. This seems reasonable since personal acquaintances that have the means to add capital to a company are often successful business men or women or professionals themselves, and thus can be expected to have a fair number of contacts that can help with financing and have a good knowledge of the business environment.

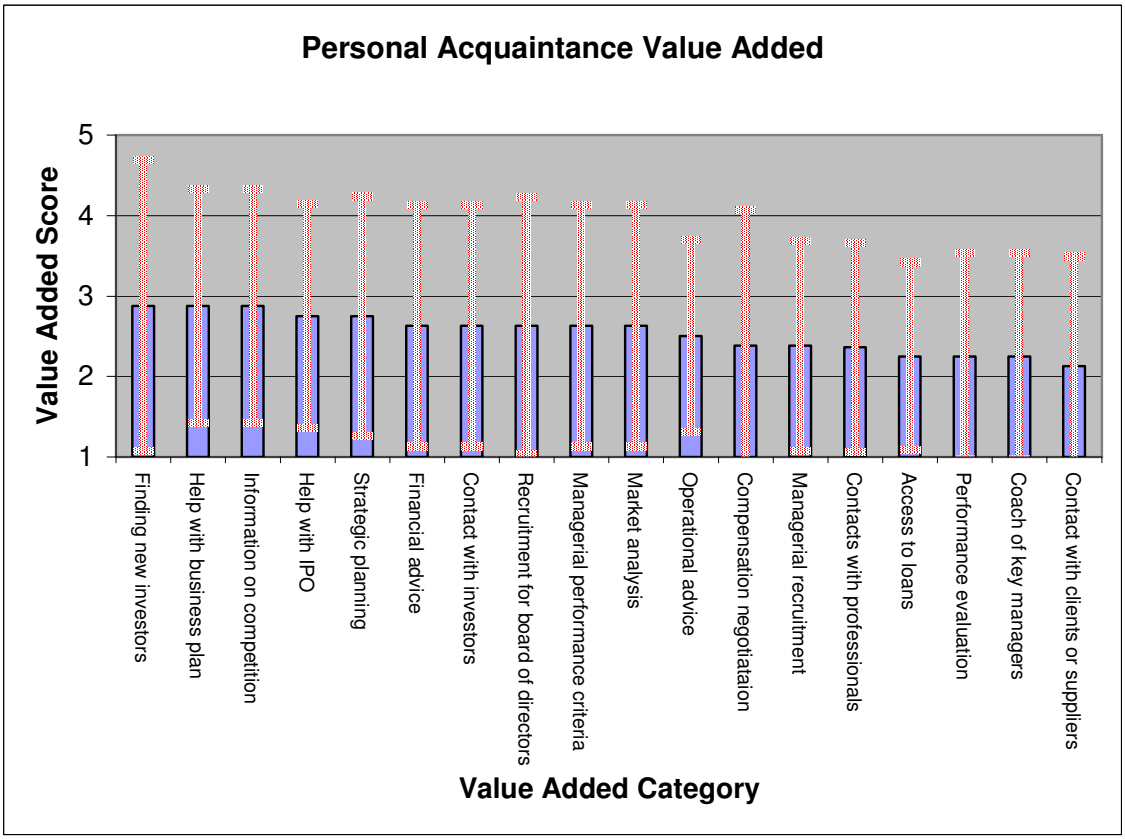

FIGURE 41: SUBJECTIVE VALUE-ADDED SCORES FOR PERSONAL ACQUAINTANCES FOR VARIOUS ROLES AND ACTIVITIES IN WHICH THEY MAY BE INVOLVED. THE RED BARS INDICATE ONE STANDARD DEVIATION FROM THE MEAN IN THE POSITIVE AND NEGATIVE DIRECTIONS.

8.4 CORRELATION BETWEEN OBJECTIVE AND SUBJECTIVE ADDED VALUE

To determine if any correlation exists between the subjective and objective added value, we consider here those companies that responded to the survey and that were financed by VCs. Only nine companies fit this criteria.

The overall subjective added value score (which is the response to item 1 of question 7 in the survey, see § 7.3.1.1) is displayed as a function of the overall metric for each of the nine companies in Figure 42. The figure shows, for example, the three of the nine companies rated the overall contribution by their VCs at the highest level (5), but of these three companies, two had a negative overall metric, and one had an overall metric of almost 2. Hence, no correlation is found between the subjective added value score and the overall metric.

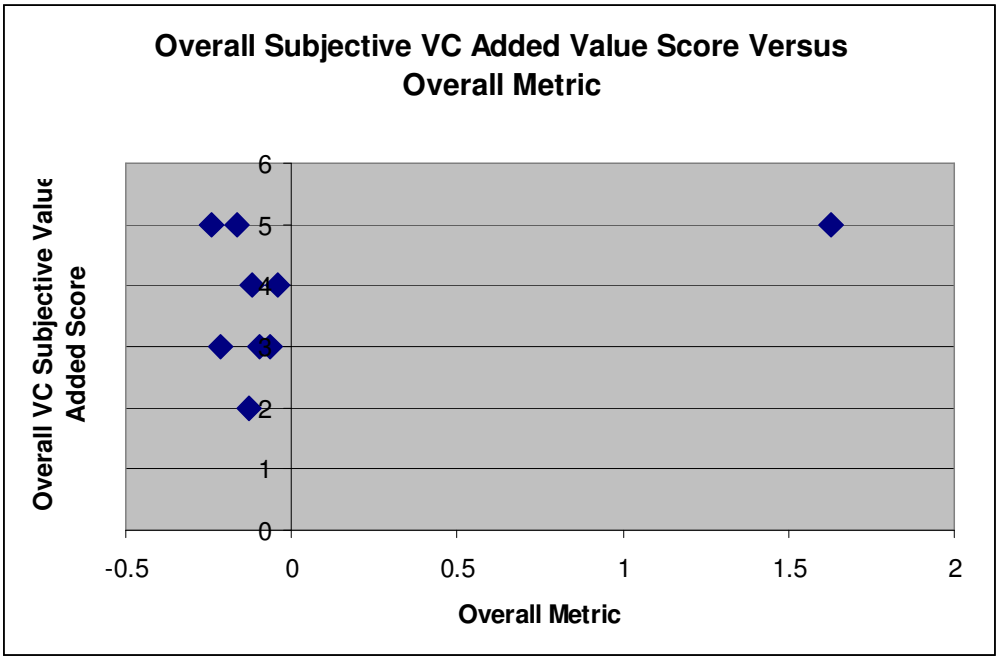

FIGURE 42 : OVERALL SUBJECTIVE VALUE-ADDED SCORE (FROM QUESTION 1 OF SURVEY) VERSUS OVERALL METRIC.

Of the nine companies considered in this section, sufficient data existed for 5 to consider their overall metric both before and after they received VC funding. To see if a correlation exists between the change in company performance, as measured by the overall metric, and the subjective value-added score, the subjective value-added score is shown in Figure 43 versus the percent change in the overall metric. Note that in the figure, the percent change in the overall metric is negative for 4 of the five companies represented. This is because the initial overall metric was negative, as shown in Figure 44. Thus, the largest negative change indicates the greatest increase in performance. No correlation is found between these the subjective value-added scores and the percent change in the overall metric upon VC funding, indicating that the directors of companies that performed significantly better after receiving VC funding did not necessarily attribute that increased performance to the value added brought by their VCs.

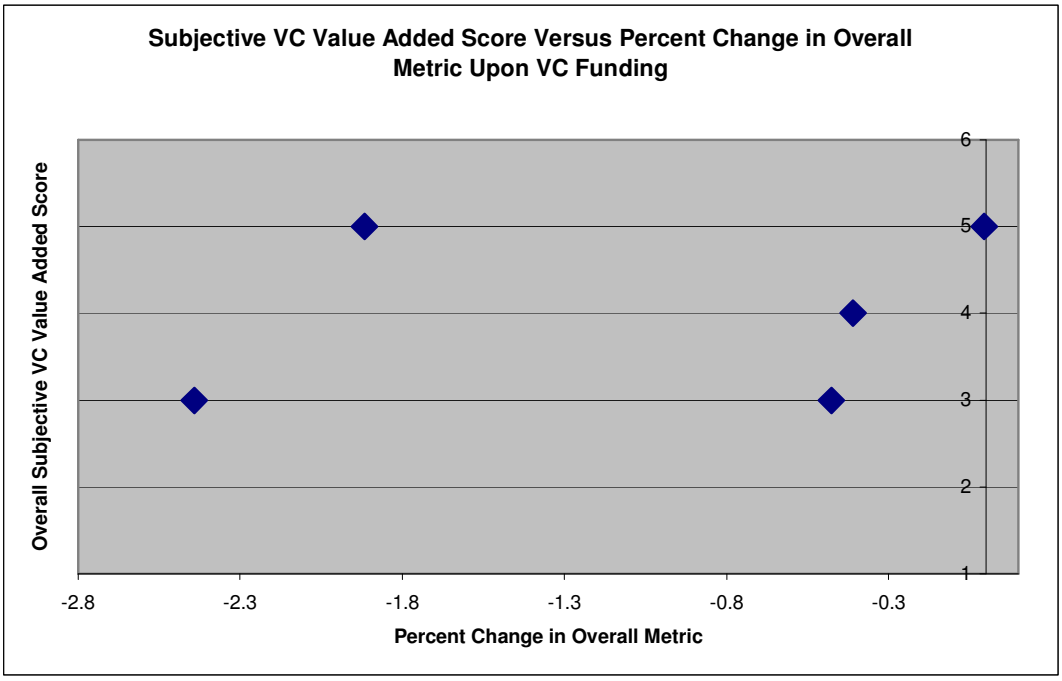

FIGURE 43 : OVERALL SUBJECTIVE VALUE-ADDED SCORE AS A FUNCTION OF PERCENT CHANGE IN OVERALL METRIC UPON RECEIVING VC FUNDING. THE PERCENT CHANGE IS NEGATIVE FOR FOUR OF THE RIVE COMPANIES REPRESENTED IN THIS FIGURE BECAUSE THEIR INITIAL OVERALL METRIC (BEFORE VC FUNDING) WAS NEGATIVE.

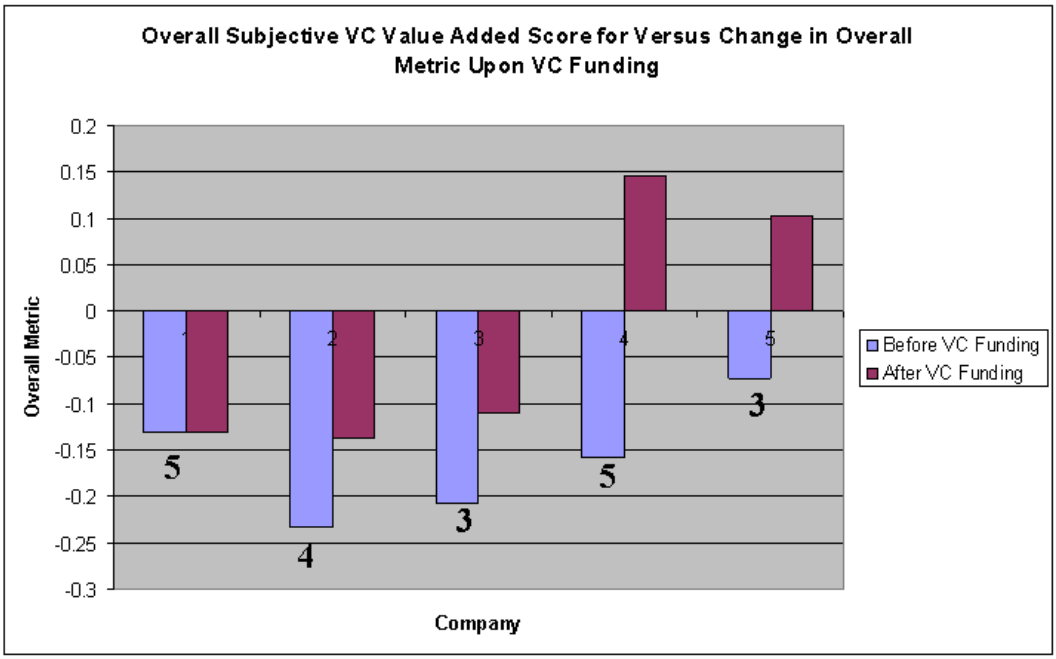

FIGURE 44 : OVERALL METRIC FOR COMPANIES THAT RECEIVED VC FUNDING AND THAT COMPLETELY FILLED OUT SURVEY. THE NUMERALS IN BOLD NOTED FOR EACH COMPANY IS THE OVERALL SUBJECTIVE VALUE-ADDED SCORE GIVE BY THAT COMPANY FOR THE CONTRIBUTION OF THEIR VC FINANCIERS.

In conclusion, no correlation is found between the subjective value-added score given by the companies for the contribution of their VCs and the objective value-added score, given by the overall metric.

9. CONCLUSION

According to the overall metric, which was designed to reflect the characteristics of a successful growth-oriented high-technology business, VC-funded companies in the Grenoble area performed significantly better than companies not funded by VCs (§ 8.1). This fact may be attributed to the fact that VCs spend considerable effort in selecting the most promising companies for funding, so that the superior performance of the VC-funded companies may be interpreted as an indication that they have done their job well, and the companies in their portfolios simply continue to outperform the competition. That the companies improved their performance upon receiving VC financing is also true of financing by debt or state support, so VC financing does not distinguish itself in this regard. Hence, the financial data do not disprove the hypothesis that VCs bring an added value superior to other forms of financing, but there neither do they bring conclusive evidence to support this hypothesis. Further research with a larger number of companies is necessary to reach a more definite conclusion.

The survey of company directors done as part of this study gives a subjective indication of the added value offered by various different financiers (VCs, business angels, banks, state agencies, private persons). Note that this is not affected by the habit of VCs to select the most promising companies, as discussed above for the objective value added. When asked to rank the "overall contribution" of their financiers to the company, they ranked VCs the highest (§ 8.3.4). Also, of the 18 other roles or activities that may constitute an added value, VCs ranked highest in the following 9:

1. Strategic planning;
2. Performance evaluation;
3. Compensation negotiation;
4. Recruitment for board of directors;
5. Contacts with professionals;
6. Help with business plan;
7. Contact with investors;
8. Financial advice;
9. Finding new investment;

However, despite the high ranking of VCs in terms of the added value, they are the least utilized method of funding of all the methods considered in this survey.

Finally, it was found that of all the VC-funded companies included in this study, those that were financed by VCs from Paris posted the best performance as measured by the overall metric (§ 7.4.1.5) , and those that were financed by VCs from Grenoble performed second best (§ 8.2.6).

10. APPENDIX

10.1 CONAN & HOLDER SCORE INTERPRETATION

TABLE 20: CONAN & HOLDER SCORES AND CORRESPONDING PROBABILITIES OF BANKRUPTCY.

Score	Probability of Bankruptcy
> 16	0 %
16	10 %
14.5	20 %
11.75	30 %
9.5	40 %
6	50 %
3.75	60 %
1.75	70 %
-2.25	80 %
-4.5	90 %
< -4.5	100%

10.2 SURVEY INVITATION LETTER

«Courtesy_Title» «Last_Name»,

Dans le cadre d'une thèse de MBA à Grenoble Ecole de Management, je réalise une enquête sur les financements des jeunes entreprises technologiques de la région grenobloise. Cette enquête est réalisée sous la direction de Christophe Bonnet, Professeur de Finance à Grenoble Ecole de Management.

Votre expérience en tant que dirigeant de «Company» nous intéresse. Nous vous demandons donc de bien vouloir nous répondre de façon **anonyme** à un bref questionnaire en ligne au **:**

http://express.perseus.com/perseus/surveys/1734848031/1451d3e0.htm

avant le 1er avril, 2006. Le formulaire demande environ **10 minutes** afin d'être complété.

Ces données resteront **strictement confidentielles et sont uniquement destinées à un traitement statistique.** Le nom des entreprises qui figurent dans cette enquête n'apparaîtra dans aucune publication ou communication. **Vous resterez totalement anonyme.**

Si vous avez participé a la création de plusieurs entreprises, n'hésitez pas a remplir le formulaire en ligne pour chacune d'entre

elles.

Pour toute question, n'hésitez pas à me contacter et nous vous remercions par avance de votre collaboration.

Brett KRAABEL

brett.kraabel@grenoble-em.com

10.3 NUMBER OF INVESTMENTS PER VC FIRM

The following table shows the number of investments by the various VC firms that invested in companies included in this study.

VC Firm	Number of Investments
CEA Valorisation	4
Rhone Alpes Creation	4
Ace Management	3
Innovacom 3	3
ABN Armo Capital	2
CDC Entreprise Innovation	2
Credit Lyonnais VC	2
Ed. Roth. Banque	2
Emertec Gestion	2
I Source Gestion	2
Innovacom Gestion	2
MX 5	2
SPEF Venture	2
Turenne Capital Parnters	2
3i	1
Alto Invest	1
Aquasourca	1
Auriga Partners	1
Banexi Ventures	1
Biotek Partenaires	1
BNP Parisbas Priv. Equity	1
CAP Innova	1
Endeavor	1
ETF Investments	1
Eurosiris	1
Evergreen Partners	1
FCPR Kairos Ventures	1
Fidelity Investments	1
First SA France Innovation Scientifique et Transfère	1
FMR Corporation	1
France Telecom Cap. Dev.	1
Groupama Asset Management	1

Groupe Banque Populaire	1
HSS Ventures	1
INPG Entreprise	1
Invest in Europe	1
JP Morgan	1
MDS Capital Corp.	1
NA Texis Pr. Equity	1
Nexa Orthopedics	1
Odysee venture	1
Platinum Neuron Ventures	1
Pre IPO Invest	1
Safran	1
Schnieder Electric VC	1
Shin-Etsu Handotai Co. Ltd.	1
Siparex Dev.	1
Siparex Ingenerie et Finance	1
Societe Nouvell Pacha	1
STE Dirigeants	1
STE Financiere D'Innovation Sud-Est	1
STE Privee Gestion de Patrimonie	1
STI Ventures NV	1
Sud Partenaires	1
teamlog.net	1
Trescal Gestion	1
Truffle Venture	1
Up Up	1
XK Interactive	1

10.4 COMMENTS FROM COMPANY DIRECTORS

The following are all the comments obtained from the last question of the survey of company directors.

- Nous avons bénéficié d'aides publiques liées à l'innovation. Participation à un projet RNTL (subvention). Dispositif JEI (Jeunes Entreprises Innovantes). Ces aides ont été un bon complément à notre activité, nous permettant de financer de la R&D. Elles n'ont toutefois pas conditionné notre survie.
- Aucun financement autre que le capital minimal
- Aucune aide de personne. Je n'étais pas chômeur...
- PAS DE QUESTION AU NIVEAU des BARRIERES pour le produit innovant? Problème de réglementation pour la mise en marche; concurrence internationale des le départ; positionnement de la start-up vis vis des multinationales
- Entreprise indépendante autofiancée
- Se tromper sur un employé est critique et peut mettre la société en grand danger...
- Le small business act à l'Américaine n'existe pas alors que des grands donneurs d'ordre sont présent en région
- Le Ca
- Nous fonctionnons par auto-finacement. Les éventuels prêts bancaires concerne uniquement des actifs matériels (matériel info, véhicules,...)

- Le financement d'une PME innovante est difficile à obtenir, le crédit d'impôt est un parcours du combattant
- Frilosité des banques, Trop d'entreprises dans le domaine informatique, Mauvaises informations sur les offres de contrats,
- Peu d'information sur les subsides disponibles dans la région
- Vous parlez très peu de la vente

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