THE MONEY OF INVENTION

How Venture Capital Creates New Wealth

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The Problem: Financing Entrepreneurial Firms

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Ninety percent of new entrepreneurial businesses that don't attract venture capital fail within three years.

A software engineer at the government contractor EG&G, Don Brooks had been working on computer systems for the Idaho National Engineering and Environment Laboratory, a Department of Energy facility, when he suddenly had a brainstorm that he knew would help him as well as others solve an all-too-common problem.[1] Using the "gopher" technology that had long made the exchange of files and programs across mainframe devices possible, in 1991 Brooks developed a way for one computer to access data stored on another and to interact with that information. As he publicized his innovation among his fellow employees and across the computing community, people admired the quality of his work. In fact, in head-to-head comparisons, his software program garnered ratings far superior to those of Mosaic, a similar tool then under development at the University of Illinois. Reviewers of Brooks's prototype raved about its ease of use and reliability. The engineer felt certain that, with EG&G's backing, his idea would soon be a major success in the marketplace.

But his hopes were not realized. Four years later, another company working on the same technology went public to great acclaim and fanfare. The firm? Netscape Communications, under the leadership of Marc Andreessen and Jim Clark.[2] Because its new product was based on the Mosaic technology developed at the University of Illinois, Netscape became embroiled in a messy intellectual-property dispute. Despite these challenges, on its first day of trading, Netscape soared to a market capitalization of $2.1 billion.

Why did Andreessen and Clark succeed where Brooks failed? Part of the answer lies in the role of Netscape's initial financiers, the venture capital firm Kleiner Perkins Caufield & Byers. While Brooks struggled to interest EG&G in backing his concept (EG&G considered Brooks's idea outside its core business), Kleiner Perkins moved decisively to fund the fledging Netscape, realizing that market timing was critical to the success of the new venture. In addition to providing financing and advice on product development, marketing, and finance, Kleiner introduced Netscape to key Silicon Valley players, as well as the investment banking teams at Morgan Stanley and Hambrecht & Quist. Even more telling is that Jim Clark, cofounder of Netscape, had been a highly successful entrepreneur at Silicon Graphics and could have easily financed the firm himself. Instead, he understood the value that Kleiner Perkins could bring to Netscape. Lacking such assistance, Brooks soon fell far behind his rivals.

Like Brooks, most high-technology entrepreneurs are convinced that their ideas hold immense promise. Often, their excitement is well founded. An innovative product or new service concept may have enormous market potential and may far outperform competitors' alternatives. Moreover, the intellectual talents of the founding team may be stellar.

However, many of these entrepreneurs discover they need to attract money to fully commercialize their concepts. Thus they must find investors—such as their own employer (if the idea was created while on staff), a bank, an "angel" financier, a public stock offering, or some other source. But potential investors often greet entrepreneurs' business plans with skepticism, or worse, turn them down entirely. Alternatively, some investors demand a large equity stake in the project and tight control rights in exchange for a modest sum of money.

Before the emergence of the venture capital market, the vast majority of entrepreneurs seeking financing from traditional sources failed to realize value from their ideas. Indeed, many product or service innovators privately (and sometimes publicly) referred to investment professionals as "vulture capitalists." These entrepreneurs' frustrations are understandable: Most financiers do not understand the fragile growth process that start-ups experience.

But entrepreneurs themselves have also contributed to their own financing problems. Many of them simply don't have a clear picture of the risks inherent in their business models—risks that pose some serious concerns for potential investors—or they lack a thorough understanding of

the four basic problems that can limit financiers' willingness to invest capital, which we outlined in the introduction to this section:

- Uncertainty about the future
- Information gaps
- "Soft" assets
- Volatility of current market conditions

All companies must grapple with these difficulties, but young, emerging enterprises are particularly vulnerable to them, as these problems limit their ability to receive value from their ideas and innovations. This chapter will help both entrepreneurs and potential investors understand these financing hurdles and the various mechanisms that can be used to reduce potential conflicts that arise due to these four factors.

Uncertainty About the Future

There's no getting around it: Innovation is risky business. All entrepreneurial individuals and companies face uncertainty about the future—not only in terms of their own development possibilities, but also in terms of market and industry trends.[3] But a word of caution: Many people who are interested in the investment world confuse *uncertainty* with that which *is unknown* or *unknowable.* In the case of something that is unknowable, no amount of research or analysis will lift the fog. However, for young, entrepreneurial firms, uncertainty doesn't have to mean unknowability. Rather, uncertainty can be viewed as *a measure of the distribution of possible outcomes for a company or project.* The greater the uncertainty, the wider the distribution of potential outcomes.

This distinction between uncertainty and unknowability is critical. A careful analysis of a particular entrepreneurial project can identify key phases of uncertainty, yield a list of potential outcomes of each phase, and provide an assessment of the likelihood of those various outcomes. This kind of thoughtful review constitutes the first step in determining a project's financing alternatives.

A Closer Look at Uncertainty

Bill Aulet had to make a decision when he joined SensAble Technologies in 1995.[4] While completing a Sloan Fellowship at MIT, Aulet had become

excited by an opportunity to pursue entrepreneurship with the company, founded by recent MIT graduate Tom Massie. Massie had developed a computer peripheral that simulated physical resistance, a device that might have had applications for some highly specialized areas, such as training doctors in surgical techniques. Aulet, who had served for years as a marketing manager at IBM, had a different idea in mind. He felt that potential investors would be far more excited about the technology if it were used to deliver games to players via the Internet. However, when he began to put together feasible estimates of the size of this online market in upcoming years, as well as the market share that SensAble might be able to capture, uncertainty surfaced at each stage of his analysis. For example, how rapidly would delivery of computer games switch over to the Internet? What would the pricing structure look like? How likely was it that SensAble would capture a significant portion of the proceeds? In order to make a decision that would take into account the uncertainties that SensAble faced, Aulet would need to explore the possibilities of each scenario, assess the range of potential outcomes, and set out a plan for the company.

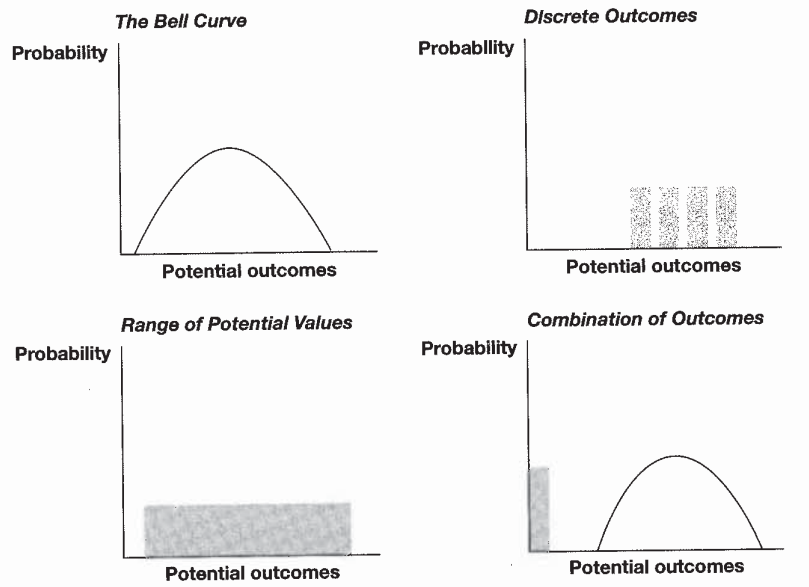
The Many Shapes of Uncertainty

If we view uncertainty as the range of potential outcomes for a project or idea, then we can get a deeper understanding of the uncertainty faced by a firm by examining the *distribution* of potential outcomes.

There are four possible types of uncertainty distribution. Thinking about an innovation in terms of one of these distributions can provide a useful benchmark for gauging the uncertainty involved:

- Does the potential distribution of outcomes resemble the traditional bell-shaped curve, with a peak in the middle and tails running in either direction? To illustrate, the demand for a new toy being developed by an entrepreneur could be very high or very low. The most likely case, however, would be somewhere in between.
- Is the potential outcome discrete, with a limited number of identifiable outcomes? For example, the potential approval of a new drug by the Food and Drug Administration (FDA) has a discrete distribution. After reviewing all the information, the FDA will either approve the drug for sale or else it will reject it.

Figure 2-1 Potential Outcome Distributions



- Is there a range of values for which the potential outcome is equally likely? For example, an entrepreneur who is bidding to supply all or part of the manufacturing required by a major corporation may believe that the likelihood of providing none of the manufacturing is equal to the likelihood of supplying all or half of it.
- Is there a combination of possible distributions? For example, the demand for a new generation of personal digital assistant (PDA) may be zero under certain circumstances, but exhibit a traditional bell curve over another set of circumstances.

Breaking a firm's development into discrete stages of uncertainty can help inventors *and* investors grasp a company's evolving financial needs and market potential. For example, back in 1989, Pascal Brandys, a venture capitalist, and Marc Vasseur, a research geneticist, founded Genset, a biotechnology company.[5] Its goal? To initiate research on the commercial applications of a new genetic technology, polymerase chain reaction (PCR), which allowed scientists to create millions of copies of a single DNA fragment. Although the technology had immense potential,

at the time no one could predict with certainty what kinds of commercial markets Genset might ultimately develop, or when commercial applications would be available. Still, Brandys and Vasseur needed to develop a business and financial strategy that would let them learn from their efforts and continue to guide the company as events unfolded. Similarly, potential investors needed to know how to evaluate progress at the firm, limit potential losses, and create enough potential return to justify their investment.

We can break down Genset's uncertainty into several distinct phases. In the first phase, Brandys and Vasseur needed to determine whether the new PCR technology could lead to any viable commercial products. This uncertainty had several discrete outcomes. The initial research would either yield a technology breakthrough that had market potential or it would fail. Nevertheless, Vasseur's technological experience, combined with Brandys's background as a venture capital investor in biotechnology companies, gave the two men confidence that if the technology did have commercial applications, those applications would have great potential value.

In the second phase, uncertainty hinged on government and regulatory approvals. This phase had outcomes over a broad spectrum of possibilities. However, the history of drug approvals in various medical markets helped Brandys and Vasseur estimate the various probabilities; for instance, it is known that once a drug reaches stage III clinical trials, it has a two-thirds chance of approval. By clarifying the types of uncertainty Genset faced, Brandys and Vasseur were able to decide on a strategic direction, one that would poise them to take full advantage of any discovered commercial applications.

Uncertainty may also arise in the form of competitors' responses to the introduction of a new product. For example, Netscape's Jim Clark and Marc Andreessen wrestled over the possible initial response of Microsoft to the introduction of Netscape's browser in the mid-1990s.[6] Netscape had developed a product that ultimately captured nearly 90 percent of the market. They knew that other companies would try to grab some of the action, but their most feared competitor was Microsoft. To develop an effective business and financing strategy, Clark and Andreessen needed to gauge Microsoft's likely response. Would Bill Gates's behemoth ignore the Internet as it had in the past, or would it pounce on the fledgling Netscape? Clark and Andreessen couldn't predict with certainty what shape an offensive from Microsoft would take. This aspect of Netscape's "uncertainty pic-

ture" influenced the company's key financial decisions, including their decision to raise a substantial amount of capital in their IPO.

The Financial Implications of an Entrepreneur's Uncertainty

While it's relatively easy to point out the various forms that uncertainty takes, it's far more difficult to quantify their financial implications. Uncertainty affects investors' willingness to contribute capital, suppliers' desire to extend credit, and managers' decisions as they set direction for their company.

Rob Brooker, an American entrepreneur who started a chain of bagel shops in Hungary in the early 1990s, experienced these difficulties firsthand when trying to raise additional capital for his venture.[7] With democracy only just emerging in the country, Brooker couldn't predict what shape Hungary's economic policy would take in the future. Despite the first stirrings of democratic thinking, old bureaucrats still wielded considerable influence in the Hungarian business community. Moreover, various government agencies levied onerous taxes at each stage of the business-development process. Similarly, while the Hungarian market had proved fertile ground for American products such as Levi jeans and McDonald's hamburgers, Brooker couldn't know for certain what kind of appetite for bagels Hungarians might have.

Brooker thus faced a daunting range of possible outcomes—including the large possibility that the venture would fail. The potential upside for just such a business, however, appeared quite limited. The likely market for a chain of bagel shops in Hungary, even for a first mover like Brooker, looked somewhat small. In his search for capital, Brooker got a lukewarm response from the investors he courted. Many of them contributed small amounts of initial capital but dragged their feet about advancing additional funds. They wanted to see Brooker prove the concept first. Similarly, many of Brooker's suppliers, most of whom were located outside Hungary, hesitated to provide credit because of the business's unclear future. Suppliers of capital often look to the achievement of definable milestones as a sign that some of the uncertainty has been resolved. Because Brooker hadn't yet reached those milestones, he couldn't attract as much capital as he wanted. As a result, Brooker ultimately had to sell off the assets of his company at a loss.

Problems can also crop up if outside investors and entrepreneurs perceive uncertainty differently. Though most finance and economic

research assumes that people always act rationally and make appropriate decisions given their knowledge about future outcomes, a growing body of research shows that individuals make decisions based on *biased* assessments of information.[8] These assessments are powerfully influenced by people's beliefs about themselves and the workings of business. Most entrepreneurs are certain that their venture will succeed—despite the fact that nearly half of all venture capital–backed companies don't fulfill their potential, and nearly one-third go out of business. For newly launched enterprises without venture capital backing, failure is almost assured: nearly 90 percent fail within three years.

Jack Taub's story is a case in point.[9] A successful pioneer in online data communications, Taub wanted to provide data infrastructure to the developing world. He hoped to use this infrastructure to create a global wireless network that would advance education and business in underserved markets. Convinced that his vision of a global wireless data-communication network would become a reality, he foresaw no significant obstacles to his plans.

Investors, however, were reluctant to fund the venture because of the uncertainties they perceived. For one thing, Taub did not yet have in place elements critical to the success of the technology, such as a network of satellites. What's more, governments in these developing countries would have to adopt Taub's communication standards and be willing to guarantee revenues for each project.

Though Taub met with investment bankers, venture capitalists, and corporate partners, and impressed many with his vision, he didn't see the uncertainties of his venture in the same light as his potential investors, and so did not feel the need to change any aspect of his business plan. The result? He failed to raise the capital he needed to proceed with the venture.

Such exaggerated and unwarranted optimism on the part of entrepreneurs can not only ruin their chances of getting funding, it can also spawn intense conflict over strategy and management policy between investors and innovators. For example, entrepreneurs will almost always choose to continue spending money to market their product or develop their technology—even when the evidence clearly shows that they should abandon their efforts. Similarly, overly optimistic entrepreneurs may feel compelled to expand their firm's capacity beyond its requirements because they overestimate the future demand for their products.

Just as entrepreneurs' oblivion to risk can scare investors away, so can too strong an aversion to risk.[10] In such cases, innovators may avoid making risky but essential decisions because they fear losing what they already have. Many entrepreneurs, for example, invest all their personal resources in their new businesses. When the time comes to commit the firm to a direction that carries substantial risk, entrepreneurs whose sole source of wealth is their ownership in their companies may freeze or adopt a highly conservative stance. Overly cautious decision making can cause outside investors to miss out on potentially valuable new opportunities.

Information Gaps

Young, entrepreneurial firms—along with their potential investors—face another potential pitfall in the capitalization process. This second pitfall comes in the form of information gaps; that is, differences in what various players know about a company's internal workings and prospects, market trends, and other information vital for investment decisions. Entrepreneurs and investors alike risk making unwise decisions because neither possesses a complete picture of reality. Often, the fear of such gaps can render firms incapable of completing transactions that would be beneficial.

Innovators' Informational Advantages

In the natural course of running a company, entrepreneurs learn more about a particular technology than outsiders can hope to glean. They also know more about what happens inside their company on a day-to-day basis. They may choose to keep this information private for several reasons. Perhaps they hope to keep proprietary information from finding its way into competitors' hands. Or they want to protect the benefits they receive from managing their own companies, including the prestige and perks that come with the job. Such entrepreneurs may even try to inflate their firm's performance reports to present an attractive package to investors.

The story of Ovation Technology vividly captures what can happen when innovators withhold or distort information about their firm's progress.[11] In the early 1980s, Tom Gregory and a group of his colleagues from a minicomputer software company decided to enter the personal computer software market and compete head-to-head with Lotus and Microsoft. The company they founded, Ovation Technology, raised over $6 million in venture capital financing. Gregory and his founding team possessed extensive marketing backgrounds but scant technical skills.

So, perhaps not surprisingly, Gregory's team decided to spend substantial resources on marketing—at the expense of research and product development.

Out of the gate, Ovation began spreading the word about major improvements in functionality that their program would offer over their competitors. Its polished advertising campaign excited the imaginations of potential customers and investors, and gave them the impression that the company was thriving. Current investors, however, found it difficult to gauge the progress of the company. Although Ovation gave them glowing reports of the company's supposedly significant strides, they never presented a completed prototype. In fact, the company never finished developing its product—and never made a significant sale. If the founders had shared the necessary information with investors, perhaps Ovation's venture capitalists could have guided Gregory along the development path and this failure could have been averted.

In addition to inside knowledge about a company, entrepreneurs may have far more knowledge about market dynamics than investors—a situation that can lead to unnecessary and unfortunate conflict between the two parties. Hira Thapliyal, president, CEO, and founder of Arthrocare, a medical devices company, experienced this phenomenon firsthand.[12] In 1997, Thapliyal had received market feedback from his company's first product launch. The product, a laser-based surgical scalpel, had not penetrated the orthopedic market as successfully as Arthrocare had hoped. In order to succeed, the company needed to price the base units more aggressively and continue to invest heavily in the research and development needed to expand Arthrocare's product line into new surgical markets.

Though he was convinced that this strategy made sense in the long run, Thapliyal also knew that it would cause a temporary decline in earnings. Arthrocare had recently gone public, and Thapliyal tried to calm shareholders' anxiety about the potential decline. Over the long haul, he maintained, the new strategy was in their best interest. When news of the earnings shortfall came out, however, many investors sold their shares. The price of Arthrocare stock plummeted.

Thapliyal had failed to convince outside investors that his strategy made sense for several reasons. First, the investors did not have in-depth knowledge of the market and thus could not understand Arthrocare's strategy. Second, Thapliyal withheld other vital information—such as what Arthrocare's marketing and pricing program would look like—to

avoid compromising Arthrocare's market position. Thapliyal's inability to credibly bridge this information gap ultimately cost him his job as president and CEO of Arthrocare.

In addition to inside knowledge about a company's workings and market trends, innovators also know much more about their firm's prospects than outside investors do. Daily contact with the market provides constant feedback about how likely it is that the firm's research will bear fruit, what plans competitors have up their sleeves, what customers think of a product, or who might offer to finance the firm in the next round of capitalization. Outside investors can't easily obtain or verify this kind of information.

In other instances, a venture's milestones are difficult to identify; thus potential investors have no way to judge the firm's progress. For example, there may be no clear method for gauging the likelihood of market acceptance of a new product. Similarly, evaluating the qualitative differences between a start-up's new product and its existing offerings may be difficult until a large number of customers have used the product for a long period of time. In these cases, entrepreneurs and investors must rely on their own subjective assessments to gauge the firm's progress. And just as innovators and financiers can disagree over what kind of uncertainty is facing a new firm, they can also define a company's progress in radically different ways.

A recent lawsuit between a high-tech company and its venture capital investors illustrates what can happen when disagreement over how to define a firm's progress arises.[13] The founder of the company—a telecommunications switching firm—was an engineer with years of experience researching new designs for faster switches. He had raised financing from a venture capital firm to develop a prototype of a new communications switch with the promise of a second, more substantial round of financing upon completion of a working prototype. Several months later, the engineer claimed to have built a working switch, and the venture capitalist provided the second-stage financing. As it turned out, each party had a different definition of "working prototype." When the venture capital firm realized that the founder's definition differed from its own, it began investigating the actual performance of the founder's prototype. The disagreement between the founder and the venture capital firm ended up in a lawsuit. A significant amount of money and precious managerial time were lost due to the parties' failure to establish a common definition of success.

Investors' Informational Advantages

Information gaps can hamper entrepreneurs' efforts as much as investors'. Investors know more about their own resources or ability to add value than an entrepreneur can discover. And despite a financier's claims that he has substantial contacts in the industry or important knowledge of the market in question, innovators can't always verify these claims. As the following example shows, this creates the risk of entering into a bad deal.

In 1992, Michael and Richard Weissman, founders of the day care franchiser Tutor Time, attracted the attention of a potential business partner at a childcare trade show.[14] Tutor Time had been looking for a strategic partner to help in expanding to other markets around the country. This potential partner claimed that he was involved in a number of businesses, including childcare and real estate development. He produced financial statements that indicated he was worth several million dollars. He also claimed to have an interest in one of the nation's twenty-five largest real estate development companies. Tutor Time's founders believed that their new partner could provide the capital and real estate expertise they needed for Tutor Time to go national quickly. Within weeks, the Weissmans and the investor had formed a joint venture to develop and market Tutor Time childcare centers across the country.

As it turned out, many of the investor's prior projects were teetering on the brink of insolvency, and his financial statement was a sham. Before the Weissmans discovered the deception, they had been saddled with a number of poorly bid lease build-outs for new day-care centers. Some of these sites were several hundred thousand dollars over budget before the Weissmans grasped the extent of the disaster. The fallout from the ill-advised partnership included lawsuits between Tutor Time affiliates and employees and between the unscrupulous investor and his associates.

Problems as a Result of Information Gaps

The problems that can arise from information gaps inhibit many traditional investors from funding entrepreneurial ventures. Entrepreneurs might take potentially harmful actions that investors are not aware of. For example, the entrepreneur may undertake a riskier strategy than initially suggested or may not work as hard as the investor expects. The entrepreneur might also invest in projects that build up her reputation at the investors' expense. Alternatively, even if the project has negative

expected returns, the private benefits of "running his own show" may inspire an entrepreneur to continue.[15] For this reason—and others—an entrepreneur may, at times, try to inflate performance to avoid closing down his firm.

The example of Kendall Square Research illustrates how difficult it is to monitor the performance of start-up companies. A company founded in Cambridge, Massachusetts, Kendall Square Research raised over $100 million to develop a new generation of parallel computers.[16] The company fraudulently booked sales to "boost" performance in order to maintain the image of solvency and robust growth during a slowdown in government and university purchases of large, expensive machines. In July 1993, the company announced sales of $24.7 million. By the end of the year, it had restated the first nine months down to $10.6 million. At the same time, it revised its net loss for 1992 to $17.2 million from $12.7 million. When the company announced these changes, the stock price, which had been trading near $25 per share, dropped precipitously. Ultimately, the company was forced into liquidation. Entrepreneurs have considerable ability to manipulate the information that investors evaluate.

Information gaps exist in all aspects of business. Sometimes those gaps are purposeful because management or investors do not wish to disclose information that would compromise their position. Other times, the information cannot be easily and persuasively conveyed to another party. Even if the entrepreneur wanted to share such information with investors, outsiders might well misinterpret the information.

The experience of Rob Utschneider, founder of Torrent Systems, a Boston-based software start-up, illustrates this problem.[17] Torrent received early funding from the Department of Commerce's Advanced Technology Program (ATP). ATP funds precommercial, highly risky research and development, with the stipulation that *all* funding be used for direct research expenses. None of the grant money can be used for expenses that might have ties to commercial activity. Torrent had tried to make a clear distinction between the two areas and had raised additional money from North Bridge Venture Partners, a prominent Boston-based venture fund, to cover the project's other costs (including commercial activities).

Torrent made substantial progress developing its software and forged an agreement with IBM about future sales of the product. When the company casually announced the agreement in a press release, officials at ATP were alarmed, and wondered whether Torrent had used some of the ATP funding to engage in commercial activity. ATP's concern was

understandable; that year, its administrators had come under intense scrutiny from a Republican Congress, which had its antennae out for "corporate welfare." If Congress thought that ATP was funding commercial ventures that could have been funded by private investors, it might cut off future funding.

Because ATP officials did not have day-to-day contact with Torrent, Utschneider failed to convince them that Torrent had acted in accordance with the rules of the program. The outcome? ATP sent a team of auditors to Torrent, and ultimately ceased its funding. The Torrent story shows how difficult it is for investors to distinguish between competent and incompetent (or trustworthy and untrustworthy) entrepreneurs—and how this difficulty can spawn inappropriate decisions.

Whatever the source, information gaps reduce investors' willingness to provide funds, increase the unease that suppliers have about extending credit, and hinder a firm's ability to recruit new employees. In addition, information gaps affect the types of financing investors give and the corporate control that investors require. Understanding these effects is a second critical step in understanding the financing hurdles facing young, technology-intensive companies.

Soft Assets

The value of all firms is dependent upon the assets it owns today and the investment opportunities it can undertake in the future. Assets in place today are either hard, physical assets such as buildings, machines, or real estate, or they can be soft, intangible assets such as patents, trademarks, or the collective ability of a company's employees, sometimes referred to as human capital. The availability of financing and the terms under which financing is provided depend heavily upon the nature of the firm's assets.

As hard assets are, in general, easier to value than soft assets, firms with hard assets often have more financing options than those with only soft assets. Most hard assets have active secondary markets for resale that allow the value of an asset to be easily determined. For example, real estate values can be assessed by looking at comparable buildings or parcels that have sold recently. Banks, leasing companies, and other lenders provide financing based on these simple hard-asset rules, with an eye toward how much they could recoup if they had to sell all the hard assets of the firm piecemeal. Most banks or financial lenders use strict formulas to determine how much money they are willing to lend a particular

company—formulas based on a firm's physical assets rather than its potential value. An entrepreneurial firm outside Chicago, efficient market services (ems), offers a prime example of how this works.[18] ems was founded to provide consumer goods companies with information on how well their products were selling in grocery stores around the country. The company sought to leverage the information-technology revolution by providing an unprecedented service: timely, accurate, and store-specific inventory and pricing information on products sold through individual supermarkets. It believed that such information would help its customers optimize inventory levels, avoid backorders, establish appropriate pricing, and align promotional efforts with sales.

Though ems was clearly a technology-based start-up, its operations still required substantial physical assets, as it had to put one of its own computer workstations in every one of its thousands of partner supermarkets. Owing to this large, hard-asset investment, ems succeeded in raising almost $10 million in lease financing early in its development. The leasing company, Comdisco, felt confident in its ability to estimate the value of the computers that it was lending against, even if ems itself was a risky start-up.

Soft assets rarely have active markets that list their value. Each soft asset is unique—looking at the value of a recently sold patent would not provide much information about the value of another patent. For example, the 7-Up trademark, while similar in many ways to the Coke trademark, clearly does not have the same value. Drug patents, while related, are not perfect substitutes for one another. Because the value of a soft asset is difficult to estimate, lenders are less willing to provide credit against such an asset. Moreover, soft assets provide little cushion in case a company crashes.

Patents and Trademarks

Although more tangible than an idea, patents and trademarks themselves are not enough to enable a company to obtain financing from most lenders. A soft asset such as a patent may have value only when it is combined with other assets, such as an entrepreneur's knowledge of a particular process or technology that the patent involves. Similarly, the particular process or service embodied by a soft asset may be intimately related to the entrepreneur's reputation. In either case, if any other company tried to use the soft asset, its value would plummet.

The trouble with using patents as collateral can be seen in the example of RhoMed, a New Mexico–based medical-technology firm that had been spun off from the Los Alamos Laboratory, a U.S. Department of Energy national laboratory. RhoMed had few assets aside from several patents it had won for its diagnostic radiology testing and treatment technology.[19] After an intense quest for funding, RhoMed found a financier, Aberlyn Capital, which was willing to make a loan secured by a key RhoMed patent. Unfortunately, a key alliance fell through, and the firm was unable to repay its obligation to Aberlyn. When Aberlyn tried to recover its loss by marketing the patent, it ran into difficulty. Many firms regard a single patent as far less useful than a patent that is part of a broader portfolio. Other firms, correctly guessing that Aberlyn had little appetite for undertaking costly litigation to defend its patent, began using the technology without a license agreement. Aberlyn was left holding an asset that ultimately had no value.

Another problem with soft assets is that their value is often linked to the overall value of the company. For example, the trademark for a particular restaurant chain may retain its value only if the company remains in business. If the restaurant chain ceases operations, the trademark may lose its value due to the bad image of the company now in the customers' minds. No lender would be willing to bet on such a trademark.

Human Capital

The collective skill set of a firm's employees constitutes a vital competitive edge. But, how does a potential lender evaluate that skill set? Moreover, how does a lender recoup its losses through capturing the value inherent in a firm's workforce in the event of a business failure? Unlike buildings or machines, people can walk out a company's doors, go to work for a competitor, or start their own firm.

The story of Cambridge Technology Partners (CTP) is a case in point. In late 1998, Cambridge Technology Partners was considered a darling of the information technology-services world. Jim Sims had taken over as president and CEO of the company in 1991 and had built it into one of the premier IT consulting firms. He had assembled and nurtured a group of highly trained, highly motivated computer-science professionals who consistently delivered top-notch services to large clients. CTP's revenue exploded from less than $50 million in 1992 to more than $600 million in 1998. At the same time, its net income soared from $2.2 million in 1992 to $57 million in 1998.[20]

During 1999, however, the firm stumbled. Owing to some operational problems and difficulties integrating acquisitions, revenues plateaued in 1999 and earnings dropped to a little over $3 million that year. Investors took notice, and CTP's stock price, which had approached $60 per share in 1998, fell to just $10 per share. Employees with stock options that had exercise prices substantially above the prevailing stock-market price began leaving in droves, alarmed by the dwindling value of their compensation packages. In fact, the *best* employees were the first ones out the door. New, high-flying start-ups had courted them with jaw-dropping salaries, signing bonuses, and irresistible equity-ownership stakes. The value of Cambridge Technology Partners evaporated along with its consultants.

Future Investment Opportunities

Future investment opportunities, also known as real options, often constitute tremendous value. Genset, the biotechnology company discussed earlier, is a prime example. Pascal Brandys and Marc Vasseur entered the genetics industry in its early days without knowing what direction their company would take. However, they *did* know that by launching a research program in genetics, they would generate future investment opportunities as Genset's technology matured. By getting into the business early, they could accumulate essential competitive and market intelligence.

From the beginning, Genset brilliantly leveraged its early entry into the genetics arena. By focusing on genetics right away, Brandys and Vasseur learned about future commercial opportunities, eventually focusing the company's efforts on genomics, the mapping and study of human genes. Being the first to market let Genset take a global leadership position in genomics, even though no one could have predicted that any company would make money in the industry back in 1989, when Genset was founded. Early investors recognized Genset's unique positioning and future growth potential, and voted with their checkbooks—providing Genset with $2 million in seed financing and substantially more as it grew.

Not all companies are as lucky as Genset was, however. Like other soft assets, growth options are difficult to quantify, and thus to finance. Because they represent a firm's *future* ability to invest in new projects, the

company cannot guarantee that such possibilities will translate into hard cash. Similarly, a specific growth option may have value only in the eyes of the innovator who proposed the original idea.

Firms that enter various industries may have little choice about the asset structure of the business. Some industries have a need for large, physical assets while others rely on softer, more ephemeral assets. What emerges from the discussion above, however, is that the nature of the firm's assets will have a large impact on the supply of financing and its terms.

Financial- and Product-Market Conditions

Financial and product markets can be alarmingly fluid. The supply of capital from public and private investors and the price at which this capital is available may vary depending on regulatory edicts or changes in investors' perceptions of future profitability. Thus investors' interest in a particular product or service idea may evaporate overnight, as in the case of business-to-consumer and business-to-business Internet start-ups. And the vitality of product markets may change with shifts in the intensity of competition or in the attitudes of customers. The competitive landscape may also change in an instant, as it did when more than a dozen pet retail sites were founded on the Internet in a short period of time, affecting a firm's current value and its potential profitability. Entrepreneurs must constantly evaluate the status of financial and product markets today and the direction they may take in the future.

Financial-Market Flaps

The experience of BioTransplant, a Boston-based firm, illustrates financial-market dynamism.[21] When the firm considered going public in 1994, everything looked on track. Its product developers had proposed some impressive technologies, and biotechnology stocks were trading at an all-time high. Under the leadership of Elliot Lebowitz, the company had raised several rounds of venture capital financing, had signed strategic alliances with major pharmaceutical companies, and had forged research-collaboration agreements with top transplantation research teams around the globe. The company had followed its strategic blueprints perfectly and had hit all its major milestones on target.

But everything changed later that year when Hillary Rodham Clinton began pursuing health care reform ideas and several high-profile drug

failures sent biotechnology stock prices into a tailspin. Many private companies that had been waiting to go public were told by investment bankers that investors wouldn't touch their stock at any price. The opportunity to issue public equity had evaporated for BioTransplant, and the firm's future looked at best uncertain, at worst, grim. In the face of a funding drought, Lebowitz was forced to reevaluate both the firm's financial- and product-market strategies. Lebowitz learned a valuable lesson: Even the best-performing companies can have difficulty raising funding if their sector falls out of favor with the public market.

The decline in the stock-market value of many Internet companies in the spring of 2000 is another striking example of financial-market dynamism. Many Internet retailing companies attracted huge valuations before the severe market correction that came later in March and April 2000. The sudden dive in Internet stocks slammed this public market window shut.

This swing in market conditions had radical consequences for Internet retailers. Those who survived the correction now had no choice but to move from an exclusively growth-focused strategy (which had little regard for profits) to one that tried to generate true value. Many firms, including well-known firms like Pets.com and eToys, were forced to close their doors.

The Product-Market Pendulum

In additional to financial-market shifts, swings in product markets—primarily changes in competition—can hamstring start-ups' ability to establish market share, earn profits, and boost their value. Competition may also force start-ups into an escalating race of product enhancements that require tremendous research and development expenditures.

Regulatory intervention may also hamper a start-up's ability to enter a new market or expand its existing ones. Regulators may mandate price ceilings or insist on costly product features, both of which make profit generation more difficult. Similarly, although mergers among competitors may improve economies of scale, government regulations may prohibit them in the name of antitrust legislation. Finally, governments often actively seed competition in various markets through investment and tax incentives with the hope of increasing consumers' choices and decreasing their costs.

Star Cablevision illustrates the importance of product-market shifts in determining corporate value and financing decisions.[22] In 1990, Star's founder, Don Jones, had entertained bids from potential buyers. He had

received several impressively large valuations and was deciding whether to sell part or all of the company. However, during this time several events occurred that drastically eroded Star's valuation. First, in response to consumer complaints, Congress introduced legislation to further regulate cable television rates. The new laws led many in the industry to lower their expectations of future cash flow forecasts. Second, several competitive threats appeared in the form of two satellite television companies offering programming through small, affordable dish antennae. The combination of these threats and the new, restrictive legislation turned buyers bearish, and Jones saw the acquisition price of his company fall by nearly 40 percent in a matter of months. His ability to attract future financing, both debt and equity, also suffered.

The Four Pitfalls of Capitalization: How Much Do They Matter?

The ability of a young company to grow rapidly and respond swiftly to changing competitive conditions is a key source of its competitive advantage, if not its survival. However, this ability is hindered by the four pitfalls that we've discussed: uncertainty, information gaps, soft assets, and changing market conditions. Entrepreneurs can go only so far in addressing these difficulties. But they need not be helpless. Among the steps they can take to overcome these obstacles are:

- Get a better sense of the risks in their industry and business and communicate these to investors.
- Enumerate and set clear goals and timelines to reduce information gaps.
- Communicate clearly what the firm's assets, both hard and soft, are.
- Think critically about financial and product market cycles and the challenges that they pose to the company's business model.

But in many cases, these steps won't be enough to access financing from banks and other traditional sources. To surmount capitalization roadblocks, innovators must therefore look to other investors—in particular, venture capitalists. As we'll see in the next chapter, this particular class of investors has some unique characteristics that make it especially qualified to overcome innovators' investment woes.