The role of Corporate Venture Capital funds in financing biotechnology and healthcare: differing approaches and performance consequences

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Abstract: Corporate Venture Capital (CVC) is an alternative financing mechanism to traditional venture capital for promising start-ups. Yet, these programmes have been operated in very different ways with some focusing on “reserving the right to play” vs. others focusing on “leveraging or upgrading the core”. The paper explores the role of these different CVC models and assesses the performance consequences for the start-ups. Existing research has found that CVC programmes that focused on ventures related to their base businesses were more likely to have more initial public offerings and higher valuations than independent venture capitalists. Furthermore, researchers have found that this effect may be owing to corporate endorsement or the relationships actually developed between the business unit and the entrepreneurial venture. This paper confirms these findings for the biotechnology context.

Keywords: CVC; corporate venture capital; entrepreneurial finance; biotechnology.


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1 Introduction

Corporate Venture Capital (CVC) programmes, where large companies take minority equity investments in early-stage enterprises, have long been recognised as an important alternative financing mechanism for promising start-up companies. This recognition is not different for the biotechnology industry. Many large pharmaceutical companies have set up their own venture capital programmes to harness these opportunities. Indeed, the number of CVC funds, including healthcare-related ones, rapidly increased from 1995
To 2000 attracted by the excellent returns made by the independent venture capital funds. For example, some 350 CVC funds were reported in existence worldwide in mid-2000, up from 110 in 1998 (Campbell, 2000). Corporate investors also accounted for approximately 8% of the total venture capital (approximately $16 billion) invested in 2000 up from 1% in 1997 (Barry, 2000). However, this euphoric participation did not last for long. Following venture capital, CVC went back into a cyclical downturn in the early 2000s. Satisfaction in CVC waned (Bain and Co., 2001).

What should biotechnology or other life science start-ups know about these CVC programmes? We argue that apart from the traditional worries regarding conflicts in objectives and intellectual property protection, biotechnology/life science start-ups should be keenly aware of the CVC market itself, approaches taken, and their likelihood for success, as another source of strategic financing for these companies. For example, when entering into a relationship with a corporation, biotechnology entrepreneurs may be blindsided by decreasing corporate commitment to corporate venturing, tenuous relationships between the business units and the CVC programmes, differences in incentives to make the programme work and difficulties in managing different types of CVC investments. However, despite the potential significant headaches for biotechnology start-ups, CVC, as a mechanism to endorse and leverage the corporation’s core competencies, can significantly improve the likelihood of start-ups’ subsequent exit success over independent venture capital programmes.

This paper thus first introduces a history of CVC market cyclicality, and reasons for its chequered history. The next section follows with the origins of CVC in the pharmaceutical industry focusing on the programmes of five major pharmaceutical players (Novartis, Pfizer, Merck, GlaxoSmithKline and Eli Lilly). We then compare the results of life science CVC with its counterpart, independent venture capital. In the following section, we examine in more specific whether different approaches to CVC of the five major pharmaceutical players may be linked to a greater likelihood of liquidation success, a critical criterion for biotechnology start-ups. Finally, we discuss the implications and consequences for a start-up biotechnology company interested in this alternative source of financing.

2 Corporate Venture Capital

CVC programmes raise money not only from the corporations’ internally generated cash but also from outsiders and invest it in entrepreneurial start-ups at all stages of development. As a group, the CVC industry mirrors the venture capital industry, with funds specialised by stage of development and industries. As shown in Table 1, the distribution of investment dollars by industry is quite similar for independent venture capital and CVC programmes. The life sciences industry receives the highest percentage of venture capital funds, with approximately 25% allocated to portfolio companies focused on the life sciences. This is followed by computer hardware, computer software and online services, and communications.

Similar to venture capital, CVC is cyclical having experienced three major cycles since the 1970s. Since 2000, the number of CVC investments has dropped dramatically as Figure 1 illustrates. Interestingly, the CVC and venture capital cycles do not exactly mirror each other in time. Gompers and Lerner (2002) found that the corporate cycles slightly lag the independent VC cycles, perhaps exposing the corporate funds to
additional risk as they enter closer to the downturn. As one can see from Figure 1, venture capital investments increased much more rapidly in the early days of the internet (circa 1995–1996) than did CVC investments.

Table 1  Venture capital investment by industry

<table>
<thead>
<tr>
<th>Industry type</th>
<th>Entire VC industry (%)</th>
<th>Corporate VC only (%)</th>
<th>Independent VC only (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>25.5</td>
<td>25.9</td>
<td>24.2</td>
</tr>
<tr>
<td>Computer hardware</td>
<td>16.7</td>
<td>17.0</td>
<td>16.8</td>
</tr>
<tr>
<td>Communications</td>
<td>14.5</td>
<td>14.2</td>
<td>15.5</td>
</tr>
<tr>
<td>Computer software/online services</td>
<td>15.1</td>
<td>15.1</td>
<td>16.2</td>
</tr>
<tr>
<td>Other</td>
<td>28.1</td>
<td>27.9</td>
<td>27.3</td>
</tr>
</tbody>
</table>

Source: Gompers and Lerner (1998)

Figure 1  Number of investments made, 1983–2006 (see online version for colours)

Independent venture capitalists are generally motivated by financial returns. CVC also has financial motivations, but there are also strategic motivations: leveraging or upgrading core competencies, reserving the right to play in alternative markets/technologies and finally building an ecosystem (Henderson and Leleux, 2005a). Leveraging or upgrading the core may come from the transfer of resources from the corporation to the venture (leveraging) or from resource combinations or the transfer of resources from the venture to the corporation (upgrading). For example, resource combinations could be in the form of joint product development or joint task forces. Resource transfer from the corporation to the venture could be in the form of the venture leveraging the corporation’s existing distribution channels, gaining access to product development expertise, brand names, or supplier networks. Resource transfer from the venture to the corporation could be in the form of new complementary technologies that could be used in corporations’ business units.

Another way of creating rents through CVC programmes is to provide ‘strategic feelers’ not only to identify early substitute technologies/markets but also to co-opt them
through minority investments. A minority investment (rather than a full-scale acquisition or full-scale development programme) can be seen as a learning option/probe/hedge into a new highly uncertain technology or market that the company has not yet pursued.

CVC programmes may realise value not only through leveraging and upgrading core competencies and reserving the right to play in alternative technologies or markets, but also through the network it develops from the portfolio of investments. As the economy grows into a networked collection of resources, competencies and activities, the importance of the network has grown relative to the value of the individual pieces. Indeed, many researchers have recognised the importance of network-based competition. For example, Gomes-Casseres (1994) refers to the competition between the CISC and RISC standards in computing. Rather than firms competing against each other in a vertical part of the industry value chain, they are competing as a network along the value chain against other horizontally coordinated networks. In recognition of this fact, some players have shifted their corporate VC programmes towards the support and development of these complementary network nodes to shape the industry to their view, which ultimately support the success of their new technologies. For example, Intel Capital has created two funds: Intel 64 and Intel Communications fund with this objective in mind.

Yet, despite these multiple but straightforward objectives of CVC programmes, many corporations have still been very frustrated. Indeed, a recent Bain study showed corporate venturing as one of the least applied and least satisfying strategic programmes used (Bain and Co., 2001). Numerous obstacles have been explored in the CVC literature. First, a well-defined mission for the CVC activity may not have been provided (Fast, 1978; Siegel et al., 1988). Top management often seeks to accomplish multiple potentially incompatible objectives, not only including the traditional objectives – reserving the right to play in alternative technologies and markets, leveraging and upgrading the resources of the corporation, or building an ecosystem – but also comprising spinning off internally developed start-ups, or providing incubation services, or simply riding the venture capital wave by generating attractive financial returns. If CVC programmes incorporate the same venture investment process to different types of external investments and internal ventures that do not ‘fit’ into the organisation, then business unit managers may regard the programme with great suspicion and confusion (Henderson and Leleux, 2005b).

Second, the level of commitment to CVC on several managerial levels can be limited. (Hardymon et al., 1983; Rind, 1981; Sykes, 1990). New senior management teams often close down these programmes because they see them as ‘pet projects’ of a previous management team (Gompers and Lerner, 1998). Furthermore, a decrease in the performance of the base business typically negatively impacts the survival of CVC units. In addition, given past recommendations, CVC investment managers may be more closely aligned to the independent venture capital model and thus search for ‘good’ investments regardless of the ventures’ resource combination and transfer potential with the corporation (see e.g., Siegel et al., 1988). Finally, business unit managers may resist corporate efforts to engage in leveraging the core, because they would prefer funds to be allocated to their internal development programmes. Although business unit managers may recognise the potential value of leveraging or upgrading the core, they are often not specifically incentivised to do so, and they may feel that their effort with start-up companies may be greater than the financial return (Henderson and Leleux, 2005b).
Finally, the relationship may be arduous between the CVC unit and the business units. In many cases, the CVC units may be perceived by the business unit managers as lacking credibility. For example, the units may consist of ‘fast trackers’ from corporate staff and mergers and acquisitions (Henderson and Leleux, 2005b). Finally, business unit managers may envy the financial rewards earned by the CVC units. Why should they make an effort to combine or transfer resources when they know that the returns (in terms of capital gains) would go to the CVC managers, not themselves? (Block and Ornati, 1987)

Yet, not all are lost for start-ups interested in getting funding from corporate investors. In their examination of some 30,000 transactions by corporate and independent venture organisations, Gompers and Lerner (1998) found that CVC investments in entrepreneurial firms appeared to be more ‘successful’ than those backed by independent venture organisations, when there was a ‘strategic overlap’ between the corporate parent and the portfolio firm. More specifically, while controlling for age, rounds of investments, location and the stage of development of the company, the researchers determined that the start-up’s likelihood of going public or being acquired (major determinants for ‘success’) were much higher for those which were corporate-backed and belonged to the same line of business as the investor. Further research has unpacked the notion of ‘strategic overlap’ in more detail. For example, Maula and Murray (2001) determined that this improved success rate might be owing to corporate endorsement. Others argue that the existence of a significant relationship, other than financial, developed between the business unit and the entrepreneurial venture has a significant impact of subsequent liquidation likelihood (Henderson and Leleux, 2006b).

In summary, CVC appears to be a legitimate and important source of funding for start-up ventures. Indeed, CVC has provided significant endorsement and resource benefits that the start-up could never get on its own. However, despite these nice benefits, CVC has had a chequered history owing to its multiple often incompatible objectives, limited commitment and tenuous relationships. So far these conclusions have emerged primarily from high-technology industries such as telecommunications and computing. Do the same results appear for the life science industry, in general, and biotechnology start-ups, in particular?

3 The life science industry approach to Corporate Venture Capital

Historically, established drug-makers have enjoyed consistently high profit margins owing, in part, to patent protection for their products and barriers created by high costs associated with the drug development and approval process. However, profit margins have increasingly being threatened by a variety of forces including the increased level of research complexity, lengthening time to market resulting in less time for patent protected sales, smaller biotechnology companies, which are taking the technological lead in the most advanced therapeutics, and price pressure from third party payers. To succeed in this increasingly competitive and uncertain environment, pharmaceutical companies have been actively exploring alternative ways to shorten the developmental pipeline and increase profitability. These alternatives include internal venture programmes, outsourcing parts of the value chain, partnerships/alliances with other players in the value network, mergers/joint ventures, and, the subject of this paper, corporate venturing capital. To better understand the pharmaceutical industry’s approach
to CVC, we compared the programmes of leading companies: GlaxoSmithKline, Eli Lilly, Merck, Novartis and Pfizer.

Figure 2 summarises selected information regarding these companies’ CVC funds. In general, the funds are structured similarly as far as capital invested per fund, investment size, a tendency to become involved at various investment stages, and a dominance of management by people with significant experience in other areas of the parent company. However, that is where the similarities stop.

<table>
<thead>
<tr>
<th>Year</th>
<th>Eli Lilly</th>
<th>GlaxoSmithKline (GSK)</th>
<th>Merck</th>
<th>Novartis</th>
<th>Pfizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2001</td>
<td>GSK</td>
<td>Merck Fund</td>
<td>Pfizer, Inc</td>
<td>Startup, Spin-off, Bioventures</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2** Life science Corporate Venture Capital programs

<table>
<thead>
<tr>
<th>Fund Names</th>
<th>Investment Stage</th>
<th>Total Capital Invested</th>
<th>Typical Investment Size</th>
<th>Typical Investment Size</th>
<th>Industry Focus</th>
<th>Geographic Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSK</td>
<td>Early =&gt; Expansion</td>
<td>$175MM</td>
<td>$500,000 - $7MM</td>
<td>Drug Discovery Platforms, IT/IT Data Mgmt, Pharma, Services, Therapeutics</td>
<td>100% US</td>
<td></td>
</tr>
<tr>
<td>S.R. One</td>
<td>Early =&gt; Expansion</td>
<td>$200MM</td>
<td>$100,000 - $5MM</td>
<td>Drug Discovery Platforms, IT/IT Data Mgmt, Medical Foods, Molec. Bio. Tools, Therapeutics</td>
<td>90% US</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Early =&gt; Expansion</td>
<td>$111MM</td>
<td>$3MM - $5MM</td>
<td>Agribusiness, Diagnostics, IT/IT Data Mgmt, Pharma, Services, Therapeutics</td>
<td>91% US</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Early =&gt; Expansion</td>
<td>$50MM</td>
<td>$500,000 - $5MM</td>
<td>Imaging, Medical, and Monitoring Equipment, Therapeutics</td>
<td>9% Europe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seed =&gt; Open Market</td>
<td>$217MM</td>
<td>$500,000 - $1MM</td>
<td>Chemical Synthesis, Drug Discovery Platforms, IT/IT Data Mgmt, Molec. Bio. Tools, Therapeutics</td>
<td>100% US</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seed =&gt; Open Market</td>
<td>$960,000 - $1MM</td>
<td>$500,000 - $1MM</td>
<td>30% US/Canada, 40% Switzerland</td>
<td>9% Americas</td>
<td></td>
</tr>
</tbody>
</table>

Many of the differences of the funds can be seen from the summary of the five programmes shown below.

**GlaxoSmithKline (GSK)**

GSK is a leading pharmaceutical company focused on four therapeutic areas: anti-infectives, Central Nervous System (CNS), respiratory and gastro-intestinal/metabolic. In addition, the company has a growing portfolio of oncology products and an interest in vaccines.

**S.R. One**: GSK’s external corporate venturing programme takes place through a wholly owned affiliate called S.R. One. This affiliate was founded in 1985 as a $50 million evergreen fund and by 2004 had $200 million under management. Of the six members of investment team, four previously worked in other parts of the company. The stated goal of these investments was “to achieve financial return while at the same time investing in companies of potential collaborative interest to GlaxoSmithKline”.

The fund’s typical investment is in the range of $100,000 to $5 million, and investments are focused on portfolio companies focusing on R&D and marketing of human therapeutics as well as developing information technologies for healthcare, biotechnology, and pharmaceutical R&D strategies. The company does take an active role in the management of its portfolios, requiring a either board seat if it leads the investment but observation rights at a minimum. The company invests at all stages ranging from seed stage to open market transactions, and portfolio companies are located primarily in North America or Europe.

**Eli Lilly & Co.**

Lilly’s primary focus is on developing drugs for depression, schizophrenia, diabetes, cancer, osteoporosis and other diseases. Eli Lilly leverages its asset base through its venture capital arm, Lilly Ventures, with the stated goal to “facilitate the success
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Of companies in our areas of focus through early to expansion stage investments and value-adding resources”. Yet, contrary to this statement, Chuck Schalliol, Managing Director of Lilly Ventures, states that “we’re making investments because we think we can make money on the investment” (Santini, 2003). This disconnect is an example of the balancing that occurs between strategic and financial motivations.

This external corporate venturing programme consists of three funds: e.Lilly Venture Fund, Lilly BioVenture Fund, and Lilly MedTech Venture Fund. Of the eight members of the investment team, at least six have come from various leadership positions from within Eli Lilly.

e.Lilly Venture Fund: e.Lilly was founded in January 2001 and is funded with $50 million. The fund’s typical investment is in the range of $500,000 to $3 million. This fund specifically

“targets investments in start-up companies with innovative network technologies that promise to have a transformational impact on the current pharmaceutical business model.”

Towards this goal, investments are focused on companies with e-business strategies, and investment stages vary from first stage to expansion stage investments. Although one company, Phase Forward, is in the process of registration, the remaining five companies are still privately held. All of the portfolio companies are located in the USA.

Lilly BioVenture Fund: Lilly BioVenture Fund was founded in 2001 and is funded with $75 million. The fund’s typical investment is in the range of $1.6 million to $7 million with a total investment of $32 million. This fund is focused on private biotechnology companies with pioneering technologies in drug discovery and development and novel therapies. The stated goal of these investments “is to facilitate the success of companies in our areas of focus through early-stage investments and value-adding resources”. Towards this goal, Lilly provides intellectual resources in addition to capital. Of the eight companies funded by Lilly BioVentures, all are still privately held. All of the portfolio companies are located in the USA.

Lilly MedTech Venture Fund: Lilly MedTech Venture Fund was founded in 2004 and is funded with $50 million. This fund specifically

“targets investments in companies with novel diagnostic technologies and therapeutic devices, as well as combination products incorporating pharmaceuticals, medical devices, and diagnostics.”

It did not appear that any investments had yet been made by the end of 2004.

Merck

Merck is a leading research-driven pharmaceutical company. They discover, develop, manufacture and market a broad range of products to improve human and animal health. Therapeutic areas of interest include arthritis, asthma, cancer, cardiovascular, diabetes, gastroenterology, immunology, infectious disease, neurology, obesity, ophthalmology, osteoporosis, and prostrate disease. Merck’s external corporate venturing programme consists of two funds: Merck and Merck Capital Funds.

Merck Funds: Merck Funds was founded in 1983 and is funded with $23 MM. The fund’s size of investment ranges from $1.3 to $8 million. All of the portfolio companies are located in the USA, and investments are made from early stage to
expansion stages with a preference to expansion stages. Of the five companies funded by Merck Funds, four are public and one is in the registration process.

**Merck Capital Funds**: Merck Capital Funds is a subsidiary of Merck & Company and was founded in November 2000. The fund’s typical investment is in the range of $3 to $8 million with a total investment of $100 million. The goal of this fund is to

> “build a venture capital portfolio of promising emerging companies that can bring added capabilities to Merck’s core businesses and generate attractive long-term investment returns.”

The fund is not focused on research-based companies, but rather technologies that ‘accelerate innovation’ in healthcare delivery. Investments are typically made in US-based portfolio companies and are made at various stages ranging from first round to later-stage expansion opportunities. All four members of the investment team have held positions at Medco (the distribution arm of Merck that was subsequently spun off). Of the six companies funded by Merck Capital, one is public, and the remaining five are privately held.

**Pfizer**

Pfizer is a fully integrated company focusing on human therapeutics, animal health products and consumer healthcare. It is the largest pharmaceutical company in the world focusing on the following therapeutic areas: cardiovascular and metabolic diseases, CNS disorders, arthritis and pain, infections and respiratory diseases, urogenital conditions, eye diseases, endocrine disorders and allergies. Its external corporate venturing activities are managed by Pfizer’s Strategic Investment Group.

**Strategic Investments Group**: Pfizer’s external corporate venturing programme takes place through a fund called the Pfizer Strategic Investments Group. This fund was initiated in 1985 and is funded with $50 million. The fund’s average investment is $5 million. Investment stages vary from early stage to expansion stage investments, but the company prefers to provide middle to late stage funding. The stated goal is to

> “invest in companies that develop or market technologies, products or services that could advance Pfizer’s commercial interests and that may dramatically change the dynamics involved in commercialising pharmaceutical products.”

Towards this goal, specific areas of interest include healthcare devices, healthcare information technology and healthcare services. The company clearly states that it will not invest in companies focused on R&D of human pharmaceuticals, vaccines, or consumer health products since there might be a conflict of interest with the companies own research programmes. The fund prefers to invest in portfolio companies located in the USA and hopes that there will be collaboration with Pfizer at some point during the investment period. Of the ten companies in this fund, two are public, and three companies have been acquired.

**Novartis**

Novartis is one of the world’s largest healthcare companies and was created as a result of a merger between two Swiss pharmaceutical giants in 1996: Ciba-Geigy and Sandoz focusing on the following therapeutic areas: cardiovascular and metabolism, neuroscience, respiratory and dermatology, specialty medicines, oncology and haematology, transplantation and immunology, and ophthalmic diseases, as well as
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arthritis, bone, gastrointestinal, hormone replacement therapy, and infectious diseases. As a result of the merger, approximately 10,000 people around the world lost their jobs. An estimated 3000 of these layoffs took place in Switzerland. As a way to help some of these associates, Novartis created an corporate venture division called the Novartis Venture Fund (NVF) in 1996, shortly after the merger. Its mission focused on fostering entrepreneurship, creating new jobs, and hence driving economic growth in the long run.

**Novartis Venture Fund:** The Novartis Venture Fund was organised as an evergreen fund, where investments would be recycled into the fund and not transferred to Novartis’ bottom line, indicating a primarily strategic rather than financial focus. The parent company has no interest in short-term financial returns. The fund initially allocated a limited amount of financing in the amount of CHF 100 million. NVF management believed that the sources for entrepreneurship were situated both within the existing company as well as within the local academic institutions. Consequently, two types of funds were first established: the Spin-off Fund and the Start-up Fund. Only later in 2000, did NVF create a third fund called BioVentures.

The Spin-off Fund focused on providing seed money to former and current employees who wanted to create their own business. Most of the ventures supported by the Spin-off Fund possessed technologies that complemented Novartis’ core competencies. The Start-up Fund focused on supporting start-ups mainly from European universities. In addition to providing entrepreneurs from both of these funds with necessary financing, NVF offered coaching services to facilitate these newly created businesses. Since most of the NVF’s investments were in Switzerland, NVF management was able to keep close contact with its portfolio of companies through meetings, site visits and regular progress reports. Most of these portfolio companies were founded by academic researchers and former Novartis scientists. Both of these groups possessed limited expertise in starting a business and welcomed the NVF’s guidance in addressing key business issues.

In 2000, Novartis created its BioVenture Fund. The BioVenture Fund focuses on investing in start-ups primarily in the USA and in product and platform based biotechnology, pharmaceutical and healthcare companies. BioVenture Fund investments are placed at all stages of the portfolio company’s financing with the intention of generating long-term capital gains for both the entrepreneurs and the NVF. Based on an interview with a former executive of an NVF, US-based portfolio company, we found that the NVF did not hold a board seat, though it had invested approximately $3 million in the company. Furthermore, the NVF had no involvement in the company’s business operations or strategic planning efforts. However, the portfolio company did update the NVF on its progress as frequently as warranted.

As the description of these CVC programmes shows, there are significant differences. First, the types of companies the funds invest in are quite varied. For instance, Lilly and Merck make significant investments in IT and software related companies. Lilly makes relatively few investments in companies doing traditional pharmaceutical R&D. Second, the stated goals of the funds differ dramatically. While generally there is a strategic element in all the funds’ goals of helping the core business of the parent, the approach is different. For example, Pfizer specifically states that it avoids investments in companies doing human pharmaceutical R&D, but otherwise is interested in other R&D companies, either complementary or emerging technologies. Similarly, Lilly avoids R&D directly related to drug discovery, focusing more on complementary technologies. Novartis, on the other hand, initially used its fund as a way to help Novartis scientists...
who would have otherwise been put out of a job. Finally, there is some evidence of occasional disconnects between the officially stated goals and actual activities. While the stated goals of the funds sound most strategically, there is evidence of a financial focus as well. For example, Lilly most clearly states the financial interest, citing attractive long-term investment returns. But, in one interview with one of the managing directors of Lilly Ventures, the message was different. “We’re making investments because we think we can make money on the investment” (Santini, 2003). Also, Merck and Pfizer invest significantly in R&D companies that based on their mission statement that appear to be too closely related to the parent’s R&D activities.

4 Comparison of Corporate Venture Capital and independent venture capital: application to the life science industry

Because of the limited information available regarding the amount-specific investors contribute to a company’s particular funding round and the performance of private companies, we approached the analysis of venture-backed initiatives in the life science sector in a similar method as previous studies. Ideally, we would like to use investment returns as a measure of success; however, VentureXpert, the data source, does not compile the ownership stake held by each investor. We thus resorted to examining the status of the venture in late 2004. The two changes in status that interest us are: going public and being acquired. A recent study showed that the mean returns for either going IPO or being acquired is approximately 108% (but with a variance of 135%) and not corrected for survival bias (Cochrane, 2005).

We took two descriptive statistical approaches: first, a comparison of the likelihood of liquidation either through IPO or merger and acquisition between CVC and independent venture capital programmes, and second, a status and market valuation comparison of those companies that already went through an initial public offering. All of the information came from VentureXpert, which provides data on each venture such as the following: founding date, country of origin, number of rounds, location, investment per round, the number of investors, the number of corporate investors, and the name of the corporate investors.

Two sets of raw data were taken from the VentureXpert database. The first concerned the corporate venturing activities of five major pharmaceutical companies: Novartis, Merck, Pfizer, GlaxoSmithKline and Eli Lilly up to 2003. The second data set comprised all life science investments made by any private venture capital fund as defined by VentureXpert’s industry codes, specifically 4000 and 5000 from 1985 up to 2003. We chose the starting year as 1985, the year when GSK, Pfizer, and Merck began their CVC activity. We did encounter a problem of normalising for lengths of time as both Lilly and Novartis had relatively recent fund inception dates, thus biasing downwards the liquidation potential and market valuations for those in the CVC database. The information we used from these two data sets first concerned the status of the ventures as of 2006 and second the status and market capitalisation of the subset of companies, which pursued an initial public offering up to that date. Unfortunately, this market capitalisation information was missing for a significant number of companies. In other cases, the data was set to zero. To fill in the gaps, market value data was taken for year end 2006 for the company under consideration. Bloomberg was used to sort out the cases where it was not clear whether the company still existed, to determine whether
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the company had been acquired or was defunct. Acquired companies were valued at their purchase price using data taken from SDI Platinum’s mergers and acquisitions database (in 2004 dollars). Once the data was cleaned, companies were sorted by status, and average market capitalisation was calculated using constant 2007 dollars to compare the average market capitalisation of those ventures that were backed by venture capital and those that were backed by CVC.

Table 2 shows the comparison of the status of start-ups, which were venture capital backed compared with those backed by CVC programmes of Merck, Pfizer, Novartis, GSK or Lilly. While we should be cautious in making conclusions using descriptive statistics, the results are broadly similar to previous studies: CVC programmes, in general, result in similar levels of liquidation success than private venture capital programmes (see e.g., Gompers and Lerner, 1998, for a comparison). Interestingly, the status changes for IPO and acquisition are approximately 10% lower than Gompers and Lerner (1998) (e.g., 50% vs. 60%). Perhaps the differences come from very uncertain nature and long-term nature of drug discovery compared with some other industries that receive venture capital backing. Regardless, the figures suggest that biotech entrepreneurs, on average, would achieve the same success rates whether they were funded by independent venture capitalists or CVC programmes.

Table 2
Status of start-ups: venture capital vs. Corporate Venture Capital

<table>
<thead>
<tr>
<th>Status</th>
<th>Venture capital</th>
<th>%</th>
<th>Corporate Venture Capital</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defunct</td>
<td>86</td>
<td>7.07</td>
<td>5</td>
<td>2.99</td>
</tr>
<tr>
<td>Public</td>
<td>310</td>
<td>25.47</td>
<td>43</td>
<td>25.75</td>
</tr>
<tr>
<td>Acquisition</td>
<td>319</td>
<td>26.21</td>
<td>41</td>
<td>24.55</td>
</tr>
<tr>
<td>Private</td>
<td>502</td>
<td>41.25</td>
<td>78</td>
<td>46.71</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1217</strong></td>
<td><strong>100.00</strong></td>
<td><strong>167</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

$\chi^2 = 3.17$ (Not significant).

Table 3 compares both the post-money valuation of the portfolio companies at the time of their IPO (in constant 2006 dollars) backed by independent venture capitalists and corporate venture capitalists. As we can see from Table 3, CVC post-money valuations are significantly higher than those from independent venture capitalists (by approximately 28%). In addition, Table 3 illustrates the status of these companies as of the end of 2006. While not interesting from the perspective of the venture capitalists, since they typically sell off their stakes after the company goes public, it is interesting for the biotech entrepreneur. For those companies funded by CVC programmes, 77% remained public while another 7% no longer existed. Furthermore, 16% of the firms had been acquired since their IPO. In contrast, for all life science funds, only 5% were defunct, while 69% remained public and 26% had been acquired or merged. These differences in status distribution were significant at the 10% level.

In addition, despite the lack of statistical significance, our final performance measure gives another advantage to the CVC funds. Table 3 also compares data on the 2006 end of year market capitalisation for the IPO companies in our two samples grouped by their status at that time. As the data shows, aggregating across all categories, the CVC IPO companies had a larger average market capitalisation than the overall life sciences sample. The CVC companies have an average market cap of $452 million while the life
science IPO companies as a whole have an average value of $383 million, an 18% difference. Interestingly, those that remained public also had a much higher valuation as well, a 24% difference.

Table 3  
Post-IPO performance: venture capital vs. Corporate Venture Capital

<table>
<thead>
<tr>
<th>Category</th>
<th>Venture Capital %</th>
<th>Valuation constant 2006 $ million</th>
<th>Corporate Venture Capital %</th>
<th>Valuation constant 2006 $ million</th>
<th>T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-money valuation</td>
<td>232.00</td>
<td>297.00</td>
<td></td>
<td>Sign.</td>
<td></td>
</tr>
<tr>
<td>Defunct</td>
<td>16</td>
<td>5.16</td>
<td>0.00</td>
<td>3</td>
<td>6.98</td>
</tr>
<tr>
<td>Remained public</td>
<td>214</td>
<td>69.03</td>
<td>400.00</td>
<td>33</td>
<td>76.74</td>
</tr>
<tr>
<td>Acquired</td>
<td>80</td>
<td>25.81</td>
<td>413.40</td>
<td>7</td>
<td>16.28</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>383.20</td>
<td>43</td>
<td>452.20</td>
<td>Not sign</td>
</tr>
</tbody>
</table>

For testing differences in status frequencies: $\chi^2 = 5.02$ (significant at 10%).

Analysis of the data seems to suggest that, despite the headaches associated with these programmes, CVC as a source of funding and support for biotech start-ups can have significant short and potentially long-term benefits. They result not only in similar status results than independent venture capital, but also in higher post-money valuation and longer-term valuation measures.

5  Mapping Corporate Venture Capital investments to strategic objectives: analysis of outcomes

Examining CVC to private equity companies only provides biotech start-ups a small but important data point regarding the choice between the two. Other significant criteria concern the differences and results of the CVC programmes.

Given that objectives of CVC funds seem to differ, then it would be interesting to determine how these differences translate into the actual investments made and their subsequent likelihood of going IPO or being acquired. We thus categorised all of the portfolio companies for Novartis, GSK, Pfizer and Lilly as either leveraging the core, upgrading the core, reserving the right to play. (Note that there were no funds specifically trying to establish a standard in the industry, the objective of ecosystem-based investments.) While some decisions had a subjective element, the general guidelines for the three categories were as follows:

- **Leveraging**
  - Should be consistent with the R&D focus of the fund company, whether as far as therapeutic area or process/methodology
  - Should not be a new platform technology or highly proprietary technology
  - Existence of an R&D strategic alliance favoured assignment to this category.
The role of Corporate Venture Capital funds

- **Reserving the right to play**
  - Should be different than the core competencies of the pharmaceutical company, as far as therapeutic area or process/methodology
  - Should involve a new platform technology or highly proprietary technology
  - Should have potential to be a disruptive technology.

- **Upgrading the core**
  - Should not involve directly in developing drugs.
  - Should assist in simplifying, accelerating, or lowering the costs of the drug development process. This could occur at any stage of the process, from R&D to clinical trials, to sales and marketing.
  - Evidence of strategic alliance in various parts of the pharmaceutical business favoured assignment to this category.

Given this framework, we categorised all of the portfolio companies for Novartis, GSK, Merck, Pfizer, and Lilly.

Table 4 shows the summary results for our categorisation, and a brief characterisation of the different funds is given below.

**Table 4  CVC portfolio categories**

<table>
<thead>
<tr>
<th>Category</th>
<th>Lilly</th>
<th>Novartis</th>
<th>Pfizer</th>
<th>Merck</th>
<th>GSK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leveraging</td>
<td>15</td>
<td>48</td>
<td>30</td>
<td>36</td>
<td>21</td>
</tr>
<tr>
<td>Upgrading</td>
<td>69</td>
<td>23</td>
<td>20</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Reserving the right to play</td>
<td>15</td>
<td>29</td>
<td>50</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**GSK**
- Primarily focused on upgrading investments
- Strategic intent is focused on developing portfolio companies that are complementors thus upgrading GSK’s existing capabilities.

**Lilly**
- Primarily focused on upgrading investments
- Particular emphasis on IT-related investments
- Strategic focus on complementors.

**Merck**
- Primarily focused on upgrading investments
- No presence in emergent investments.
Primarily focused on reserving the right to play investments
- Strategic focus on potential new business and disruptive technologies
- Consistent with the stated goals of the fund to not compete with their own R&D efforts.

Novartis
- Primarily focused on leveraging investments
- Strategic focus on supporting the existing company infrastructure.

Interestingly, Table 5 illustrates the percentage of each fund’s portfolio companies that are currently public, private, defunct, or have been acquired. Those companies, such as Lilly, Merck and GSK, that have focused primarily on complementary, upgrading the core, investments have succeeded with a higher percentage of IPOs and acquisitions. On the contrary, Pfizer, which emphasises “reserving the right to play” investments, has had the least success with IPOs and acquisitions. Furthermore, Novartis, which looks primarily at leveraging investments, had a moderate success. These findings, based on descriptive statistics, broadly corroborate with our empirical econometric study on telecommunications CVC. Those ventures that had formed a relationship (either upgrading or leveraging) with the corporation were more likely to go public or be acquired than those without a relationship (Henderson and Leleux, 2005a). Furthermore, “upgrading the core” investments such as ones with technology-based relationships were much more likely to go public or be acquired than those “leveraging the core” (Henderson and Leleux, 2006a).

Table 5  CVC portfolio companies: status

<table>
<thead>
<tr>
<th>Status</th>
<th>Lilly</th>
<th>Novartis</th>
<th>Pfizer</th>
<th>Merck</th>
<th>GSK</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO</td>
<td>30.8%</td>
<td>15.7%</td>
<td>15.4%</td>
<td>45.5%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Acquisition</td>
<td>19.2%</td>
<td>25.5%</td>
<td>23.1%</td>
<td>18.2%</td>
<td>27.3%</td>
</tr>
<tr>
<td>Private</td>
<td>42.3%</td>
<td>56.9%</td>
<td>61.5%</td>
<td>36.4%</td>
<td>37.9%</td>
</tr>
<tr>
<td>Defunct</td>
<td>7.7%</td>
<td>2.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>51</td>
<td>13</td>
<td>11</td>
<td>66</td>
</tr>
</tbody>
</table>

6  Discussions and conclusions

It is clear that biotech entrepreneurs should be very interested in CVC programmes as a source of funding for their start-up ventures. Indeed the short- and long-term IPO performance of pharmaceutical CVC investments compares favourably with the life science funds of independent venture capitalists. Post-market and long-term valuations are approximately 28% higher and 18% higher, respectively, for CVC funds over venture capitalists. Furthermore, biotech entrepreneurs should be aware that the higher likelihood of this success comes from those investments that “upgrade the core” of the corporation’s businesses rather than those that “leverage the core” or “reserve the right to play”.
While we can only speculate, perhaps this is because the start-ups receive more attention given their greater benefit to the corporation rather than the other way around.

However, any start-up entrepreneur should also be aware of the potential pitfalls and obstacles of CVC programmes. CVC is not highly regarded in corporate settings. There is a low rate of satisfaction in its usage. A number of reasons have been cited in which the start-up entrepreneur needs to be keenly aware. First, multiple often incompatible objectives are often not managed well. Thus, often leveraging and upgrading the core type of investments are made through the same process as reserving the right to play investments. However, using the same due diligence, negotiation, and management processes for these distinct investments types may lead to significant management disgruntlement and, consequently, difficulties for the start-up itself. Second, commitment to CVC programmes often wavers. Given the long-term nature of CVC programmes (i.e., from the time of the initial investment to the potential return from the initial public offering or trade sale), top corporate officers often get restless and impatient. Many times CVC programmes are shut down only a couple of years after they have started, leaving the start-ups often in an unstable situation. Third, business unit managers are often not incentivised to develop relationships with start-ups. Their business unit may benefit if the investment is an “upgrade the core” type but they do not gain in the significant potential upside should the start-up go public or is acquired. Rather the upside potential often resides with the CVC programme (especially if they are remunerated in the same manner as venture capitalists with a percentage carried interest). These differences in incentives can often lead to tenuous relationships between the business units and the CVC programme. Often the start-ups are stuck in the middle of these relationships. Fourth, if the business unit decides to change its strategy, many times the start-ups will be negatively affected. Where will they fit within the corporate environment? Finally, there is constant tension between the start-up and the business units over the sharing of sensitive and confidential information. Entrepreneurs may perceive heavy corporate involvement as an attempt to appropriate their know-how or expertise.

In sum, CVC can be a very successful source of funding for biotechnology entrepreneurs. However, the success comes at a price: the significant headaches navigating the obstacles associated with CVC programmes. This paper attempts to at least raise entrepreneurs’ awareness of these potential pitfalls before entering into any significant relationship with a CVC programme.

References


Notes

1Available at http://www.srone.com/invest.html

2Available at Lilly Ventures, from http://www.lillyventures.com/

3Available at http://www.lillyventures.com/

4Available at http://www.merckcapitalventures.com/index.html

5Available at http://www.pfizer.com/subsites/psig/index.html

6Interview was conducted with Ms. Nancy Stuart, former V.P of Business Development at Kinetix Pharmaceuticals.