What the Public Sector Should Know about Venture Capital

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ABSTRACT

Ready access to venture capital investments is vital to the success of start-up companies in the capital intensive high-technology sectors such as biotechnology. But there is a common misconception that an abundance of venture capital will spawn the formation of new companies. In fact, the opposite is true: new companies actually attract venture capital. This chapter provides an overview of the venture capital system, explains its importance, and identifies what qualities of a company make it attractive to venture capital investors. Some of the factors can be influenced by government action, so the chapter offers several ways that governments can encourage venture capital investment.

1. INTRODUCTION

Commercialization of biotechnology research is a long, expensive process that requires highly trained staff, sophisticated laboratory facilities, and costly regulatory approvals. A growing amount of this work is done by small companies. They are the primary source of innovation in biotechnology and are performing an ever-increasing share of total U.S. R&D. According to data from the National Science Foundation, the value of small - company R&D rose to US$40 billion, accounting for 20.7% of the value of all private sector R&D. These small start-up companies rely on venture capital investment to fund their R&D activities.

As pharmaceutical and agriculture companies merge and become larger, they increasingly focus on development and marketing, and lose their agility and ability to innovate. Thus, large companies increasingly gain access to the innovations of small companies through licensing agreements, R&D partnerships, and acquisitions.

Prior to the 1980s, most agricultural innovation in the U.S. originated at land-grant universities; there were very few small start-up companies. Innovation was offered directly to farmers and to large agriculture companies via products and license agreements. Then with the onset of the go-go genomics era in the late 1990's agriculture went through two major restructuring cycles. The first cycle was based on the premise that understanding of life processes at the molecular level could be leveraged across agriculture and pharmaceuticals. So-called life science companies were formed. Small agriculture biotechnology (agri-biotech) companies were started based on new genetic technologies; these small companies were quickly acquired by larger companies as they raced to converted into life sciences companies through the acquisition of genomics technologies and germplasm.

However, these large life science companies soon discovered the complexities inherent in managing business units with very different cost structures, market sizes, margins, and regulatory paths. Within two to three years, therefore, the large companies spun off freestanding

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pharmaceutical and agriculture companies. These rapid cycles of restructuring negatively affected small companies, because very few partnerships and acquisitions took place between 1998 and 2004. Fortunately, the trend now seems to be reversing and large agri-biotech companies are again acquiring innovation from small companies, particularly in an era when agriculture increasingly includes food production and biomass for fuels and materials. The ongoing challenge now is to create an environment that encourages entrepreneurship, the formation of small innovative companies and venture capital investment.

2. WHAT IS VENTURE CAPITAL?

Venture capital (VC) is high-risk capital that is invested in early-stage companies. It is not a loan; it is an equity investment, with the investor owning shares of the company. Venture capital companies invest in high-growth, early-stage private companies when the technology risk is still high and, if successful, potential financial returns are also high. The VC is managed by companies with deep expertise in the sector and with experience in forming and nurturing start-up companies. Venture capitalists are not only a critical source of funding; they are also actively involved in helping to manage and develop small companies.

Some venture companies, called *seed stage funds*, focus on very early-stage companies. These funds are generally small, ranging in size from US$10–50 million. They will usually invest US$250,000–3 million in a single company. *Growth stage funds* are larger, possessing US$75 million–1 billion. They invest in later-stage companies where investments of US$10–20 million are common.

VC companies raise money from institutional investors, corporations, pension funds, government agencies, and private individuals with high net worth. Most funds last for ten years. In the initial three- or four-year period, a fund typically invests money in a portfolio of 15 to 20 companies.

Investors get a return on their investments only when portfolio companies are either sold via a trade sale or participate in an initial public offering (IPO), usually three to five years after the initial investment. At that point, the investors are repaid their initial investment and any profits are split 80:20 between investors and the venture company. In general, venture capital companies can expect to achieve a return of 20–40% IRR (internal rate of return) over the life of a fund.

3. WHY IS VENTURE CAPITAL IMPORTANT?

The capital that drives the biotechnology industry comes from many sources, but mostly from R&D and marketing partnerships between small and large companies. In 2005, US$34 billion was invested in U.S. biotech companies from all sources (Table 1). This amount was already exceeded by the end of the first three quarters of 2006. In 2005, approximately US$4 billion in investment capital came from venture capital. Over half of the total annual investment from all sources came from R&D partnerships established between large and small companies.

Venture-backed small companies also create new jobs, generate wealth, and contribute to economic growth. Historically, 80% of new jobs in the United States are created by companies with fewer than 500 employees, many of which are venture financed. Between 1970 and 2003, venture-backed companies accounted for 10.1 million new jobs in the United States and US$1.8 trillion in revenues.

The impact of venture-backed small companies on local and national economies is most dramatic when two conditions are present: an entrepreneurial culture and a critical mass of small companies that attract venture investments. Most venture capital companies are located in the United States, and most venture backed U.S. companies are found in California (in the San Francisco Bay area and San Diego), Boston, and along the Atlantic seaboard. Only six states in the United States account for nearly 75% of all venture capital invested in all sectors (Table 2).

Venture capital is a vital element in establishing a biotechnology industry but it is very difficult to accomplish. Few geographic locations have

Table 1: Sources of Capital in the Biotech Industry

Sources of capital		Total investments (US$, millions) 2005	2006 (1st Q to 3rd Q)
Public	IPO[a]	819	567
	Follow-ons[b]	4,194	3,032
	PIPES[c]	2,376	1,817
	Debt	5,565	12,241
Private (Venture capital)		3,518	3,186
Other		1,114	303
TOTAL CAPITAL		17,586	21,146
Partnering		17,268 (50%)	12,463 (37%)
TOTAL		34,854	33,609

a IPO – initial public offering: a private company files to have a portion of its shares sold to the public on a regulated stock exchange, such as NASDAQ .

b. Follow-ons – When public companies sell additional shares on the stock exchange to raise additional cash.

c. PIPES – Private investments in public entities: the sale of public shares to private financial institutions that may take public shares off the public market as a way for companies to raise cash.

Table 2: Investment of Venture Capital by State

State	Percent of total U.S. venture capital
California	47.5%
Massachusetts	10.3%
New York	5.2%
Texas	4.7%
New Jersey	4.2%
Colorado	3.0%
Total of top six states	74.9.%

been successful. Seventy five percent of all venture capital in the world is in the United States and about 75% of that is in six states. However, the fundamentals for success are clear; the formation of new companies operating in an environment that increases the probability for success.

4. WHAT ATTRACTS VENTURE CAPITAL?

4.1 *The formation of companies with attributes for success*

4.1.1 *A strong management team*

Early-stage companies are high-risk investments: they will always run into problems and they will always be short of capital. Therefore, it is vitally important to have a management team that can solve problems quickly and use limited capital efficiently to create real value.

4.1.2 *Viable technology*

Small companies should be founded on scientific research published in peer-reviewed publications; however, many companies are started well before true proof of concept is demonstrated. Indeed, venture capitalists usually decide whether or not to invest in a company based on the quality of the science it does or plans to do. Venture capitalists will mitigate their own risk by offering funding in stages, investing more money as the company passes each technological milestone.

4.2 *IP ownership and freedom to operate*

The value of a biotechnology company is based on the amount of intellectual property (IP) it can acquire, develop, and protect—and on the potential market served and not on current revenues. Therefore, companies must acquire a strong IP position and have a good patent strategy. The company should ideally be based in a country with strong patent laws.

Patents are only valuable, however, if the company also has *freedom to operate*: that is, the ability to use the patented technology without having to rely on other technologies to which it does not own IP rights.

4.3 *A large potential market*

Companies with products or technologies that have large markets are obviously more attractive to investors than those that have smaller markets, even though the cost of development of a small-market technology is usually about the same as that of a large-market technology.

4.4 *A favorable entrepreneurial environment*

Companies within an entrepreneurial environment of "critical mass"—that is, an environment that has a sufficient number of similar companies and therefore a critically large pool of talent—are more attractive to investors than companies outside of such environments. This is true for several reasons. First, when there are a number of small companies in the same area, CEOs can share ideas and develop solutions with each other. Should one company fail, employees can easily move to other companies, and there is enough management talent in the area to fill the needs of the companies. The area also likely supports a large number of attorneys and accountants who are familiar with the issues of small companies.

Venture capitalists never fully fund an investment alone. They almost always syndicate the investment with other local companies, particularly those that have large funds. The presence of venture capitalists makes syndication easier. Venture capitalists who are not locally based will want to partner with other venture capitalists who are local, especially when investing in early-stage companies.

5. WHAT ENVIRONMENTS ATTRACT START-UP COMPANIES?

5.1 *An encouraging business culture*

The ideal business culture rewards success, sees failure as a learning experience, and strongly believes that technology and innovation are the drivers of economic growth and wealth creation.

Indeed, success breeds success. The presence of a few local heroes who have taken risks and built successful companies encourages entrepreneurs to start companies and to stay the course when problems arise, as they always do.

Finally, already-existing networks of experienced CEOs/managers can help lead new companies or provide mentoring to young CEOs.

5.1.2 *Access to intellectual capital*

Successful biotechnology clusters are fed by the intellectual capital flowing from great research universities. Such clusters are found in Boston (M.I.T. and Harvard University), the San Francisco Bay Area (Stanford Unviersity, U. C. Berkeley, and U. C. San Francisco), and the United Kingdom (the University of Oxford and the University of Cambridge).

5.3 *Access to financial capital*

Financial capital includes funding for peer-reviewed research; seed capital, usually put up by angel investors (wealthy individuals); and early-stage and growth capital, which is put up by venture investors.

5.4 *Other factors*

The area must also contain appropriate, readily available facilities, such as low-cost laboratories and offices. It should have a sufficient number of lawyers and accountants, and a low cost of living and high quality of life are added advantages.

6. VENTURE INVESTMENTS IN AGRI-BIOTECH

Health care biotechnology has a 40-year history of successful venture capital investment and experienced venture-capitalists and CEOs, and the products have well-known paths to market. However, venture capital investment in other sectors—such as agriculture and health & wellness, as well as the industrial application of biotechnology—is only just beginning.

Investing in agriculture is particularly challenging. Market sizes and values are smaller than for pharmaceuticals, developing a new trait or enabling technology is costly, and the impact of new developments on established crops can be quite small. Since most crops are commodities used for food or feed, profit margins are low, and it is difficult to get an attractive return on a venture investment. It takes ten to 12 years for an agricultural product to come to market, about the same length of time it takes to bring pharmaceuticals to market. However, the potential market value of agriculture products is less than that of pharmaceuticals.

During the last ten years, the agri-biotech industry has become greatly consolidated. The number of potential R&D deals and acquisition opportunities has been reduced, and the sector is much less attractive to potential venture capitalists. Finally, the uncertain regulatory issues surrounding genetically modified organisms mean that investors consider agriculture a risky investment.

In order to encourage venture capitalists to invest in agri-biotech, the public sector must provide more funding for *translational research*, that is, research that moves a technology or product further up the value chain and closer to market, thus reducing both the investment needed for commercialization and the risk (Figure 1). The point of the figure is that knowledge-based biotech industries in agriculture require a greater emphasis on translational research, compared to the pharma industry, to be able to attract the venture capital and corporate investment necessary to commercialize new products and technologies

7. HOW CAN GOVERNMENTS ENCOURAGE ENTREPRENEURSHIP?

Governments cannot dictate or legislate entrepreneurial activity; they can only help provide an environment in which the skilled entrepreneur has ready access to capital, technology, and support. The following actions can help promote such an environment:

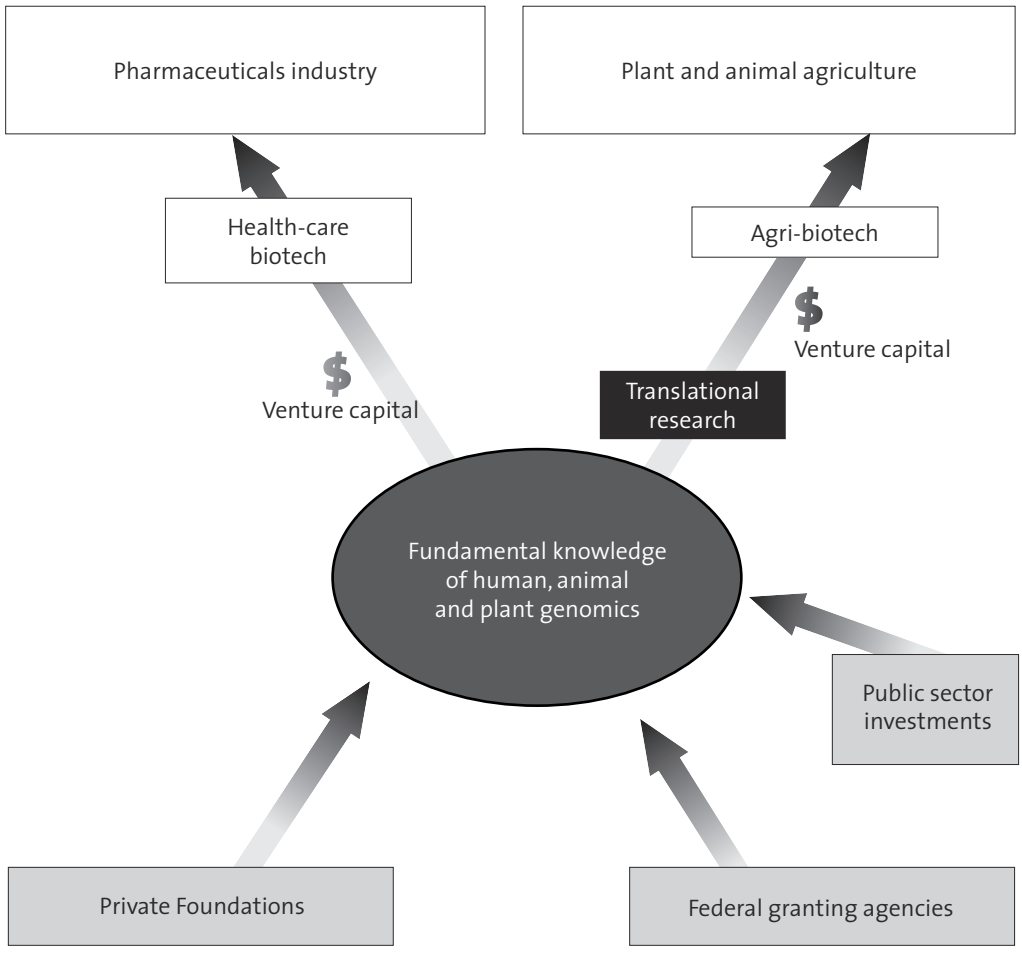
- **Provide an educated workforce.** The biotechnology industry requires a pool of individuals with advanced degrees in biology, as well as people trained in mathematics, computer science, and advanced laboratory practices.
- **Provide funding for basic and translational research.** Innovation relies on the unrestricted pursuit of knowledge. Local and national governments should therefore assure support for universities. Depending on the circumstances, government grant

money may be best used to fund applied, not basic, research. Local governments should fund translational research for agri-biotech to make up for the lack of investment from large companies and venture capitalists.

- **Enforce strong patent laws.** Laboratory research, no matter how innovative, is of little social or economic value unless it is actively protected by strong patent laws.
- **Encourage proactive technology transfer.** The transfer of technology from universities to the private sector is often a weak link in the innovation path. Such transfer should be performed proactively and efficiently. Technology transfer offices must recognize that small companies are cash poor and and are working under severe time constraints. Therefore, they must be flexible in the license terms being willing to take an equity position in lieu of cash payments. Also, funding for proof of concept research will lend clarity to the real value of the technology and the remaining risk

Figure 1: Commercializing Knowledge-Based Biotech Industries in Agriculture and Pharmaceuticals

Agriculture requires much translational research.



to commercialize. This information can reduce the negotiating period needed to agree on the value of the license.

- **Use the bully pulpit.** Governments must be strong advocates for biotechnology and entrepreneurs. They need to build an environment of expectation, address the naysayers, and signal that their locale is the place to grow a business in biotechnology. Press releases, exhibits, and advertisements by senior officials are just a few examples of actions that have proved successful.
- **Provide a science-based regulatory environment.** Investors and entrepreneurs are attracted by a regulatory system that is based on science, that encourages development while protecting the environment and society, and whose decision-making is transparent.
- **Provide financial incentives to investors and entrepreneurs.** Creative financial incentives that attract risk capital, such as venture capital including R&D tax rebates (which must be tradable, if they are to be of value to small companies), deferred taxes, subsidized incubators, and low- or no-interest loans. In some cases, the incentives may go directly to investors. A source of capital that matches VC investments in companies and tax offsets as enticements for investors to invest in venture funds reduce the overall risk to investors.

8. DEVELOPING A TECHNOLOGY CLUSTER

There is a common misconception that an abundance of venture capital will spawn the formation of new companies. In fact, the opposite is true: high-quality new companies will attract venture capital. It is therefore important to establish a *technology cluster*: a group of small companies working in the same area and in the same or related sectors.

In order to build a technology cluster, certain ingredients are necessary: technology licensing, business-plan development, seasoned managers who can assist in developing business strategies and mentoring management teams, a pool of angel investors, and venture capitalists with experience in seed-stage investing. All of these things will encourage entrepreneurs to start new companies and will accelerate the development of those companies.

The next step should be to encourage experienced, nonlocal venture capitalists who manage large funds to become involved with local companies. Local capital will never be sufficient to fully fund the development of a successful biotech company, and larger venture funds are managed by individuals who have a great deal of knowledge and often participate in global networks. However these large investors are located in just a few locations primarily in the coastal states of the United States. They can be engaged in several ways, but the easiest is probably to invite them to investor meetings where companies from a certain region present their business plans. Since venture capitalists are very busy people, the more companies that attend these meetings, the better. Another strategy that is likely to be more successful is investing local capital into the funds of a VC company and requiring that, in return, the company establishes a presence in the region. Once the company is established, it will be available to advise local companies. The company, however, would not be obligated to invest in local companies.

Finally, a local or national government may set aside a development fund and ask an external VC company to manage or co-mangage it. This system nurtures local venture-capital talent and brings venture capitalists with broad industry perspective to the region. This approach has several benefits and has a history of some success. It addresses the important issues of the global perspective necessary toward biotechnology and access to sufficient capital to fully fund a company through the various value-creating steps prior to an exit via IPO or acquisition. The large companies will have a network within the VC community, so they can syndicate the large follow-on investment required to complete the development of the company through an acquisition or IPO. ■

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