

The Rise and Fall of Venture Capital

Paul A. Gompers¹
Graduate School of Business
University of Chicago

Small firms and new business creation have become potent forces of economic development in the United States. Prior to 1980, large firms created the majority of new jobs in the American economy. During the last decade, however, a major structural shift occurred. Fortune 500 companies lost 4 million jobs. At the same time, firms with fewer than 100 employees added 16 million new jobs [Birch, 1990]. This was the first time in the 20th century that the shift from large to small firms occurred and it represented a fundamental change in the nature of growth in the American economy.

During the same ten year period, the rate of new firm incorporation rose dramatically. By the end of the decade, over 1.3 million new businesses were being started annually. Scherer [1991] demonstrated that during the 1980s, small firms were more innovative than large firms. He found that during the 1980s, firms with fewer than 500 employees created 322 innovations annually for each million employees while large companies contributed only 225 innovations per million employees.

¹ I would like to thank Joanne Dushay, Nancy Koehn, Josh Lerner, Thomas McCraw, William Rodgers, Richard Ruback, William Sahlman, Andrei Shleifer, and Jeremy Stein for helpful comments and suggestions. Any errors or omissions are my own. This research was funded by the Division of Research at the Graduate School of Business Administration, Harvard University.

This dramatic shift toward small firms makes it imperative that capital sources for funding start-up companies are efficient. This paper explores the effects of the unprecedented increase in money flowing into the venture capital sector after changes in the 1979 Employee Retirement Income Security Act's (ERISA) "prudent man" rule. Prior to 1979, pension funds were severely limited by ERISA in the amount of money they could allocate to high-risk assets, including venture capital. The 1979 change explicitly allowed fund managers to invest up to 10% of their capital in venture funds. Pension fund commitments to venture capital rose dramatically, increasing annual new contributions to venture capital funds from \$100-200 during the 1970s to in excess of \$4 billion by the end of the 1980s.

The flood of money was a mixed blessing. Many successful firms received venture capital financing and created tremendous growth in both technological development and jobs. The increase in capital also had negative effects on the industry, however. Overinvestment in certain industries occurred. Firms backed by inexperienced venture capitalists were brought to market too early. Monitoring of entrepreneurial projects deteriorated. The future health of venture capital depends upon measures that will align the incentives of venture capital investors (i.e. those who invest in venture capital funds), venture capitalists, and entrepreneurs who seek money to finance their projects.

Start-up Financing and Venture Capital

Entrepreneurs often develop products and ideas that require substantial capital during the formative stages of their companies' lifecycles. Many entrepreneurs do not have sufficient funds to finance projects themselves, and they must therefore seek outside financing. Several alternative capital sources exist. The informal risk capital market consists of individuals known as "angels." These "angels" are wealthy businesspeople, doctors, lawyers, and others who are willing to take an equity stake in a fledgling company in return for money to "start-up." Wetzel [1987] estimates that 250,000 individuals are active in the informal risk capital market and invest between \$20 and \$30 billion annually. Firms that require substantial amounts of money, however, may not be able to receive sufficient capital from the "angel"

network because the market is dispersed with little information sharing and the amount of invested capital tends to be small (usually less than \$100,000). Banks are an important source of start-up financing for a subset of new businesses. Companies that lack substantial tangible assets and are associated with significant *ex ante* uncertainty are unlikely to receive significant bank loans, however. These firms face many years of negative earnings and are unable to make interest payments on debt obligations.

Venture capital firms will finance these high-risk, potentially high-reward projects. Venture capitalists take an equity stake in the firms they finance, sharing in both upside and downside risks. Most firms that receive venture capital financing are unlikely candidates for alternative sources of funding. They have few tangible assets to pledge as collateral and they produce operating losses for many years.

A common misperception is that venture capital funds only high technology companies. A substantial portion of high-tech start-ups have received venture capital, including such present-day industry giants as Apple Computer, Microsoft, Lotus, and Genentech. Yet low-tech companies such as Staples, TCBY, and Federal Express have also received significant amounts of venture capital money. Each of these firms had a unique idea or product and venture capital was able to help the entrepreneur exploit that opportunity.

Between 1972 and 1992 venture capitalists brought 962 firms to the public market. These firms have been a source of innovation and job creation. Table 1 presents statistics from thirty venture capital-backed companies that eventually went public. The companies represent various industries and firms at various stages of development. Total 1993 sales for these thirty firms totalled nearly \$74 billion. They employed more than 420,000 people and their market value was \$88 billion. This list of firms demonstrates the important role venture capitalists have played in shaping the American economic landscape.

Whether the project is in a high- or low- technology industry, venture capitalists are active investors. They monitor the progress of firms, sit on boards of directors, and mete out financing based on attainment of milestones. Venture capitalists retain the right to appoint key managers and remove members of the entrepreneurial team. In

Table 1. Impact of Venture Capital-backed Companies, 1993

Company	Sales (\$mil)	Employees (000s)	Equity Market Value (\$mil)
Apple Computer	7,977	14,910	3,576
Au Bon Pain	123	1,250	223
Biogen	149	415	1,110
Chiron	217	2,179	2,171
Cirrus	354	1,353	885
CML Group	645	5,608	697
Compaq Computer	7,191	13,010	9,978
Conner Peripherals	2,151	9,097	774
Cray Computer	352	383	50
Data General	1,077	6,500	271
Digital Equipment	14,371	94,600	3,223
Evans & Sutherland	142	1,100	132
Federal Express	7,808	95,000	4,206
Genentech	650	2,510	3,189
Intel	8,782	29,500	27,082
Lotus Development	981	4,738	2,705
Micropolis	382	2,298	99
Microsoft	3,573	14,430	15,117
Oribital Sciences	190	1,123	315
Quantum	1,167	2,455	695
Raychem	1,385	10,772	1,581
Seagate	3,043	43,000	1,648
Staples	883	7,539	1,063
Starbucks	163	4,585	866
Stratus Computer	514	2,610	723
Sun Microsystems	4,308	13,300	2,009
Tandem Computer	2,030	9,963	1,368
Teledyne	2,492	21,000	997
Teradyne	555	4,500	891
Wellfleet	180	738	784
Totals	3,227	41,148	88,428

addition, venture capitalists provide entrepreneurs with access to consultants, investment bankers, and lawyers.

The History of Venture Capital

The ancestors of modern venture capital in the United States developed in the late 19th and early 20th century. Wealthy families began to look for ways to invest in potentially high-return, high-tech undertakings. David Lample writes in his history of the Route 128 venture capital region:

The city's [New York] great fortunes, including those of the Vanderbilts, Whitneys, Morgans, and Rockefellers, were based on such ventures as railroads, steel, oil, and banking. Although not all investors were so well known, it was wealthy families such as these that bankrolled Boston's earliest high tech entrepreneurs. When the young Scot Alexander Graham Bell needed money in 1874 to complete his early experiments on the telephone, for example, Boston attorney Gardiner Green Hubbard and Salem leather merchant Thomas Sanders helped out, and later put up the capital to start the Bell Telephone Co. in Boston [Lample, 1989].

The market for risk capital remained largely unorganized and fragmented throughout the late 19th and early 20th century. The first impetus to organize investing came from wealthy Americans. In the 1930s and 1940s, members the Rockefeller, Bessemer, and Whitney families hired professional managers to seek out investment in promising young companies.

The first modern venture capital firm was formed in 1946, when MIT president Karl Compton, Massachusetts Investors Trust chairman Merrill Griswold, Federal Reserve Bank of Boston president Ralph Flanders, and Harvard Business School professor General Georges F. Doriot started American Research and Development (ARD) [Lample, 1989]. The goal of the company was to finance commercial applications of technologies that were developed during World War II.

Doriot was the heart and soul of ARD and is justifiably called the "father of venture capital." Doriot's focus was on adding value to

companies, not just supplying money. Companies funded by ARD were considered to be "members of the family" [Sexton and Kasarda, 1991.] ARD's staff under Doriot's direction began providing industry expertise and management experience to the companies they backed in order to increase their chances of ultimate success.

Doriot served as ARD's president until it was acquired by Textron in 1972. During the course of his tenure at ARD, Doriot's vision was not one of "making money" but rather financing "noble" ideas. The first investment made by ARD in 1947 was in High Voltage Engineering Company. The firm, founded by several MIT professors, was established to develop X-ray technology in the treatment of cancer. ARD invested in the company for reasons noted by Compton's comment to Doriot:

They [High Voltage Engineering Company] probably won't ever make any money, but the ethics of the thing and the human qualities of treating cancer with X-rays are so outstanding that I'm sure it should be in your [Doriot's] portfolio. [Lample, 1989]

When High Voltage went public in 1955, the original \$200,000 investment was worth \$1.8 million.

ARD created the standard venture capital paradigm with its highly successful investment in Digital Equipment Company (DEC) in 1957. ARD invested \$70,000 for a 77% stake in DEC. Doriot's disdain for quick profits was displayed in the displeasure he expressed with Kenneth Olsen, Digital's founder and president, the first time DEC reported a profit. Doriot was concerned that not enough money was being reinvested in research and development and that the company might suffer in the long run [Kotkin, 1984.] Over the ensuing fourteen years, the investment in DEC increased in value to \$355 million. Almost half of all the money earned by ARD during its 26 year existence was earned by its investment in Digital. The concept of the "home run" in venture capital was synonymous with DEC and the term would become pervasive in the industry during the 1980s and 1990s. Everyone wanted to finance the next DEC.

In 1958, the Federal government decided to play an active role in promoting small firm development by becoming a participant in and regulator of small firm financing. The Small Business Administration

was given the authority to charter new small business investment companies (SBICs). SBICs were to provide early stage financing for companies in various industries. The number of SBICs increased rapidly. By the mid-1960s, 700 SBICs controlled the majority of risk capital invested in the United States.

SBICs differed markedly from ARD. SBICs tended to provide little more than money. Most managers of SBICs had little industry expertise and could not provide entrepreneurs with information or access to industry experts. SBICs did not monitor the firms as active investors, but instead relied on the repayment of loans to evaluate the success of a project.

Problems quickly developed. In an effort to lever investments in small business, SBICs were able to borrow four government guaranteed dollars for each dollar of equity capital in the investment company. Because SBICs needed to make periodic interest payments, they chose to finance firms with debt rather than equity, as ARD had chosen to do. Had they used equity, SBICs would not have been able to service their own debt obligations. Because high-risk projects are unsuited for leveraged capital structures, the use of debt financing meant that SBICs focused on more stable industries.

A second major concern was the incentive problems inherent in government guarantees. As the recent S&L crisis suggests, when the managers of certain financial institutions understand that the government will bail out the depositors if things go wrong, they have little incentive to monitor their investments closely. The implicit put option offered by the government gave individual institutions an incentive to gamble.

The initial public offering (IPO) market of the late 1960s was extremely active, and many SBICs were able to bring a number of companies public during the boom. But the IPO "bubble" and adverse investment incentives caused by the loan guarantees led to increased investments in risky projects. The recession after the first oil embargo of 1973-1974 hit young firms particularly hard. IPO activity dropped to one-tenth its previous level and many SBIC-backed firms began losing money. SBIC-backed companies, which were often financed with debt, could not meet interest obligations. At the same time, SBICs themselves were highly leveraged and could not meet their

interest and principal repayment schedules. Many were forced to liquidate. By 1978, only 250 were still active. In 1988, SBICs accounted for just 7% of venture capital financing; they provided over 75% of the investments 25 years earlier. Companies like ARD and the firms they financed survived many recessions because they relied on equity financing of both the venture capital fund and the entrepreneurial firm.

The earliest venture capital firms were organized in the Northeast, centered both in Boston and New York. It was not until 1957 that West Coast venture capital came into existence. Arthur Rock, then an investment banker at Hayden, Stone & Co. in New York City, was sent to investigate a potential project in California [*Venture Capital Journal*, 1991]. Rock called various individual and institutional investors to secure financing for Eugene Kleiner and a group of Shockley Laboratory employees. Rock's efforts led to Sherman Fairchild, the largest holder of IBM shares at the time, who invested \$1.5 million to form Fairchild Semiconductor. Four years later, Rock moved to California to form the first of two early venture capital funds in Silicon Valley. His investments in such industry leaders as Intel, Scientific Data Systems, Teledyne, and Apple have had a tremendous impact in transforming high-tech in California.

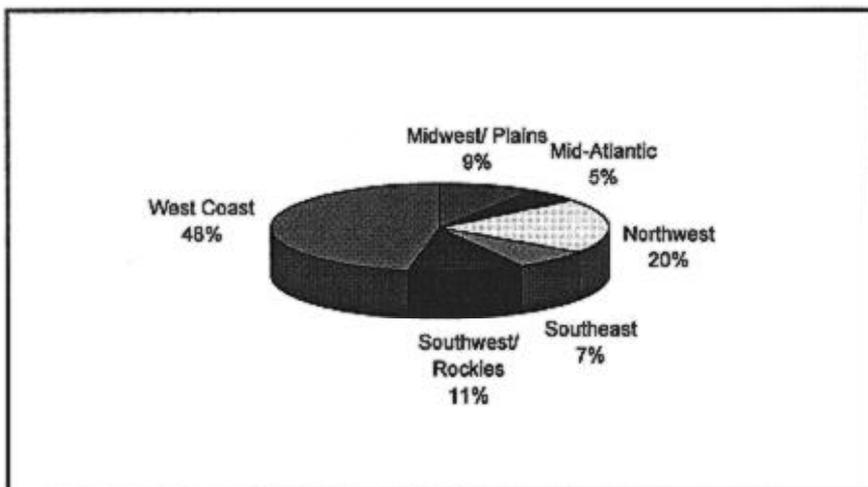
By 1992, West Coast venture capital had become one of the nation's centers for entrepreneurial activity. Figure 1 shows that in 1992, 48% of the dollars invested were invested in the West Coast region of the country. The Northeast accounted for 20% of invested venture capital. While other regions of the country seem to be underrepresented, venture capital is expanding rapidly in the Midwest and Southwest.

The dramatic success of ARD induced individuals to start new, private venture capital firms in the 1970s. Some of the earliest imitators were actually former members of the ARD team, including Bill Congelton, the ARD associate who initiated the DEC investment. This spawning produced private venture capital firms that carried the spirit of Doriot into new companies. The goal was always the "home run" while the modus operandi was always "hands-on" management. The "new" venture capitalist (unlike the manager of the SBIC) provided many services to the entrepreneur including access to

investment bankers, corporate lawyers, accountants, and industry experts.

One of the early disciples of the Doriot tradition was Don Valentine. Valentine had been marketing director at National Semiconductor. Like many other early venture capitalists, Valentine brought years of industry experience to the firms he financed. When Steven Jobs and Stephen Wozniak sought his help in 1976, Valentine knew that the two engineers needed a competent manager to head their young start-up, Apple Computer. In addition to the money he provided, Valentine cajoled A.C. Markkula, Jr., a former Intel manager, to be Apple's president [Kotkin, 1984.] Valentine's help was typical of early venture capital financing. In addition to supplying \$91,000 of capital, Valentine brought in \$600,000 more in start-up financing by syndicating the investment with other venture capitalists. Prior to its initial public offering, Apple received \$3.5 million in venture capital money. That investment grew in value to \$271 million in December 1980, when Apple went public.

Figure 1
1992 Venture Capital Disbursements by Region



(percent of dollar amount invested)

The Growth of Venture Capital

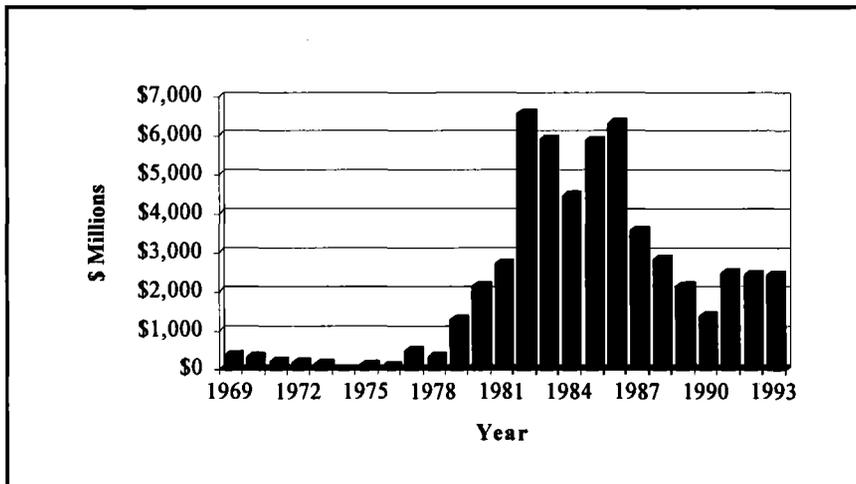
Prior to the 1980s, venture capital was a cottage industry. The mild "boom" of the late 1960s gave rise to the bust of the 1970s as SBICs sank into obscurity. The annual flow of money into new venture capital funds was never much more than \$200 million, and usually substantially less. As figure 2A shows, money flowing into the venture capital industry increased dramatically during the 1980s. In 1987, \$4.9 billion was committed to new venture capital funds. The trends in venture capital commitments appears to be highly correlated with the initial public offerings market. Figure 2B graphs cycles in the IPO market. The total number of IPOs in each year are plotted for the period 1969 to 1992. The correlation coefficient between the level of IPO activity and venture capital commitments is 0.70 and is significant at the 5% level.

The increase in venture capital coincided with two important legislative changes. The first was the 1978 Revenue Act, which decreased the capital gains tax from 49.5% to 28%. The second was the change in ERISA's "prudent man" rule in 1979, which explicitly allowed pension funds to invest in venture capital. While both changes may have been favorable to venture capital investment at the time, the long term impact of the "prudent man" rule change was substantially greater than the reduction in the capital gains tax rate.

Many professionals in the venture capital industry argue that the cut in the capital gains tax spurred the increase in venture capital investing. The cut may have had a marginal effect, but the overall impact was likely quite small. Prior to 1978 the tax favorability of capital gains, i.e. the difference between the highest marginal tax rate on normal income and the tax rate on capital gains, was 20.5% (the maximum marginal tax rate was 70% and the capital gains tax was 49.5%). The Tax Reform Act of 1978 lowered the capital gains tax to 28% without changing the top marginal tax rate, increasing the tax advantage of capital gains to 42%. This would, *ceteris paribus*, give an incentive to *taxable* individuals to invest in venture capital because the returns from venture capital investments are realized primarily in the form of long-run capital gains. While the flow of money into venture

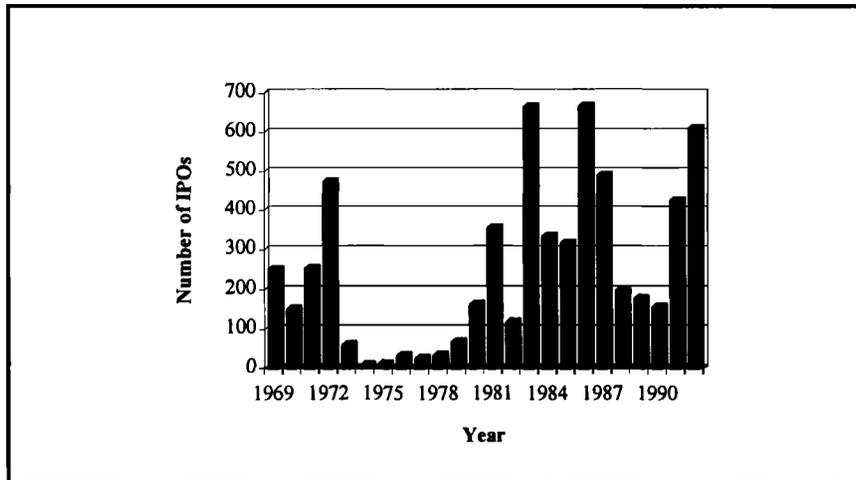
The Rise and Fall Venture Capital / 11

Figure 2A - New Commitments to Venture Capital Funds in Constant 1993



DollarData from Venture Economics.

Figure 2B - Number of Initial Public Offerings



capital funds did increase substantially following the change, causality is not established.

Capital gains policy seems to have had little impact after the 1978 reform. Subsequent changes in the capital gains tax rate have had little effect on the flow of money into venture capital. The Economic Recovery Tax Act of 1981 lowered the capital gains tax to 20% but also reduced the top marginal tax rate on income to 50%, reducing the capital gains tax advantage to 30%. New commitments to venture capital increased in the following two years, however. When the capital gains tax differential was totally eliminated in the Tax Reform Act of 1986, the flow of money into venture capital increased from \$4.5 to \$4.9 billion. If the incentive to invest in venture capital was affected by capital gains tax treatment, then the money committed to venture capital should have declined after both the 1981 and the 1986 tax changes.

The primary reason that capital gains taxation has a small impact on the amount of money flowing into the venture capital industry is that up to 70% of the money flowing into new funds is from tax-exempt sources such as pension funds, endowments, trusts, and foreign companies. Changes in the tax code have no effect on this group. Corporations, which can be taxed, constitute a significant fraction of the remaining commitment to venture capital funds. Corporations invest for both pecuniary and nonpecuniary reasons. Investment in venture capital is viewed as a way to buy "a window on new technology." Many firms may be unwilling or unable to undertake new investment in research or product development. Funding the development through venture capital may provide a way to avoid the immediate "hit" on earnings that occurs because standard accounting rules require research and development to be expensed. In addition, the corporation does not bear the entire cost of the development process, spreading the risk to other limited partners. Any change in the capital gains rate is likely to have a small, second-order effect on corporate venture capital investment because firms are looking at more than the monetary gains.

The single most important factor accounting for the increase in money flowing into the venture capital sector was the change in the 1979 amendment to ERISA's "prudent man" rule. Prior to that date, the Employee Retirement Income Security Act of 1974 prohibited pension funds from investing substantial amounts of money in venture capital or

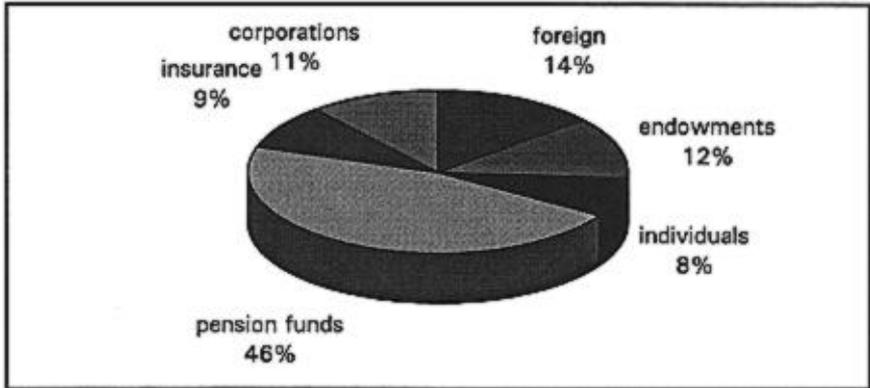
other high-risk asset classes. The Department of Labor's clarification of the rule explicitly allowed pension managers to invest in high-risk assets, including venture capital.

The rule change opened the door to tremendous capital resources. Pension funds controlled over \$3 trillion by the end of the 1980s. Stocks and bonds performed extremely poorly during the 1970s, the same time that venture capital was earning in excess of 25% per year. Pension fund managers saw venture capital as a way to earn excessive rewards. But they did not always understand the inherent risk associated with higher returns, and they poured money into new funds at a rapid pace. Figure 3A shows that in 1978 when \$218 million was invested in new venture capital funds, individuals accounted for the largest share (32%). Pension funds supplied just 15%. By 1988, when \$3 billion was committed to new funds (figure 3B), pension funds accounted for 46%, by far the largest share. The participation of individuals had fallen to the lowest fraction of new money committed (8%).

The institutionalization of venture capital has had some dramatic effects on the venture capital industry and its performance. The "short-term" focus of institutional investors has been examined by several economists. Their research indicates that the mismatch of time horizons may have had adverse effects on incentives in the venture capital industry. Because money was poured into venture capital and the flows were directed on the basis of myopic criteria (e.g. short-run performance measures), the structure of venture capital investment deteriorated dramatically.

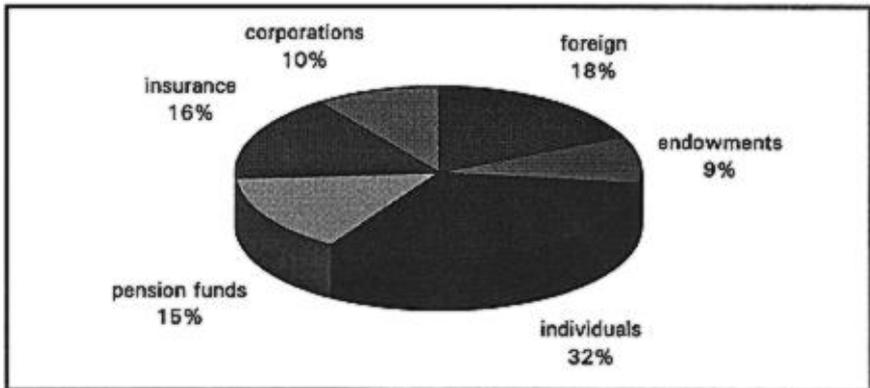
Lakonishok, Shleifer, Thaler, and Vishny [1991] investigate pension fund money managers. They examine each quarter's equity holdings and calculate the quarter-to-quarter performance for each stock in the portfolio. Their results indicate that funds sell "mistakes" (poorly performing stocks) every quarter. This selling activity is particularly strong in the fourth quarter. Large, established funds do not seem to window dress as much as smaller funds. Reputation (as proxied by age or size) may alleviate some of the adverse incentives of short-term performance evaluation.

Figure 3A - Sources of Commitments to Venture Capital Funds



1978 - \$216 million

Figure 3B - Sources of Commitments to Venture Capital Funds
1988 - \$3.0 billion



Patel, Zeckhauser, and Hendricks [1991] report a similar result. They show that past performance is rewarded with greater money inflows to the management of investment companies. For an average-size investment fund of \$80 million, a one percent increase in annual return is correlated with a \$200,000 increase in capital commitments. Rank order, or relative performance, is more important in explaining cash inflows than absolute performance.

Sirri and Tufano [1992] examine the flow of funds into 632 equity mutual funds for the period 1971-1990. They find that an increase in one period's performance leads to greater investment inflows in the next period. Sirri and Tufano also find that poor performers are, in general, not punished. One exception is small, young funds which appear to be judged harshly when they perform poorly. Young funds might be punished because the market is uncertain about the fund managers' investment abilities. Initial returns move the market's posterior estimate of young fund managers' abilities to a larger degree than they would for older fund managers.

The myopic horizons of pension fund managers result from quarterly evaluations of the funds. A pension fund manager cannot afford to have a poor year or she risks losing her job. Jansson noted that pension fund managers are obsessed with short-run performance [1984, p. 7]. Because the returns from venture capital may take five to ten years to show their results, the mismatch of time horizons could have serious consequences. *Institutional Investor* noted in 1984 that a potential problem existed:

In fact, the only thing that could destroy this market, [Raymond] Held [vice president of venture capital investing at Manufacturer Hanovers Investment Corp] and his colleagues insist, is pension funds themselves and their obsession with the short-term relative performance game. Venture investing requires patience as problems are worked through and with all the money that has flowed into venture investments the last few years, the problems are bound to multiply [Jansson, 1984].

Pension Funds and Venture Capital

The huge increase in institutional money had a dramatic impact on the process of venture capital investing. This process can be broken down into three main stages. All three have been adversely affected by the institutionalization of venture capital.

The first stage is identification of deals. For each 100 business plans that a typical venture capitalist might review, she will invest in only one. An experienced venture capitalist concentrates on not only the skills and ideas of the entrepreneur but also on his personal qualities.

The second stage is the actual structuring of the deal. The deal contains contractual elements including the type of financing (e.g. convertible preferred stock, common equity, etc.), timing of capital infusions, explicit and implicit options, board representation, and advice provided.

The final stage is the harvesting of investments. During this phase the investment is made liquid by performing an initial public offering, negotiating a merger, acquisition, buy-back of the entrepreneurial firm, or liquidating the assets.

The move to late-stage investment

The dramatic rise in pension fund money flowing into venture capital created a mismatch between the duration of most venture capital investments and the time horizon of investors. Incipient investments in firms are known as "seed and start-up" investments. In 1980, 25% of all venture capital investing was in these classes. Table 2 shows the changing makeup of venture capital investing. By 1988, seed and start-up investing accounted for only 12.5% of new investments, half the fraction of 1980. The big increase came from leveraged buyouts (LBOs). In 1988, 20% of venture capital money went into LBOs.

The shift to late-round financing and LBOs is evidence that short-term performance pressures increased dramatically with the institutionalization of venture capital sources. Seed and start-up projects many take five to ten years to show returns. The industry practice is to wait to write-up the investment until it is harvested. Because valuation of venture capital-backed firms is very difficult and subject to potential

biases, institutions have no idea how their portfolio is performing for several years. In fact, bad venture capital projects are usually identified much sooner than good ones. Most bad investments are written-off early in the fund's life, depressing the stated value of the venture capital portfolio. Because one bad year could end the career of a money manager, pension fund investors put significant pressure on venture capitalists to perform quickly. Kaplan [1991] shows that the lifetime of an LBO investment is significantly shorter than that of a comparable venture capital investment. Assets are sold off almost immediately to meet debt burden, and many companies go public again (in a reverse LBO) in a very short period of time.

Table 2. Percent of venture capital investment by type of financing

	Seed & Start-up	Expansion & Late Stage	LBO
1980	25.0%	75.0%	0.0%
1981	22.6%	77.4%	0.0%
1982	20.0%	68.0%	12.00%
1983	17.2%	70.8%	12.0%
1984	21.0%	67.0%	12.0%
1985	15.0%	69.0%	16.0%
1986	19.0%	58.0%	23.0%
1987	13.0%	69.00%	18.0%
1988	12.5%	67.5%	20.0%

The shift towards later-stage investing and LBOs is a direct result of the need to realize returns earlier. With less money flowing into the developmental stages of investment, the U.S. economy may be heading into a period in which new firms will be less innovative. The success of venture capital in the 1980s was driven by the tremendous amount of money invested during early-stage projects in the late 1970s and early

1980s. The dramatic decline in early-stage investing may mean that there will be fewer opportunities for profitable late-stage investing in the 1990s.

Herding and venture capitalists

The large increase in money also affected the identification of opportunities in a perverse way. Because venture capitalists were now bloated with cash, they could pursue many projects. Certain industries appeared particularly attractive and a herd mentality resulted. Too much money was chasing too few deals and venture capitalists paid far too much for the projects.

Sahlman and Stevenson [1987] chronicle the exploits of venture capitalists in the Winchester disk drive industry. Sahlman and Stevenson believe that a type of market myopia affected venture capital investing in the industry. During the late 1970s and early 1980s, \$400 million was invested in 43 disk drive companies. Two-thirds of this investment came between 1982 and 1984. Many disk drive companies also went public during this period. Over \$800 million was raised in public offerings by 1983. While industry growth was rapid during this period of time (sales increased from \$27 million in 1978 to \$1.3 billion in 1983), it is questionable whether the scale of investment was rational given any reasonable expectations of industry growth and future economic trends.

In mid-1983, the twelve publicly traded disk drive companies had a market value of \$5.4 billion, which represented four times sales and a price-to-earnings ratio of nearly 50. The bubble had to burst, and it did in 1984. By year's end, the market value of the twelve public disk drive companies had fallen to \$1.4 billion. Industry income fell 98% as overproduction and competition cut margins. Many of the industry's leading companies went bankrupt during this period, including Priam and Miniscribe.

Ex post, it is easy to establish that investors poured too much money into an industry, but the case of the Winchester disk drive industry is one that could have been predicted. The sudden and dramatic increase in venture capital commitments meant they had to find something in which to invest. The large fraction of inexperienced

venture capitalists changed the rules of investing. Too many companies were funded in various industries at prices that were clearly unwarranted. The dramatic failure of disk drive and other venture capital-backed companies substantially reduced returns in the venture capital industry.

Grandstanding in the venture capital industry

The large growth in new funds affected fund returns in additional ways. Gompers [1994] has explored the process of initial public offerings by venture capital-backed firms. The number of new venture capital partnerships increased from 225 in 1979 to 674 in 1989. Eighty percent of venture capital investing is provided by funds that are organized as limited partnerships. (A limited partnership is an entity that has a legally defined ten year lifetime.) The fund may be extended up to three additional years in one-year increments with the approval of limited partners, however. The money from investments must be returned to limited partners within the ten year time.

Venture capitalists usually invest all the money from their fund in the first five years of a fund and wait during the second five years to harvest the investments. This strategy means that the venture capital partnership must start a second fund during the first five years of the partnership's first fund in order to invest in attractive new projects. Gompers finds that unseasoned venture capital firms (those that have been in existence five years or less) are under tremendous pressure to perform during the initial stages of their first fund. Young venture capitalists are concerned about having a track record and showing pension fund investors that they are financing worthy projects in order to raise additional funds. The empirical results show that these inexperienced venture capitalists have an incentive to "grandstand," or bring firms from their first fund to the public market sooner than would otherwise be optimal.

Firms backed by inexperienced venture capitalists are nearly two years younger at their initial public offering date than similar firms that are financed by older, more reputable partnerships. On average, young venture capitalists lose almost \$1 million on each initial public offering because they bring the companies to market too early. When the results

are examined by year, inexperienced venture capitalists were under less pressure to signal their abilities when pension funds accounted for a small fraction of the venture capital pool. Pressure to perform early IPOs seems to have increased as pension funds became the major supplier of money for venture capital funds. The short-term focus of pension fund managers may be a contributing factor. Because two-thirds of the venture capital partnerships were founded during the past ten years, returns in the industry have been dramatically affected by the increasing institutionalization of venture capital and its effect on young venture capitalists' incentive to signal their abilities.

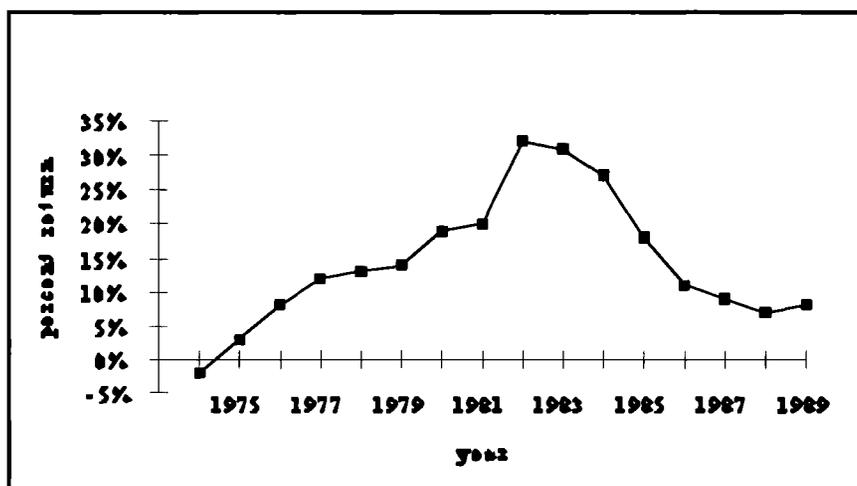
The effect on returns in the venture capital industry

The above structural and behavioral changes in the venture capital industry dramatically affected returns. Figure 4 shows the median return on all venture capital funds tabulated from the Venture Economics database [Bygrave and Timmons, 1992]. The figure demonstrates that median returns on venture capital investments increased from the early 1970s and peaked in 1982 at 31%. Subsequently, fund performance has decreased, and in 1989 median annual returns were only 8%.

The low returns in the early 1970s resulted primarily from the oil shock-induced recession and the failure of many SBICs. As the industry shifted toward more efficient limited partnerships that used equity financing and provided advice and the economy expanded in the early 1980s, venture capital returns increased. During the 1980s, funds became swollen with money and problems arose. While the twenty plus percentage decline in venture capital returns since 1982 may not be entirely due to the factors listed above, they are certainly major contributors to the precipitous drop.

The declining commitment to new venture capital funds has resulted primarily from pension funds losing interest in venture capital even though some of the excesses have been corrected. Many of the partnerships that performed poorly are no longer active. Understanding

Figure 4 - Median Rates of Return on Venture Capital



the nature of venture capital can also change investment behavior and many venture capitalists have gained considerable experience during the difficult years of the mid-1980s. Industry experts believe that most venture capital partnerships are more efficient and experienced than ever before.

The story is all too familiar. Excesses in investment lead to new excesses in pulling out. C. Kevin Landry, managing partner at TA Associates (a leading venture capital firm) notes:

Pension funds all wanted to get into venture capital in 1983, and that was the wrong time [because returns had peaked]. Now, most institutions want to get out at the wrong time. [Retkwa, 1990]

While the surge in pension fund contributions to venture capital did dramatically reduce returns in the industry, other factors were important. The returns on venture capital investments are affected by the strength of the initial public offering market. If venture capitalists cannot make their investments liquid, they stand to lose substantial amounts of money. Alternative avenues of harvesting the venture exist and an increasing number of venture capital-backed firms have been merged or acquired by large corporations in recent years. But

alternative exits provide returns on investment that are significantly less attractive than IPOs and still remain a second-best harvest. The recent surge in IPO activity has once again boosted returns and venture capital contributions.

The supply of new technologies is also an important requirement for venture capital investing. Many technologies and companies have been spawned from large corporations as a by-product of government-funded research. Federal funding for scientific research, both military and nonmilitary, has decreased in real terms over the last ten years. Private funding of R&D has also stagnated. While it is too early to say that future areas for potential venture capital investing will be substantially smaller, the decline in R&D funding is reason to be concerned.

Conclusions

Venture capital in the U.S. is significantly larger and more active than in any other country. The control mechanisms and tight monitoring of high risk/ high reward projects and the information generating activities of venture capitalists are clearly valuable. Venture capitalists are a long-run competitive advantage for the American economy. Present and future world leading firms have been, are, and will continue to be financed by venture capital. Promoting an efficient venture capital sector should be a goal of any administration.

Will venture capital thrive in the 1990s? The question cannot be easily answered because many policies the Clinton administration has proposed have yet to be implemented. We do not know if they will succeed in stimulating small business formation in general and venture capital in particular. Health care reform could curtail investment in promising areas like biotechnology and medical-related fields. The experiences of the 1980s and the political debate of the early 1990s have focused attention on small firms as the engine for economic development in the United States for the next decade. New initiatives and regulations can aid in the growth of venture capital.

First, the Federal government should increase the financing of basic science research. The potentially profitable spin-offs from such spending are enormous. Spending on space and defense research

created the electronics, modern communication, and computer industries. National Science Foundation funding of genetic research led to the breakthroughs that made biotech companies possible. No one can pick the next major technological advance with perfect certainty, but basic science research is an important element of any economic proposal to foster new businesses.

The constant debate over whether a lower capital gains tax would increase venture capital and the horizons of venture capital investors does not address the entire problem. Reduction in capital gains taxes alone would likely have little or no effect on venture capital investments in the absence of other changes. While venture capitalists may argue vehemently for decreases in the capital gains tax rate, the ones who would benefit most from such a reduction are the venture capitalists themselves. Because a significant fraction of venture capitalists' compensation is taken as a percentage of the accrued capital gains, reduction in capital gains tax would substantially increase their personal returns.

Publicly traded venture capital companies are a possible solution. ARD was a public company and periodically issued equity to raise new capital. Incentives for long-term investment could be achieved because venture capitalists could reinvest proceeds as retained earnings. In addition, individuals might not be as myopic as institutional investors. Regulations limit the appeal of this option, however. Under the Investment Company Act of 1940, public venture capital firms were restricted from transactions with their portfolio companies and investors (6). The Small Business Investment Act of 1980 eased some of the restrictions by allowing public venture capital firms to incorporate as Business Development Companies (BDC) that could invest in much the same manner as limited partnerships.

The double taxation of corporate profits remains a problem. In order to avoid the extra tax burden, the venture capitalist has two options. The first is to register as a BDC with the SEC. The registration must be renewed annually and is very expensive and burdensome [Huemer, 1992]. The firm can also incorporate as a public partnership. This option limits the firm because the public partnerships are highly illiquid. No organized market exists to trade their shares. Broker and underwriter fees can also be substantial [Huemer, 1992.]

In order for viable public venture capital firms to be a potential alternative to the present limited partnership form, multiple legislative changes must occur. First, public venture capital firms must be exempted from the double taxation of corporate profits. Second, filing requirements need to be simplified. Finally, if the appropriate measures are taken, a cut in the capital gains tax may increase funds available to venture capitalists.

Given the excesses of the 1980s, one might ask what the proper scale of the venture capital industry is. Was the industry too large? The answer is both yes and no. Many venture capitalists who received money in the "boom" of the 1980s had little or no previous industry experience. These firms did not understand the nature of venture capital investing, the optimal deal structure, and effective monitoring. The industry shake-out of the last five years has repositioned venture capital for steady growth, however. Entrepreneurs exist who need financing. Venture capital investing accounts for only about 1% of capital expenditure annually. Experienced venture capitalists are and will be in short supply for some time. As long as the supply of funds does not outstrip the managerial capabilities in place, the venture capital industry can grow to be substantially larger than it is today.

The importance of small business in the American economy makes venture capital a central part of any future economic growth. Venture capitalists have financed and continue to finance companies that will be the driving force of the American economy well into the 21st century. The importance of long-term perspectives is not to be underestimated. Many projects take decades to show their full benefit. If capital suppliers do not have equally long horizons, the process of new firm development, effective product development, and cutting-edge research will be hindered.

References

- Birch, D., "Sources of Job Growth and Some Implications," in J. Kasarda, ed., *Jobs, Earnings, and Employment Growth Policies in the United States* (Norwell, MA, 1990), 71-76.
- Bygrave, William and Jeffry Timmons, *Venture Capital at the Crossroads* (Boston, 1992).

- Gompers, P., "Grandstanding in the Venture Capital Industry," University of Chicago, mimeo (1993).
- Gompers, P., "Optimal Investment, Monitoring, and the Staging of Venture Capital," University of Chicago, mimeo (1993).
- Gupta, Udayan, "Venture Capital Dims for Start-Ups, but not to worry," *Wall Street Journal*, January 24, 1990.
- Huemer, Jason, "Public Venture Capital," *Venture Capital Journal*, February 1992, 39.
- Jansson, Solveig, "The Leap of Faith into Venture Capital," *Institutional Investor*, September 1984, 117-121.
- Kaplan, S., "The Staying Power of Leveraged Buyouts," *Journal of Financial Economics*, 29 (1991), 287-314.
- Kotkin, Joel, "Why Smart Companies are Saying NO to Venture Capital," *INC*, August 1984, 65-75.
- Kunze, Robert, *Nothing Ventured* (New York, 1990).
- Lakonishok, J., A. Shleifer, R. Thaler, and R. Vishny, "Window Dressing by Pension Fund Managers," *American Economic Review*, 81 (1991), 227-231.
- Lample, David, "Investing in the Future," mimeo, 4 (1989).
- Liles, Patrick, *Sustaining the Venture Capital Firm*, Management Analysis Center research study (1977).
- Patel, J., R. Zeckhauser, and D. Hendricks, "The Rationality Struggle, Illustrations from Financial Markets," *American Economic Review*, 81 (1991), 232-236.
- Pollack, Andrew, "Venture Capital Loses Its Vigor," *New York Times*, October 8, 1989.
- Retkwa, Rosalyn, "Venture Industry Now in Transition Period," *Pension World*, July 1990, 24-26.
- Sahlman, W., "The Structure and Governance of Venture Capital Organizations," *Journal of Financial Economics*, 27 (1990), 473-524.
- Sahlman, W. and H. Stevenson, "Capital Market Myopia," Harvard Business School case (1987).
- Scherer, F., "Changing Perspectives on the Firm Size Problem," in Z. Acs and D. Audretsch, eds., *Innovation and Technological Change: An International Comparison* (Ann Arbor, 1991), 24-28.
- Sexton, Donald and John Kasarda, *The State of the Art of Entrepreneurship* (Boston, 1991).
- Sirri, E. and P. Tufano, "The Demand for Mutual Fund Services by Individual Investors", mimeo (1992).
- Soja, T.A., and Jesse Reyes, "Investment Benchmarks," *Venture Capital Journal*, 1989, 118.
- Thackray, John, "The Institutionalization of Venture Capital," *Institutional Investor*, August 1983, 73-76.
- Venture Capital Journal*, December 1991, 36.

Wetzel, W., "The Informal Venture Capital Market," *Journal of Business Venturing*, 2 (1987), 299-314.