"The Future of New Venture Finance"

Richard Smith
September 25, 2001

Peter F. Drucker School of Management
Claremont Graduate University

Venture Finance Institute
http://www.cgu.edu/drucker/vfi
WE'RE HERE TODAY TO DISCUSS THE KINDS OF CHANGES WE CAN EXPECT TO SEE IN THE MARKET FOR NEW VENTURE FINANCING, AND HOW VC INVESTORS AND ENTREPRENEURS MUST, THEMSELVES, CHANGE TO BE SUCCESSFUL IN THE NEW MARKET. THE CHANGES WE'LL BE TALKING ABOUT ARE CAPABLE OF HAPPENING NOW, USING EXISTING ANALYTICAL TOOLS AND COMPUTER TECHNOLOGY. THE COMPETITIVE PRESSURES TO BRING THE CHANGES ABOUT ALL ARE IN PLACE.

FOR THE MOST PART, I'LL BE TALKING ABOUT FINANCING THE INTANGIBLE ASSETS OF VERY HIGH-RISK VENTURES. THESE ARE VENTURES THAT MAY HAVE NOT YET ESTABLISHED THAT THEY EVEN ARE CAPABLE OF GENERATING REVENUES, LET ALONE PROFITS. CONVENTIONAL MEANS OF FINANCING ARE UNAVAILABLE TO SUCH VENTURES.

FOR HIGH-RISK, EARLY-STAGE VENTURES, FINANCING SOURCES INCLUDE INTERNAL OR STRATEGIC PARTNER FINANCING BY A CORPORATION THAT IS INTERESTED IN THE VENTURE AS PART OF ITS R&D PORTFOLIO (E.G., INTEL, PHARMAS); VENTURE CAPITAL FUNDS, BUSINESS ANGEL INVESTORS, AND, OF COURSE, THE ENTREPRENEUR AND HIS/HER FAMILY AND CLOSE FRIENDS (AND THEIR CREDIT CARDS). THE WILLINGNESS, IN THE LATE 1990S, OF STOCK MARKET INVESTORS TO FINANCE SUCH VENTURES WAS ANOMALOUS, AND IS NOT LIKELY TO BE SUSTAINED AT ANYTHING CLOSE TO THE RECENT LEVELS.

WHILE I'LL BE SPEAKING PRIMARILY ABOUT VC FUNDS, ALMOST EVERYTHING I HAVE TO SAY APPLIES TO ALL SOURCES OF HIGH-RISK CAPITAL FOR EARLY-STAGE VENTURES.

VC FUND ORGANIZATION

FOR THOSE OF YOU WHO ARE NOT FAMILIAR WITH THE VENTURE CAPITAL INDUSTRY, ALMOST ALL VC FUNDS ARE ORGANIZED AS LIMITED PARTNERSHIPS. CURRENTLY, THERE ARE WELL OVER 1000 FUNDS IN EXISTENCE IN THE US, AND A SMALLER NUMBER OF OTHERS INTERNATIONALLY. SOME OF THE US FUNDS INVEST INTERNATIONALLY. EACH FUND HAS A FINITE LIFE, INTENDED TO BE ABOUT 10 YEARS, AND GOES THROUGH A WELL-DEFINED LIFE CYCLE OF RAISING CAPITAL AND INVESTING IN VENTURES, OVERSEEING THE INVESTMENTS, AND HARVESTING.

THE FUND'S MANAGER IS A SEPARATE ENTITY--A VENTURE CAPITAL ORGANIZATION THAT IS IN THE BUSINESS OF CREATING VC FUNDS, AND MANAGING THEM THROUGH THEIR LIFE CYCLES. THE MANAGER'S JOB CHANGES ACCORDING TO THE STAGE IN THE FUND'S LIFE CYCLE. MANAGERS TRY TO CREATE ORGANIZATIONAL STABILITY BY RUNNING MULTIPLE FUNDS IN VARIOUS STAGES OF EXISTENCE.

INTRODUCTION

WITH THIS BACKGROUND, LET ME START WITH A QUOTE FROM ONE OF THE PIONEERS OF THE VC INDUSTRY - ONE THAT FREQUENTLY IS ECHOED BY BOTH PRACTITIONERS AND THOSE OF US WHO TEACH IN THIS AREA.

"GOOD IDEAS AND GOOD PRODUCTS ARE A DIME A DOZEN. GOOD EXECUTION AND GOOD MANAGEMENT--IN A WORD, GOOD PEOPLE--ARE RARE." --ARTHUR ROCK

THIS IS KIND OF A NICE, FEEL-GOOD, QUOTE. IT REFLECTS THE VIEW OF VC INVESTORS THAT GOOD IDEAS ARE EASY TO COME BY, AND THAT FINDING PEOPLE WHO CAN IMPLEMENT THE IDEAS IS THE KEY TO SUCCESS IN VC. HOWEVER, WITH ALL DUE RESPECT TO THE OBVIOUSLY CORRECT VIEW--THAT GOOD PEOPLE ARE ESSENTIAL TO SUCCESS--THE EMPHASIS ON FINDING GOOD PEOPLE IS NOT VERY HELPFUL.

MAYBE THE VIEW CAN HELP INVESTORS AVOID SOME OBVIOUS MISTAKES. HOWEVER, IT DOES NOT TELL THEM HOW TO COMPETE IN WHAT IS GOING TO PROVE TO BE A MUCH MORE DIFFICULT AND CHALLENGING ENVIRONMENT. NOR DOES IT TELL ENTREPRENEURS WHAT THEY WILL NEED TO DO TO ATTRACT INVESTMENT CAPITAL. IT ALSO DOES NOT REVEAL, OR EVEN SUGGEST, WHAT PRACTITIONERS, EDUCATORS, AND POLICY MAKERS CAN DO TO FOSTER ENTREPRENEURIAL ACTIVITY AND NEW VENTURE SUCCESS.
Ironically, the Venture Capital environment of 1998 through April 2000 had nothing to do with investing in good people. Instead, the winning strategy was to search for exciting stories. Winning VC organizations were those that could complete the IPO process quickly.

But, the future of new venture financing is going to be nothing like the recent past. In fact, the VC boom of the late 1990s will force the survivors in the industry to transform themselves much more rapidly than otherwise would have been necessary. The same pressures that apply to VC investors have implications for what it will take to be successful as an entrepreneur. In broad terms, the practice of Venture Capital investing is going to change from predominantly art to predominantly science.

This is an easy prediction to make. The transformation of the market for new venture financing is just the latest frontier of a much broader transformation of the capital markets. The broad transformation has been from a regime of art, where asset values were subjective matters of personal taste and private attitudes toward the bearing of risk, to a regime of investment science, where asset values reflect market consensus based on risk in the context of a diversified portfolio.

**CAPITAL MARKET TRANSFORMATION**

The most significant post-war catalyst for this transformation was the development of portfolio theory and its implications for valuing risky financial assets. Development of portfolio theory dates from a groundbreaking article by Harry Markowitz in 1952. Development of portfolio theory’s implications for capital asset pricing dates from two papers in the mid-1960s that earned their authors the first Nobel Prize in Economics to be awarded for a contribution to investment science. Portfolio theory and the capital asset pricing model have driven the evolution of the capital markets ever since.

This figure shows the impact of investment science on the breakdown of US family financial wealth over the past 20 years. The figure reflects two related trends: the consolidation of financial assets into diversified portfolios, including professionally managed pension and mutual funds, and the shifting balance of total holdings out of low-risk, low-return debt and bank deposits into higher-risk, higher-return equity.
Because portfolio investing (investing small amounts in many assets rather than large amount in a few) uses diversification to offset the risk of individual holdings, it lowers the rate of return that investors seek for investing in risky assets. The shift toward equity that you can see in the figure is only part of the transformation brought about by portfolio investing.

With portfolio investing as a tool for managing risk, professional asset managers compete aggressively for a few basis points of enhanced yield. A basis point is one one-hundredth of a percent—one penny per year on an investment of $100. Asset managers' pursuits of basis points are responsible for:

- Growth of the small-cap public equity market
- Securitization of mortgage portfolios and a variety of debt instruments
- And growth of the international equity capital markets

In every case where portfolio investing has transformed a portion of the capital market, it has driven rates of return down. I hope to convince you that VC is just the latest frontier of the transformation.

**VC MARKET HISTORY**

Before going into specifics on how the VC market will change, I'd like to spend a few minutes on where the market has been.

This slide illustrates the growth of annual new capital commitments to venture capital funds since 1969. A commitment is a promise by a limited partner to provide capital when called upon to do so by the fund's general partner. The industry is structured this way because fund managers can produce highest returns by raising money and finding deals at the same time, instead of raising the money first. Because VCs operate in this way, only investors who can be relied on to respond quickly to large "capital calls" are attractive as limited partners. This is one reason most of us are not being solicited to invest in VC funds. Our investments will have to be indirect, either through our pension funds, or through investments in companies like Intel that act like VC funds with some of their capital.
You can see from the chart that, as of 2000, new capital commitments to VC were nearly $100 billion. These are "new commitments" to formal VC funds in the US. They include rolled-over capital from investments that are being harvested as well as truly new money. They do not include angel investment or corporate venturing. In terms of the flow of capital commitments, the figure makes clear that VC is still a small industry.

But, if you look at the values of public companies that were financed with venture capital—companies like AOL, Microsoft, MCI, Compaq, Cisco, and Genentech—it is clear that VC is a key engine of economic growth. In the latest round of VC investing, e-commerce was the primary target. However, target industries have changed over time, including telecommunication, biotechnology, hardware, software, Internet and others. The common characteristic is that these are research-oriented, break-through industries where participants are not likely to be profitable or cash-flow-positive for many years.

In its current form (VC limited partnerships) the industry was virtually non-existent before 1979. The numbers before that period are predominantly SBICs (Small Business Investment Companies) making subsidized loans to cash-generating small businesses.

RETURNS TO INVESTING IN VC

In 1979, a change in U.S. federal law enabled institutional asset managers like pension funds and endowments to invest in illiquid assets, including VC funds. These entities that invest in VC funds are investors who easily can tolerate illiquidity. They can hold investments for several years waiting for an appropriate opportunity to sell. Such investors do not need much inducement to encourage them to invest in VC. This 1979 regulatory change is the same one that enabled fund managers to invest in small firms, securitized debt, and international equities.

With regard to illiquid assets, because of portfolio investing, even a slight differential in expected returns, compared to returns on liquid assets, is sufficient to attract capital. Portfolio investing, in fact, argues for some investment in VC even with no differential return or a slight negative. Nonetheless, returns to VC investing have been attractive.

![Annual Returns of Venture Capital Fund Investments](image)

Source: Venture Economics, National Venture Capital Association

The long-run average return (based on the last 20 years) for investing in VC has been 20.3%. If we were to weight the performance by total funds invested, the percentage return would be much larger. These returns are dramatically higher than returns investors seek for investing in liquid assets (stocks and bonds). Long run, the (postwar) average return on stocks (the S&P 500) is 14.7%. VC returns have been almost 1.5 times as high.
THE IMPLICATIONS OF VC HISTORY

Let's consider, for a minute, what lessons we should draw from the historical evidence. One phrase that has been used to describe the VC market of the last two decades is “money chasing deals”, in which usage, “chasing” means “following.” Before 1979, US regulations were starving the capital market for new ventures, a fact that may not be apparent to practitioners. There were plenty of attractive high-risk opportunities, but investment capital was held back. With passage of the 1979 ERISA Act, the barrier was removed, and capital began flowing into the venture finance market.

Over the most recent 10 years (since 1990), the compound annual growth rate of new commitments has been over 40%. The restricted flow of capital implies that VC returns historically have been higher than they needed to be. Lack of a well-established VC infrastructure was the bottleneck. Both opportunities and capital were available to anyone who could build a credible VC organization. But, because VC investments are long-term, investors wanted to associate with managers who had established records and reputations.

Because established VC management organizations could only grow so fast, the market provided opportunities for unproven managers to enter. In the environment of rapid growth, inefficient organizational forms and poorly structured deals were viable. In that environment, entrepreneurs occasionally found themselves being strung along by VCs until their cash shortages became acute. Only then would the VC enter into a deal.

This tactic was only possible due to the scarcity of capital and lack of direct competition among alternate VCs. The fact that some VCs may have taken advantage of this condition has damaged the reputation of VC among inexperienced entrepreneurs.

THE INTERNET BOOM

In addition, in the late 1990s, the public became interested in VC. Because federal regulations related to the Investment Company Act of 1940 impeded individual investors from VC investing, they sought to participate by investing in IPOs of very early-stage companies. This, fundamentally, drew VCs out of their business model. No longer did you need a good company with a good product and management. All you needed was a good story and lawyers who knew how to write prospectuses quickly.

The industry grew from $29 billion in 1998 to $94 billion in 2000, largely on the basis of finding e-commerce ventures and taking them public. VC investment horizons dropped from their traditional 3-7 years down to 12-18 months.
THE END OF THE INTERNET BOOM

That was the VC environment until April 2000.

In April, for whatever reason, the dot.com rally ended. Within two months, Internet stocks lost 40% of their market value. They now have lost over 90%. The implications for VC are serious but are only just beginning to show up in formally reported performance.

From an annualized rate of return of 130% in the first quarter of 2000, US VC Fund returns declined to 34% in the second quarter, 28% in the third, and negative 23% in the fourth. These reported return numbers seriously overstate the actual performance of the funds. VC funds generally follow accounting conventions of only recording value changes on the basis of subsequent transaction prices. If an investment has lost value but no new investment is made, it still can appear on the VC’s books at the earlier high valuation. There are other factors that can complicate valuations and distort reported earnings. This is just the most direct one.

Overvaluation is only part of the current problem. Declining stock market interest in concept IPOs— that is, public offerings by companies with good stories but nothing tangible—has closed the door on easy early harvesting. VCs must now return to the traditional model of overseeing and continuing to support their investments for several years. More of the fund manager’s time will have to go to working with portfolio companies. This will take away from time spent attracting investment capital and looking for opportunities.

Incidentally, it’s not very surprising, in this new climate, that VCs have become more interested in networking with business angel groups. They are effectively using the angels’ time and effort to find, filter, and nurture opportunities. As a result of the market decline, enterprises that might have attracted VC funding a couple years ago no longer are as attractive. Because they can’t find attractive investment opportunities or can’t find sufficient time to oversee them properly, some VC funds are now returning capital to limited partners or releasing them from capital commitments.
Aggregate new capital commitments are declining. This, again, includes the effects of inability to harvest, and to roll funds into new commitments. Corresponding to the decline in attractive opportunities, the number of funds receiving new capital commitments also is declining.
So here is where we are:

We have shifted from "money chasing deals" to "deals chasing money." The VC industry is over-built relative to realistic forecasts of future investment opportunities that may exist. It is populated by organizations that previously could generate acceptable rates of return for investors without having a great deal of what the professional investment management community refers to as "skill." The result is that the economic survival of all but a few VC fund managers is at risk.

THE FUTURE - OVERVIEW

Succeeding in the New Environment:
The Future of New Venture Financing
The future of new venture finance is about what it will take to survive and profit in an industry that is about to become more competitive than it ever has been. We can take a first, broad look at the future by returning to Arthur Rock's observation that good people are important to success. Searching for good entrepreneurs, however, is not like searching for truffles that are waiting passively to be found. The woods are full of truffle hunters. They all have trained truffle hounds, and there are not enough truffles to go around.

A VC who wants to find good people must be a good person. But, in the world of new venture finance, what does being a good person mean? I can tell you being a good person it is not the same as being a nice person. In part, it means being the right person.

---

**What makes entrepreneurial teams successful?**

- **Team = Entrepreneur and Investor**

- **The Meanings of Success and Failure**
  - **Success=** Reaching agreement on a deal that can maximize expected return on an opportunity.
  - **Failure=** Being unable to reach an agreement that would have been likely to work.

---

VC and angel deals are skill-and-opportunity matches. In the new competitive environment, a VC or business angel who brings only money to the table will not attract good entrepreneurs. The same is, of course, true of entrepreneurs. Unlike during the late 1990s, bringing only good ideas will not be enough.

Suppose we define an entrepreneurial team as the entrepreneur and the VC investor. Success, for the VC, is not that the portfolio of ventures he decides to finance will be more successful on average. Rather, it means a given opportunity is more likely to be pursued and more likely to be successful. Success for the entrepreneur means that, for a given idea, being financed is more likely and her expected return is more valuable.

**NEW VENTURE PARADIGM**

If you ask many VC investors and others to describe the characteristics of entrepreneurs, they are likely to say that entrepreneurs actively seek out risk, are overly optimistic about the merits of their ideas, and overly egotistical about their own abilities. This is the stereotypical view of the entrepreneur. But it is a stereotype and a personality type that cannot survive in a highly competitive environment. Entrepreneurs may be exceedingly optimistic, willing to tolerate high risk, and egotistical, but they cannot be unjustifiably so. If you ask many would-be entrepreneurs the same question about venture capitalists, they are likely to say that VCs are greedy, ruthless, vultures who prey upon cash-starved entrepreneurs. This, of course, is the stereotypical view of the venture capitalist. This kind of investor, also, cannot survive for long in a competitive market for venture financing.
The stereotypical views of the entrepreneur and the VC investor yield a "law of the jungle" "kill or be killed" process of new venture financing. The parties over-emphasize their separate interests and lose track of their mutual interest. The parties' energies are dissipated through fighting over how to share gains that may never materialize.

A more enlightened view is of the entrepreneur is as a rational risk taker; a person who is not risk-seeking, but is willing to take high risk based on the attractiveness of the opportunity, and compares (at least qualitatively) the risks and potential returns of the venture against those of other opportunities. A rational entrepreneur can form realistic expectations about the potential of a venture and understands the market and the opportunity. Finally, a rational entrepreneur is committed to the venture, knows his or her own limitations, and is able to hold ego in check.

A more enlightened view of the VC is as a rational investor who recognizes that the VC investment market is increasingly competitive and who seeks to provide a competitive rate of return to fund investors. The rational VC is one who looks for win-win opportunities with the entrepreneur, and whose capabilities compliment those of the entrepreneur.

The distinctions between stereotypical and rational entrepreneurs and investors yield four different views regarding the nature of new venture teams:
The "Kill or be Killed" view, which is the product of combining stereotypical VCs and entrepreneurs; the "Predatory" view, which is the fear of some entrepreneurs and combines a rational entrepreneur with a stereotypical VC; the "Parasitic" view, which is the fear of some VCs and combines a rational VC with a stereotypical entrepreneur; and the "Symbiotic" view, whereby a rational team pursues mutual self-interest.

In the new competitive environment only the symbiotic relationships are likely to survive. In any environment, predatory and parasitic teams are unlikely to form and both parties will probably get what they expect:

"Stereotypical (vulture) investors are unlikely to attract rational entrepreneurs.

"They are more likely to attract paranoid and arrogant entrepreneurs.

"Stereotypical (paranoid and arrogant entrepreneurs) are unlikely to attract rational VC investors.

"They are more likely to attract vulture investors.

Thus, in any environment, new venture teams are likely to form along an axis of team quality. Location on the axis is correlated with the potential for success.
Until April 2000, a venture capital investor could be successful and sloppy at the same time, as long as a few fundamental things were being done right. Most importantly, as an investor, you needed to focus investments on technologies you understood, stay close to the center of new ideas related to the technology, monitor your investments, be ready to make hard choices about ventures not performing up to expectations, and have access to patient capital. These relatively mild, competitive pressures account for the concentrations of certain kinds of entrepreneurial activity in specific locations, like Silicon Valley, as well as the difficulties other communities have had in their efforts to foster entrepreneurship and the similar but even greater difficulties that most foreign countries have had.

The factors that were sufficient for success in the past will be necessary but not sufficient in the future. Far too many high-quality investors with similar capabilities are mining the same pile of business plans.

DEAL STRUCTURE

If you take only one point away with you, I'd like it to be that deal structure is the new frontier of competitive success in new venture financing. In addition to doing everything else well, if you can value investment opportunities more accurately than your rivals, do a better job of assessing the venture's cash needs, structure investments more strategically, and devise ownership claims that also appeal to entrepreneurs, then you can mine the same pile of business plans as everyone else and find attractive investments.

For those interested in VC, but still engaged in the corporate world, corporate investment is undergoing the same kinds of change. Team quality and deal structure are directly related to each other. Low quality teams may form, but the deals are likely to be poorly structured. While some ventures with poorly structured deals have survived in the past, they are likely to fail as the environment becomes more competitive. High quality teams, on the other hand, can be expected to evolve deal structures that promote good decision-making. Good deal structures increase the potential for venture success. They limit the amount of investment in unsuccessful ventures. And, they increase the values of the team members' financial claims.

High-quality, rational, entrepreneurs and investors, especially those without track records of prior success can use deal structures to reveal their quality to each other. Parties who fail to do so, or resist doing so, are naturally going to be perceived as low quality.
To illustrate, an entrepreneur who is confident of the value of an idea and his or her own capabilities does not need to guarantee full funding up front. Conversely, a VC who is not trying to take advantage of the entrepreneur can agree to conditions that would enable the entrepreneur to re-acquire control of the venture, if it is successful.

The conceptual elements of good deal structure can be summarized in just four points. First, value can be created by structuring a deal around milestones (but not necessarily tied to automatic triggers). Staging gives the investor, and the entrepreneur, the opportunity to assess progress regularly, to abandon or refocus a venture that is not doing well, and to accelerate a venture that is. Because risk tends to fall as milestones are achieved, staged financing lowers the venture's cost of funds. It may not be obvious, but abandonment options and staged financing benefit entrepreneurs as much as they do investors.

Second, if the VC investor and the entrepreneur have similar expectations about the potential for the venture, allocating most of the risk to the investor can create value. Because the VC represents well-diversified investors like pension funds, and the entrepreneur cannot be well-diversified, structures that shift risk to the investor create value (as long as they do not adversely change behavior).

Third, shifting risk to the more optimistic or better-informed party can create value. Asking the better-informed party to bear more risk reduces incentive incompatibilities in the team. Asking the more optimistic party to bear more risk creates value because (other things equal) the more optimistic party will contribute more capital or effort per share of ownership.

Fourth, value is created if risk allocation is used to align the incentives of the parties. Staged financing contracts and other deal terms create options for one party or the other. In a well-structured deal between high-quality parties, it should not be very important who has the right to decide on option exercise.

Some of these points are well-understood; staging, for example is not new. Others, such as the implications of the entrepreneur’s underdiversification are not widely understood despite the fact that underdiversification, alone, explains much about who chooses to become an entrepreneur. Furthermore, even though each of the four points is simple… when it is viewed in isolation… considering them together in a coherent deal structure is very difficult.
To make my comments about deal structure more concrete, I'd like to spend my last few minutes walking you through a simplified example of staging. Suppose a VC receives the business plan from an entrepreneur who is seeking $5 million for a new venture. This is a software venture that may appeal to more than one target market, but development of a different software application is necessary to reach each market. Let’s suppose there are four target markets. The entrepreneur’s business plan contains financial projections of how well the venture will do assuming it is successful in all four markets. Finally, suppose that if the cash flow projections in the plan were valued at a reasonable cost of capital for the software industry, their value would be $25 million.

Here is how the negotiation might play out today with some VCs: based on the $25 million value, the entrepreneur (who cannot conceive of anything less than complete success) proposes to give the investor 20 percent of the equity for $5 million. This seems to the entrepreneur to be a fair offer based on the projections.

However, the VC believes that success is far from certain and tries to arrive at an offer by discounting the cash flow projections at a much higher rate, such as 100% per year. The VC’s discount rate is not guided by investment science. Rather, it is a product of art—a rule of thumb developed from the investor’s experience. The investor’s ad hoc valuation is, therefore, much lower. In addition, the investor wants to provide significantly less money.

Because the VC’s valuation makes no sense to the entrepreneur, and the entrepreneur still sees the need as $5 million, no deal is reached. The entrepreneur continues to search until the prospect of running out of money or losing the opportunity forces a deal to be reached with someone or forces the entrepreneur to abandon the venture.

Now, consider a more sophisticated investor, one who recognizes there really are five possible outcomes for the venture of which the success scenario in the business plan is only one.

The venture may be successful in anywhere from zero to all four target markets. Suppose the VC recognizes that the target markets really represent a hierarchy and that the venture would operate best by targeting one market at a time. Using assumptions and modeling similar to the approach used by the entrepreneur, the VC develops three other scenarios and makes some judgments about the probabilities of success at all five levels.

The diagram illustrates these scenarios:

- **Invest**: Initial investment of $5,000,000
- **Complete Success**
- **Success in Three Applications**
- **Success in Two Applications**
- **Success in One Application**
- **Complete Failure**
Based on the VC’s best judgment, the venture is only worth $4.7 million. Not enough, by far to justify a $5 million investment. The slide shows the investor’s assessments of probability, the conditional value of achieving each level of success, and the total present value of the venture. It appears that the VC should forego the opportunity, even though it might turn out to be worth $25 million.

But, maybe the project can be redeemed by thinking of the venture as a portfolio of real options, exploiting the sequential nature of the opportunity and staging the investment.

Suppose the VC and the entrepreneur agree that with an investment of $1 million, the venture could develop a software application appropriate to attempt to reach the first market.
Only if the effort to reach that market were a success would the venture go on to the second market. Otherwise the investor would abandon the venture. An additional $1 million would be needed for the second application.
**NewCo's Real Options**

<table>
<thead>
<tr>
<th>First Application</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Round</td>
</tr>
<tr>
<td>$1,000,000</td>
</tr>
</tbody>
</table>
If the second application is successful, the investor would provide another $1 million to develop the third. Otherwise, the venture would concentrate on just the first market.

**NewCo's Real Options**

```
<table>
<thead>
<tr>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Round</td>
</tr>
<tr>
<td>$1,000,000</td>
</tr>
</tbody>
</table>
```
The same kind of rule applies in the third market, except that $2 million is needed to develop the application for the final market.
Success in one market is worth $3 million. Success in two is worth $5 million. Success in three is worth $15 million, and success in all four is worth $25 million, as implied by the entrepreneur's business plan. The most valuable opportunities are the ones that are hardest for the venture to achieve.

Is investing the first million a good idea for the VC? We can't tell without starting at the end and working backward. It turns out that investing would be a good idea provided that acceptable terms can be reached.

This is a dynamic programming problem and I do not have time to go through the entire math here. In this example, the expected investment is $2.15 million, compared to the $4.7 million present value. The investor would need about 46% of the equity to justify committing to provide all of the financing up front. Staging, however, would produce a different pattern of ownership and would enable the investor to accept a lower ultimate share of equity in scenarios where the venture is highly successful. Only if the venture fails in the first application does it turn out that the VC would lose money. To protect against this outcome, the VC will need to virtually own the venture in the first round, irrespective of how ownership is characterized in the term sheet.

However, as each level of success is achieved, the next round is provided on terms more favorable to the entrepreneur. If the venture is a complete success, the entrepreneur can easily end up with an ownership share that is close to the 80% he originally proposed.

It's important to recognize that in the first rounds, the entrepreneur and the VC did not have to agree, even remotely, on the probability of ultimate success. Dynamic adjustment of the ownership shares can overcome their different forecasts. This is one simple illustration of the power of deal structure to create value in new venture financing.
Let me just wrap up by commenting on how we approach these kinds of issues in the New Venture Finance class.

Valuing the Real Options

- Model the venture cash flows based on the agreed deal structure.
- Use risky discount rates to value the real options.
- Work back recursively through the decision tree to determine current value and required ownership.
- Use the model to evaluate alternative structures for the purpose of aligning interests and maximizing value.

We start by building a formal model of the venture, including important real and financial options, and basing the assumptions of the model on appropriate evidence from comparable firms, engineering studies, and analogies. The real options in the model effectively create a decision tree that can be simulated.

Using the model and Monte Carlo simulation software that is included with the Entrepreneurial Finance book, we evaluate the real options using appropriate, investment science-based, risky discount rates. We evaluate the options recursively, beginning at the end of the decision tree and working back to the earliest decisions. This is how I would approach the example I just discussed if more time were available.

After finding the best approach for a given set of assumptions, we then investigate alternative model assumptions. We do this to search for a structure that does a good job of maximizing the values of the financial claims of the parties and aligning their incentives with respect to decisions to exercise or not exercise the options.

I would just conclude by noting that the approach I have just discussed already is being used to a limited extent by some VC firms. In addition, consulting firms like Boston Consulting Group and McKenzie are actively developing consulting practices around the real options approach.