

THE MANAGEMENT OF VENTURE CAPITAL

INVESTMENT COMPANIES.

by

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ABSTRACT

This thesis is a study of the investments and the management of fourteen publicly-held venture capital investment companies. The thesis is written to provide potential investors with greater understanding of the nature of venture capital investing, investment managers with a greater perspective on their own operations, and entrepreneurs with more information on their sources of capital. The annual reports of the fourteen companies for the years 1959-1970 were the primary source of data.

Investments in technical companies had lower initial and total size, lower initial claim on equity, longer holding times, and received lower average subsequent financing compared to investments in non-technical companies. The rates of return on investments in technical companies were higher and had lower coefficients of variation. Investments in technical companies less than one year old were smaller initially, but larger in average total size, had longer holding times, and received higher average subsequent financing compared to older technical companies. Over half the investments were debt. These investments were larger initially, had longer holding times and much lower rates of return than investments consisting only of common stock.

Investments with higher rates of return had longer holding times and received less subsequent financing. The initial and the total size of the investment had little effect on its rate of return.

The distribution of returns was highly skewed, indicating that the average was dependent upon a few extreme investments. When the top five percent of the distribution was omitted, the average ratio of money invested to money returned dropped from 2.36 to 1.73.

Larger investment companies had lower operating ratios and larger average size of investment. No relationship was found between size of investment company and the compound rate of return realized by the stockholders. The average compound rate of return to the stockholders of the fourteen investment companies was 11%, which was

also the compound return on the Standard and Poors Stock Price Index during approximately the same time period 1960-1970.

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CHAPTER ONE

INTRODUCTION, BACKGROUND, AND RESEARCH METHODOLOGY

"Venture capital is characterized by any or all of the following: investment in something new with high risks and high potential reward, 'seed' money, unsecured investment, investment motivated by the prospect of capital gains...venture capital is an essential element in our economy."

U. S. Department of Commerce
Panel on Venture Capital, 1970

1.1. Introduction

Several government agencies and private groups believe that the continued formation of new businesses, especially technical ones, represents an important source of innovation within the U.S. economy, and therefore have attempted to increase the amount of venture capital available to new businesses. The Small Business Investment Act of 1958 was one such attempt. More recently proposals have been made that would change certain government regulations to stimulate more venture capital.¹ A panel on venture capital recommended that the Department of Commerce and the Small Business Administration promote a greater exchange of information on the formation of new enter-

¹See U.S. Department of Commerce Panel on Invention and Innovation, "Technological Innovation: Its Environment and Management", (Washington: U.S. Government Printing Office, 1967), and Encouraging Venture Capital for Small Business (New York: Small Business and Venture Capital Associates, 1966).

prises.² In the private sector more money is available for venture capital investing than ever before and new approaches to venture capital investing are being proposed.³

Most information on the formation and financing of new enterprises is qualitative, anecdotal, and based on personal experience. Academic research on entrepreneurship has increased the understanding of the formation and management of new enterprises. However, very few broad-based, impartial studies of venture capital exist. To increase the effectiveness of venture capital today and to encourage more venture capital investments in the future, empirical research is needed to analyze the range of venture capital activity. What has been the distribution of rates of return? What has been the dispersion of these returns? How long were venture capital investments held? How were they realized? How have investments in technical companies differed from those in non-technical companies? What were the specific risks in "seed" capital? Were there economies of scale for investing venture capital? What were the costs of managing venture capital?

²See U.S. Department of Commerce Panel on Venture Capital, "Financing New Technological Enterprise", (Washington: U.S. Government Printing Office, 1970).

³See Chris Welles, "Venture Capital: the biggest mousetrap of the 1970's?", Institutional Investor, January, 1970, pp. 37-52.

To answer these questions, this thesis reports research on the venture capital investments of thirteen small business investment companies (SBICs) and the American Research and Development Corporation (ARD). Studying the historical experience of present-day venture capital institutions should contribute to the evaluation of new approaches to venture capital. This research focuses on the financial characteristics and the distributions of returns of the venture capital investments, and on the operating policies of the investment companies in the sample. Because technical innovations are considered especially important to the economy and especially attractive to investors, investments in technical companies are compared to investments in non-technical companies. The Panel on Venture Capital noted that seed capital is the most difficult to find and that if a venture capital gap exists, it is in the supply of seed capital.⁴ The information in this thesis should encourage more investors to invest sooner in the life of a technical company. Venture capital financing consists of debt or equity in the new company. The use of debt has several advantages for the investor, but some disadvantages for the financed company. Investments in equity and in long term debt are compared to determine characteristics and outcomes of these two forms of financing.

This thesis is written to assist potential investors in knowing what to expect from "venturing", to provide venture capital investment

⁴U.S. Department of Commerce Panel on Venture Capital, 1970.

managers with a greater perspective on their own operations, and to provide information for entrepreneurs about their sources of capital.

1.2. Organization of the Thesis

A review of prior research and a description of research methodology follows. The growth stages of new enterprises and differences between new technical and non-technical companies are defined to provide a framework for describing the characteristics and outcomes of venture capital investments. The major sources of venture capital are presented to relate the fourteen investment companies studied here to the venture capital community as a whole. The chapter ends with a description of the sources of data and of the statistical methodology used to analyze the data.

Empirical research in this thesis examines relationships that exist in 1) the population of venture capital investments and 2) the population of venture capital investment companies. Investments in technical companies, "technical investments", are compared with investments in non-technical companies, "non-technical investments". Investments in technical companies less than one year old, "Stage I investments", are compared to investments in older technical companies, "Stage II investments". For this comparison, the investments of ARD, Boston Capital Corp., and Greater Washington Investors, Inc. are used since specific data were not available for the other companies in the sample.

Investments in common stock, "stock investments", are compared with investments in long-term debt, "debt investments", and with investments of both common stock and debt, "mixed investments". An investment was classified as stock if at least 90% of the initial investment was a purchase of common stock. A debt investment had at least 90% of the initial investment in convertible debt or straight debt with warrants. Mixed investments were all investments not classified as stock or debt.

The financial characteristics of investments are studied in Chapter Two. The initial investment is characterized by its size and its claim on equity. The characteristics of subsequent investments to the same enterprise are examined. The length of time venture capitalists held an investment is related to other characteristics of the investment.

The outcomes of the venture capital investments are analyzed in Chapter Three. Two measures of return and a measure of dispersion of returns are used to determine the success of the investments. Investment success is related to financial characteristics of the investments.

The management of venture capital investment companies is examined in Chapter Four. Rates of return for the stockholders are used as measures of performance. The relationship between operating income, operating expense and size are examined and related to performance. Taxation of venture capital investment companies and the implications for investment management are analyzed.

The empirical research is summarized and suggestions for future research on venture capital investment strategies are presented in Chapter Five.

1.3. Growth Stages of New Enterprises--Uses of Venture Capital

The problems and opportunities of managing venture capital are derived in part from the problems and opportunities of the new enterprises financed by venture capitalists. There are two major research studies on entrepreneurship: one at M.I.T. on technical entrepreneurs who left M.I.T. laboratories and academic departments to start their own companies,⁵ and another study at Michigan State on entrepreneurs who started manufacturing companies in Michigan in the period 1945 to 1958 and survived until at least 1960.⁶ The results of these two studies are used here to draw a composite description of the growth of a new enterprise.⁷ Both studies attempted to explain the causes and correlates of success. In the Michigan

⁵ Summarized in M. A. Cohen, Spin-off Organizations: A Study of Enterprises Spun-off from the M.I.T. Community, (Cambridge: Unpublished S.M. thesis, M.I.T., Sloan School of Management, January, 1970).

⁶ O. F. Collins and D. G. Moore, The Enterprising Man, (Lansing: M.S.U. Business Studies, 1964).

⁷ A similar description is found in U.S. Department of Commerce Panel on Invention and Innovation, 1967.

study, success was defined qualitatively as survival and growth. In the M.J.T. study, success was defined quantitatively as an index constructed on the basis of company sales, age and profitability. No published study is available that relates company success, however defined, and investor success, defined on the basis of return on investment.

Conceptually the growth of a new business can be ordered into three stages: starting up (Stage I), initial growth (Stage II), and sustained growth (Stage III).⁸ The boundaries of these stages are not well-defined. The time spent in a specific stage varies widely between enterprises. All new enterprises do not experience the same set of problems as they struggle to survive and to grow. However there are common characteristics and unifying themes that are shared by the majority of new enterprises as they grow.

The start-up stage begins with the founding of the new company and ends when the firm has sales volume and product development to demonstrate its growth potential. The start-up stage is defined operationally in this thesis as the first year of operation of the new firm. During this stage the initial product is developed or refined to establish customer acceptance and unit costs. The entrepreneur learns the specific demands of the market and establishes production procedures. The new company is primarily concerned with product development and sales. The government is the

⁸U.S. Department of Commerce Panel on Venture Capital, 1970.

only customer of many technical start-ups and may continue as the major customer through all three growth stages. Marketing channels usually consist of friends and personal contacts of the entrepreneur.

The new company can react quickly when opportunities arise. Adaptability and specialized expertise are the only competitive advantages the new company has. In all other respects, financing, marketing, production and managerial experience, the established company is superior to the start-up. Often the equipment of the new company is barely adequate. There are not sufficient funds to complete product development.

How much capital is required at this stage? The study of M.I.T. spin-off found that

Twenty-three percent of these companies were begun with funds of less than one thousand dollars. Twenty-two percent began with funds equal to or in excess of fifty thousand dollars, while the remaining forty-five percent varied between one and fifty thousand dollars. The precise amounts of initial financing ranged from zero dollars for six companies to \$900,000 for one company (Cohen, 1970, p. 89).

Companies with a larger number of founders raised larger amounts of initial capital, and raised more capital from sources other than their personal funds and their family and friends. Companies that raised larger amounts of initial capital were more successful in terms of sales growth and profits.⁹ That these companies were successful because they received large amounts of initial capital or vice versa was not determined. These findings do indicate that the

⁹Cohen, 1970, p. 95.

new companies financed by the venture capitalists studied here were larger initially and more successful than companies that received initial financing only from family and friends.

The risks of investing in the new enterprise are substantial at this stage. There is little historical evidence that the management is competent or that the product can be sold. Often the product is still experimental. If the firm fails, there will be few salvageable assets. If the firm succeeds, it will need more capital to continue growing. The investor in a start-up must be patient, his investment may not be realized for several years. If the firm merely survives (does not grow or go bankrupt), the investment may never be realized. If the company is exploiting "high technology", many investors will have no knowledge of that technology enabling them to understand the product, the promise, or the problems of the new company. In every case the potential investor must trust unproven management to develop, produce and sell an unknown product. Obviously the expected returns for investing in start-ups must be high to compensate for the large risks. The empirical research in this thesis describes the financial characteristics and measures the actual returns of investments in Stage I companies.

In Stage II, the company builds upon its initial base of operation. A routine becomes established in the company that makes more efficient operation possible. The company begins to improve product quality and delivery times, and to lower its unit costs. As the company grows, an organization evolves. Specialized management

is needed in production, marketing, and research. Administration and financial controls are required to keep the company operating profitably. New problems arise. Friction may develop within the founding group over policy issues or management roles. Competition increases. Other firms may begin to imitate the innovation that gave the new company its growth potential. Additional capital is required. The company may operate at a profit, but the resulting cash flows from operation will be insufficient to support continued growth. More capital equipment, greater working capital and more product development are required.

Financing is easier for the company at this stage. If sales and profits are growing and the business has some organization, the uncertainties of investing in the company are reduced. In cities where technical entrepreneurship is high, commercial bankers are willing to loan working capital to technical companies without requiring collateral. These bankers can help the entrepreneur to improve his financial management and introduce him to other members of the financial community. If the company continues growing, investors can expect a public offering and a market for their investment in two or three years.

In the majority of M.I.T. spin-offs, additional capital came from new sources, that is, sources not used in the initial financing. Companies that did rely on the personal funds of management and of family and friends for additional capital were the low performers. The successful companies needed more capital than these inside

sources were able to supply and found other sources of capital. Usually the amount of capital needed was sufficiently large to interest the formal venture capital organizations and large private investors. The primary need for capital was to support product development and technical personnel.¹⁰

Stage III--sustained growth--begins when the company demonstrates its capability to continue growing over the foreseeable future. The opportunities and problems facing the company become similar to those of large corporations, but on a smaller scale. A growing market has been identified. The company has shown that it can upgrade its product line and adapt its marketing strategy to continue growing even though competition is strong from both large and small firms. Opportunities to acquire or to be acquired are brought to the company. Administration is important. The entrepreneur must change his management style and motivate others to do the tasks he formerly did. This change can be difficult or impossible. If the entrepreneur cannot change, another manager will replace him. If the company has not previously sold stock to the public, investment bankers will encourage it to do so. The large financial institutions will purchase private placements of debt and equity. In the eyes of the financial community, the company is established and is an attractive investment. The research cited above focused on new manufacturing companies, especially new technical companies.

¹⁰Cohen, 1970, p. 131.

Do technical companies grow differently from non-technical companies? What advantages and disadvantages does technology have for a new company? Technical companies have not been the only successful growth companies. However, they have been the most glamorous venture capital investments. Why?

Operationally a technical enterprise is defined as any business that was classified into one of the following major groups of the Standard Industrial Classification:

Manufacturing Groups

28	Chemical and allied products
34	Fabricated metal products
35	Machinery, except electrical
36	Electrical machinery, equipment, and supplies
38	Professional, scientific and controlling instruments; photographic and optical goods; watches and clocks

Service Groups

73	Miscellaneous business services
----	---------------------------------

Technical businesses in the Services group consist entirely of computer services firms and science-based consulting companies.

Most of the non-technical companies whose financing is studied in this thesis were real estate developers, manufacturers of consumer products, specialty publishers, and CATV companies.

Small businesses in general have several characteristics that can give them certain advantages over larger businesses. One study of small business in the American economy cited four such advantages: flexibility, speed of adaptability, personalized service, and desire by the consumer for specialized or custom service or products.¹¹ In another study on the future of small business¹², the small business was cited as a prominent source of technological change because small business had greater flexibility, greater selectivity of personnel, and stronger motivation. Jewkes et al found in a study of sixty modern inventions that the individual or the small firm was the predominant source of new technical ideas.¹³ It appeared that in the creative process of invention, the individual was more important than the characteristics of the institution, including size. Limits to economies of scale have made some non-technical segments of the economy the natural habitat of small businesses, e.g. the retail and service industries.¹⁴

¹¹J. Fred Weston, "The Position of Small Business in the American Economy", in The Financing of Small Business edited by Irving Pfeffer (New York: MacMillan Company, 1967), pp. 34-66.

¹²E. D. Hollander and others, The Future of Small Business (New York: Frederick A. Praeger, 1967).

¹³J. Jewkes, D. Sawers, and R. Stillerman, The Sources of Invention (New York: St. Martin's Press, 1959).

¹⁴E. D. Hollander and others, 1967, p. 126.

The factors above explain why certain small businesses survive but they do not explain how a small business grows. Technical companies have the competitive advantages that come from the entrepreneur's knowledge of a specialized technology.¹⁵ For the technical companies, diseconomies of scale do not protect the business while it is small, nor prevent it from growing.

For non-technical growth companies, the competitive advantages are particularly difficult to maintain since they are derived from economies of scale. For example, large organizations have not managed specialty printing or real estate development profitably because of the high degree of flexibility and customer service required. The reverse is true for manufacturers of consumer products and CATV companies. These industries have economies of scale, so starting a business on a small scale is difficult. For consumer products, there are economies of scale on both production and distribution.¹⁶ CATV is a utility similar to the telephone industry and is operated most efficiently as a large integrated business. Penrose has observed

"...it is not necessarily capital that prevents the expansion of the small firms often found on the fringes of an industry; it may just as well be that the organization and execution of an expansion on the required scale is only possible for firms already large. The small firms may survive because of small advantage in some special market, but they will not in such

¹⁵Cohen, 1970, pp. 48-63.

¹⁶Hollander and others, 1967, p. 125.

circumstances become large producers in the industry. New entrants to the industry, if any, will consist of large firms, usually from related industries, which are able to undertake the necessary expansion."¹⁷

The specified advantages and disadvantages do not imply that only technical companies grow larger. They do imply that growth is slower, requires more capital earlier, and has a higher risk of failure for non-technical companies.¹⁸ This thesis examines investments in technical and non-technical companies to discover whether these characteristics are reflected in venture capital investments.

1.4. Sources of Venture Capital

The venture capitalists studied in this thesis considered venture capital investing as the primary function of their business. Presumably their decisions and actions were not biased or distracted by more pressing, non-venture capital considerations. This specialization produces a particular expertise, but it also biases the venture capital investor away from some kinds of investments. For

¹⁷Edith Penrose, The Theory of the Growth of the Firm (Oxford: Basil Blackwell, 1959), p. 99.

¹⁸The failure rate for the M.I.T. spin-offs was considerably less than the failure rates for all new companies. See Edward B. Roberts and Herbert Wainer, "Technology Transfer and Entrepreneurial Success", Speech presented to Twentieth National Conference on the Administration of Research, Miami Beach, October 27, 1966.

example, both Baty¹⁹ and the Panel on Venture Capital²⁰ found that these capital sources were reluctant to invest in start-up financing. This section will describe the major sources of venture capital and examine the reasons for these investment preferences.

Inside sources: The funds most available to the entrepreneur are his own personal savings. Many professional venture capitalists expect the entrepreneur to invest his own funds as an indication of commitment to the venture. The entrepreneur makes a large non-financial contribution in terms of his time and his ideas, but the personal savings and collateral of the typical entrepreneur are insufficient to produce the \$25,000 to \$50,000 required to start a company. The next course of funds easily available to the entrepreneur are relatives and friends. Collectively these people may be able to invest enough capital to get the business started, but this relatively easy access to capital has a price. The entrepreneur may find his relatives and friends interfering in the decisions of the new company. Also, in order to raise large sums of money, the entrepreneur must contact a large number of individuals. The time required as well as the potential interference by inexperienced investors can make this source of capital unattractive.²¹ The company will need

¹⁹Gordon Baty, Initial Financing of the New Research-Based Enterprise in New England, Research Report to the Federal Reserve Bank of Boston, No. 25, 1964, p. 33.

²⁰U.S. Department of Commerce Panel on Venture Capital, 1970, p. 11.

²¹Collins and Moore, 1964.

additional capital to support its growth and at some point it is more efficient for the entrepreneur to seek outside investors.

Private Individuals: The Federal Reserve study concluded that "wealthy men--whether as individuals, as partners in investment banking houses, or as corporate officers--are the back bone of the (venture capital) market."²² Baty indicates that in the case of the new technically-based company, wealthy individuals are the largest and most important sources of capital.²³ The private investor is typically accountable only to himself for his actions, his tax structure favors speculative investment, he can afford the inevitable losses and he often has motivations for investing which are not strictly economic. Non-economic motivations include a sense of gambling, participation in an exciting situation and fulfilling the social responsibility of wealth.

The private individual usually does not seek venture capital investments actively. Instead his friends and associates in the financial community refer proposals to him. These investors usually seek the advice of friends and other investors when making their investment decisions. Most often the decision is based on the quality of management rather than a detailed study of the technology and the market. Through syndicates these venture capitalists can provide over one million dollars for an initial financing. The majority of

²²Quoted in Baty, 1964, p. 15.

²³Baty, 1964.

deals are between \$50,000 and \$200,000. These investors usually do not require a controlling interest or a management position, since they are active in other ventures as well. Thus the wealthy private individual is an ideal source of venture capital.

Commercial Banks and Investment Bankers: Both kinds of bankers have an ulterior motive for assisting in the financing of new companies. If the companies are successful, then the institutions these individuals represent will profit from their business. The commercial bank holds their deposits; the investment banker can earn underwriting fees for selling stock. Many of the wealthy private individuals that finance new companies are investment bankers or work closely with investment banking companies.²⁴

Deutermann²⁵ and Shapiro²⁶ found that the propensity for commercial bankers to participate in venture capital financing varies with the amount of entrepreneurial activity in the locality of the bank. The commercial bank itself can loan funds for working capital. Many banks have formal SBIC subsidiary to enable them to loan long-term debt and to purchase equity in small businesses. Because these

²⁴Baty, 1964.

²⁵E. P. Deutermann, "Seeding Science-Based Industry", Business Review, Federal Reserve Bank of Philadelphia, May 1966.

²⁶Shapiro, Hoffman, Draheim, and Howell, The Role of the Financial Community in the Formation, Growth, and Effectiveness of Technical Companies (Austin, Texas: Multi-Disciplinary Research, May, 1969), Prepared for the Ozarks Regional Commission, Contract No. ORC TA 68-4 (NEG).

bankers are active in the financial community, they can aid the new enterprise in several ways. For example, bankers can find more investors and suggest improved methods of financial control of the new business.²⁷ Commercial bankers usually do not supply start-up financing, but they can be an important communication link to other investors. The Panel on Venture Capital stated that banks were often the first point of contact for entrepreneurs seeking new financing and the banks could become "an important catalyst in the venture capital network."²⁸

Industrial Corporations: Large manufacturing companies are a more recent entry in venture capital investing. Aguren found that large corporations financed independent companies primarily with the expectation of eventually acquiring new, expanding technology and talented technical people.²⁹ Aguren's list of companies investing venture capital is small but it includes the large technical companies in the U.S. such as Union Carbide, DuPont, Western Union, American Metal Climax, Singer, and Standard Oil (Ohio).

The investment approach of these companies is significantly

²⁷Shapiro, 1969.

²⁸U.S. Department of Commerce Panel on Venture Capital, 1970, p. 13.

²⁹Wayne Aguren, Large Non-financial Corporations as Venture Capital Sources (Cambridge: Unpublished S.M. Thesis, M.I.T., Sloan School of Management, June, 1965), p. 41.

different from the sources described above.³⁰ The primary emphasis in the investment decision is placed on the product and the market, rather than management. Start-up financing is avoided. The large company usually seeks a control position in the new enterprise through the purchase of common stock. The advantage of dealing with such an investor is primarily the non-financial resources he can bring to the new company. The large company may supply technology, production or development facilities or distribution channels. The major disadvantages are the corporation's eventual goal of acquiring the new company and a bureaucratic response to the problems inherent in a new company. However these large corporations can and usually do go much further than other sources in their backing of the company, the probability of a complete failure of the entrepreneur is small. Entrepreneurs seeking to control their own companies would avoid industrial corporations as sources of capital. Large industrial corporations are a small, but growing source of venture capital.

Public Stock Issues: Most new growing companies sell stock to the public. Some companies go public early in their development because they need more capital and do not know of private sources of capital or are refused by these sources. Other companies wait until they mature and are large, successful companies. Often the offerings of these companies include some stock held by venture capitalists who supplied Stage I and Stage II financing.

³⁰ Aguren, 1965, pp. 39-64.

In a study of sixteen technical companies that had primary public stock issues in the period 1964-1967, McLaughlin found that for the smaller companies, the public equity market was very costly, but that for all companies there were intangible benefits from going public.³¹ Intangible benefits included increased customer awareness and receptivity to the company salesmen, increased employee morale, and a market price for valuing the stock and options held by officers of the new company. At the time of public offering, the sample of companies had an average annual sales volume of \$300,000. The small companies had difficulty finding an underwriter. Those who did find one had to pay fees up to 30% of the value of the underwriting, and had to sell warrants to the underwriter as well. The cost to the company of underwriting was negatively correlated with the size of the issue and of the company. For the companies who went public without being underwritten, no market developed for the stock, and in several cases, they were unable to raise the amount of capital needed. Few entrepreneurs felt that going public had a significant effect on their managerial style.

Ounjian³² studied a random sample of the Regulation A filings

³¹C. W. McLaughlin, An Analysis of the First Public Stock Issues of New Technical Enterprises (Cambridge: Unpublished S.M. Thesis, M.I.T., Sloan School of Management, May, 1968).

³²Daniel Ounjian, Long-term Public Financing of Small Corporations--The Reg A Market, Research Report to the Federal Reserve Bank of Boston, No. 38, 1966.

with the SEC for 1959.³³ "The typical issuer is less than 3 years old, has assets of about \$160,000, a net worth of \$80,000, carrying as much debt as possible, and has a brief history of erratic operation." "Forty percent of the sampled firms were unsuccessful in their attempts to raise capital."³⁴ Ounjian concluded that several imperfections existed in the Reg A capital market. The costs of flotation were high--fifteen to twenty percent. The communication network between entrepreneurs and underwriters reacted with lags and varying degrees of enthusiasm. "Contrary to the accepted view of the adaptability of the capital markets to the changing needs of business, the market's response to the long term financial needs of small corporations has been characterized by sluggishness and haphazardness."³⁵

Both studies indicate that under most circumstances the public is an inexpensive source of capital only for the large, successful company and that during the initial stages of company growth, other sources of venture capital supply financing more quickly at less cost.

³³Regulation A of the Securities and Exchange Commission Act of 1933 exempts certain public stock offerings from the registration requirements. At the time of Ounjian's research these offerings were limited to less than \$300,000 in any one year and did not require registration, but a letter of notification had to be filed with the SEC.

³⁴Ounjian, 1966, pp. 142, 146.

³⁵Ounjian, 1966, p. 151.

Organized venture capital groups: This category includes the venture capital groups of several wealthy families, ARD, and the larger SBICs. Each group has a specialized full time staff who analyze investment proposals, negotiate deals, and watch over their commitments. The investment decisions of these groups are based on intensive study of management, product and market.³⁶ The investments usually range between \$300,000 and \$500,000 and consist of a debt and equity package.³⁷ The debt requires periodic interest payments which are used to meet the operating cost of the venture capital group.

Danilov found several advantages of being financed by these venture capital organizations.³⁸ Their prestige opens doors for the portfolio companies. The assets are large enough to enable the entrepreneur to get additional capital later, if he needs it. The wealthy family groups and ARD will wait five to ten years to realize an investment. The disadvantages are derived mostly from the operating policies of the venture capital group. These groups invest in a small percentage of the proposals they review and might spend several months evaluating a proposal before committing funds. They require well-documented plans and proposals and might demand representation on the board of directors, and in some instances, partici-

³⁶Baty, 1965, pp. 65-67.

³⁷Victor J. Danilov, "Sources of Venture Capital", Industrial Research, October, 1966, pp. 65-74.

³⁸Danilov, 1966.

pation in the management of the new company.

The smaller SBICs, those with less than one million dollars in capital, have not been active venture capitalists. Their small capitalization makes it difficult for them to employ good management and prevents them from diversifying by investing in many new enterprises. Hayes and Woods observed that operating costs of these SBICs were "an inappropriate vehicle for dispensing venture capital."³⁹ Rotch has observed that the "average SBIC has less than one million dollars in capital and was formed to borrow money inexpensively from the government rather than to invest aggressively in venture capital opportunities."⁴⁰ Their small capitalization should make these SBICs risk averse since they are limited to a small number of investments. The smaller SBICs have invested primarily in real estate and retail businesses.

The venture capital groups have supplied some initial financing, but the majority of their investments are second or third round financings.⁴¹ Because these organizations spend time and money investigating proposals, it is more expensive per dollar of capital

³⁹ Hayes, S.L. and D.M. Woods, "Are SBICs Doing Their Job", Harvard Business Review, March-April, 1963, p. 6.

⁴⁰ William Rotch, "The Pattern of Success in Venture Capital Financing", Financial Analysts Journal, September-October, 1968, pp. 141-147.

⁴¹ Baty, 1965, p. 33.

invested for them to invest in start-ups.⁴² Furthermore their investment policies are more difficult to apply to a newly formed company, where less information is available.

The venture capitalists studied in this thesis were a sample of the publicly held investment companies in this category. These formal groups supply a small proportion of the venture capital financing.⁴³ However the complete record of their experience is publicly available and provides a picture of venture capital investing unbiased by personal recollection or missing information.

1.5. Research Methodology

Initially a study of the decision-making process used by venture capitalists and the relationship between the venture capitalists and the entrepreneurs was attempted using questionnaires and interviews. This approach failed not because venture capitalists were uncooperative, but because written records often did not exist and memory was biased and incomplete. The research was recast to examine the operation of publicly-held venture capital investment companies, where information was available.

The primary source of data was the annual reports of thirteen small business investment companies (SBICs) and of the American

⁴²U.S. Department of Commerce Panel on Venture Capital, 1970, p. 11.

⁴³Baty, 1965.

Research and Development Corporation (ARD). Moody's Bank and Finance Manuals (1945-1970) list all publicly held investment companies that reported their activities to the SEC during that period. From that list, an initial sample of all venture capital investment companies that had at least 50% of their assets invested in manufacturing and/or technical companies was selected. That initial sampling produced 33 investment companies that could supply data for this study. ARD and the Mid-West Technical Development Corporation were the only companies of the 33 that were not associated with an SBIC.

Of the 33 investment companies, two merged with other investment companies in the sample. Their investments are included in the portfolios of the surviving companies. Eleven companies were not active investors and stopped operating in less than four years. The annual reports of six others did not include enough description of the companies they financed nor enough information on the timing and/or amounts of financing. These seventeen companies are not in the final sample. The initial and the final sample are listed in Appendix I.

All publicly held venture capital companies, with the exception of ARD were formed after the Small Business Investment Act of 1958. Since ARD was founded in 1946, many of its investments were not made during the same time period or under the same economic conditions as those of the SBICs. If data were available from other firms for the 1946-1958 period, then conclusions could be made about venture capital investing per se in that time period and about the investment

policies of ARD. However these two effects are confounded in the data that is available. Therefore only the ARD investments made from 1959-1970 are included in the sample of venture capital investments.

These fourteen companies are not subject to the criticisms directed toward the small SBICs in the last section. The initial capitalizations were large, ranging from \$1.14 million to \$18.5 million. These investment companies hired professional venture capital management and actively sought to invest in small companies.⁴⁴

The data on Stage I financing came from ARD, Boston Capital Corporation, and Greater Washington Investors Inc. An initial examination of the data showed that all three of these companies had a higher propensity to finance technically based companies than the other companies in the sample. Unfortunately none of the other eleven companies consistently described their new investments with sufficient detail to permit classification of those investments as Stage I, II, or III financing. Of the 138 investments the three companies made in the period 1960-1970 that have been realized or have market value, twenty-seven investments (18%) supplied seed capital to a new technically-based company. Operationally it was not possible to separate Stage II and Stage III investments for any of the fourteen investment companies. Technical investments made by ARD,

⁴⁴Danilov, 1965.

Boston Capital Corporation, or Greater Washington Investors, Inc. that were not Stage I investments were designated Stage II investments, whether or not those investments were actually Stage II or Stage III investments. Most of the investments were made close to the date of incorporation and before the company had sales.

The fourteen companies have 354 investments that have been realized or have market value. The investments range from high technology to low technology; some investments were in businesses that sell to one customer (the government), some to many industrial customers, and others to mass consumer markets. Within the sample are some outstanding venture capital successes, e.g. Mohawk Data Sciences, Potter Instruments, CEIR--and many failures. The size of investment ranges from \$10,000 to \$1,250,000; holding times range from less than one year to eleven years. The stated investment policies of these companies compare to those of the private venture capital companies. Both seek large capital gains by investing with initial or subsequent financing of new companies, especially technical companies. The investment companies and the companies in which they invest do represent the range of venture capital opportunities in the last decade at least, and the operation of a typical venture capital company.

Several statistics are used to analyze and summarize the raw data.⁴⁵ The quantity of data is large, so variables are summarized

⁴⁵ These statistics are described in Herbert M. Blalock, Social Statistics (New York: McGraw-Hill, 1960).

by reporting their means, medians and standard deviations. Distributions are shown for the more important variables.

Distributions are compared using the median test to measure the probability that two sample distributions have the same central tendency. For categorized, nominal data, the chi-squared test was used to determine whether the data could have been generated randomly. Statistical significance of a test is indicated in the text in parentheses.⁴⁶

Correlations are measured to determine the degree of association between certain variables. These correlations and their two-tailed significance levels are reported in the text in parentheses.⁴⁷ For example (.91, .05) indicates that the correlation between two variables is .91 and the statistical significance of that correlation is .05. The significance of that correlation is determined by an F-test. Rank order correlation is measured by Spearman's r_s .

⁴⁶A statistical significance level is the probability that the observed data could have been generated according to the null hypothesis. For example the distributions of returns for two categories of investments are compared. The null hypothesis is that the underlying distribution was the same for both categories. Statistical significance indicates nothing regarding the practical significance of the finding.

⁴⁷In testing whether one sample is different from another, two-tailed indicates that direction was not predicted in advance.

CHAPTER TWO

THE FINANCIAL CHARACTERISTICS OF VENTURE CAPITAL INVESTMENTS

"When you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind."

Lord Kelvin

2.1. Initial Investments

Briskman, Baty, and others have described the product, the market, and the management of companies financed by venture capital.¹ Very little information is available describing the actual venture capital investments. How much was invested? How long was each investment held? How much equity was sold? What characteristics are useful in examining investments?

After investigating a proposal and negotiating the terms, the venture capitalist invests an initial amount of money. The strategies used by prominent venture capitalists to investigate financing proposals have been reported elsewhere.² This section examines the result of those investigations, the amount of money invested and the

¹See Eugene Briskman, Venture Capital: The Decision to Finance Technically-Based Enterprises (Cambridge: Unpublished S.M. Thesis, M.I.T., Sloan School of Management, June, 1966), Baty, 1970, and "New Business: The Art of Joining Innovative Technology, Management, and Capital", Proceedings, Boston College School of Management, May 22, 23, 1969.

²See Briskman, 1966, and "New Business", 1969.

equity purchased.

The venture capital company must continually balance two opposing considerations when it sets its policy on the size of its investments. The smaller the size of each investment, the greater the number of investments in the portfolio and the greater the diversification of the portfolio. Each investment has a management cost associated with evaluating the proposal and with monitoring the growth of the company. The operating costs of the venture capital company increase as the number of investments in the portfolio increases. These management costs can be appreciable. An investment officer of a large life insurance company recently commented:

"...we don't have a lot of time for a few little venture capital investments. I mean, recently we spent two man-months on a single venture capital deal. I just can't afford that sort of thing."³

Danilov found in his sample that both private and public venture capital companies rarely invested less than \$100,000 or more than \$1,000,000 and that they preferred to invest in the range \$200,000 to \$300,000.⁴ The venture capitalist studied by Briskman preferred to invest in the range \$250,000 to \$1,000,000.⁵ The investment policies of venture capitalists are flexible. If a company presents

³Welles, 1970, p. 44.

⁴Danilov, 1966.

⁵Briskman, 1966.

an attractive proposal, the size of the initial investment would not prevent the venture capitalist from financing it. If the amount needed is too large, the venture capitalist can form a syndicate of several venture capital investors. Until recently it was not customary to charge a fee for the investigation and negotiation of a financing proposal presented to a syndicate.⁶

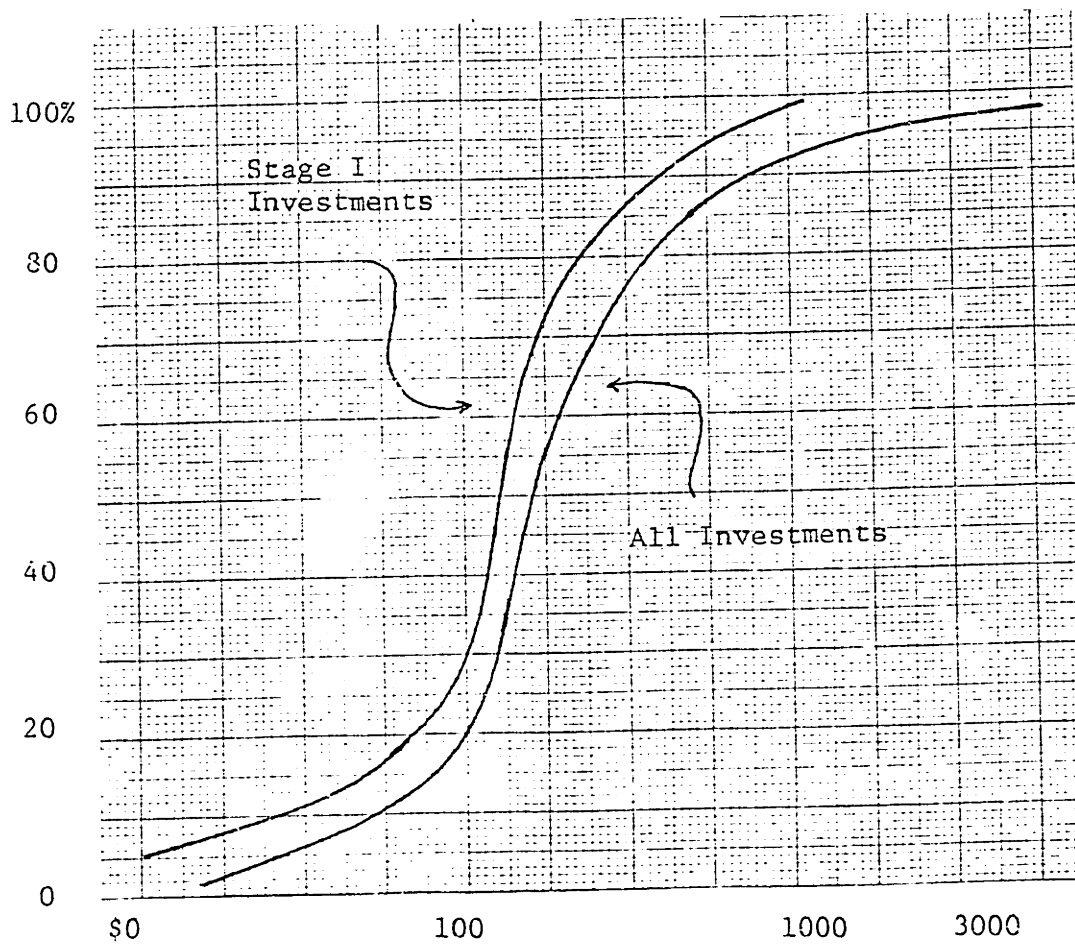
The distributions of size of initial investment for all investments and for the Stage I investments in the sample are shown in Figure 2-1. Both distributions have a large dispersion and are skewed positively. The largest investment in the sample was 400 times greater than the smallest. Stage I investments were smaller in initial size than either Stage II investments (.05) or all technical investments (.01). Stage I investments are supposedly more risky and more difficult to evaluate so it is not surprising that small amounts were invested in them. Furthermore start-ups cannot utilize large amounts of capital until their operations stabilize and are coordinated. Table 2-1 presents statistics summarizing the distribution of several subdivisions of the sample.

Thirty percent of the investments were made to non-technical companies. If the venture capitalists had different investment policies for technical and non-technical companies, those differences are not reflected in the size of initial investments. The difference in size between technical and non-technical investments was small and

⁶T.J. Davis, "The New Environment for Venture Capital", WEMA Perspective, Summer, 1970.

FIGURE 2-1
Initial Size of Investments

Cumulative
Percent of
Investments



Investment Size¹
(000s omitted)

¹Note non-linear scale.

insignificant (.30).

Even though debt is frequently used by many venture capitalists, its use is a controversial issue in venture capital financing.

TABLE 2-1
Size of Initial Investments
(000s omitted)

	<u>Median</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>% of Total Sample*</u>
All investments	\$245	\$334	\$311	100%
Technical	250	334	315	70
Non-technical	225	333	248	30
Stage I	190	250	250	--
Stage II	250	292	202	--
Debt	300	378	325	52
Mixed	254	341	284	24
Stock	125	228	274	24

* N = 354

Debt as a financial instrument has two possible advantages over common stock for the investor. It pays interest and it can be repaid by the company. Interest can support the expenses of managing venture capital. The senior position of debt plus the contracted obli-

gation to repay could increase the probability that the venture capitalist would be able to realize his investment. If these advantages exist for the venture capitalist, they are disadvantages for the new company.

At least one successful venture capital investor has recommended that debt not be used because of the financial strain on the economy issuing the debt.⁷ Growing companies need capital. Debt obliges the company to reduce capital at a time it might be needed most. The venture capitalist can forego interest and repayment, if he chooses. The choice is his, not the company's. The statistics in Table 2-1 indicate that debt is the most frequent form of investment and that these investments are larger than mixed (.05) or stock (.01) investments. The number of non-technical investments with debt was not significantly different from the number of technical investments with debt (.41).

All investments in the sample represent a claim on the equity of the financed companies. Either debt is convertible, or it is purchased with common stock or warrants. In both cases, the opportunity for capital gains is derived from the potential increase in the value of the equity of the new company. Valuation of a new company is a subjective process. The amount of equity obtained through an investment in a new company will vary with the size and nature of the investment, the record and expectation of the company, and the bargain-

⁷Davis, 1970.

ing abilities of the entrepreneur and the investors. Venture capitalists generally have the advantage of previous experience in negotiations for financing. If so, the information presented here will give the entrepreneur useful background.

The percentage of equity purchased by a venture capitalist has a direct relationship on how much money is returned when the common stock of the company is sold. It also determines the degree of legal and financial control of the investor in the company he has financed. Some venture capitalists believe that legal and financial control increase the protection of their investments if the entrepreneur has little business ability or if the new venture is failing.⁸ Some new technically-based companies operate in a highly specialized technology known best by the entrepreneur. In these situations legal and financial control by investors may be damaging. Correlation of higher equity and higher return is examined in section 3.4.

Table 2-2 lists statistics on the percent of equity to which venture capitalists had claim at the time of their initial investment. The average amount of equity represented by the initial investment was 19%. Equity purchased from technical companies was smaller than the amount purchased from non-technical companies (.01). Since there was no significant difference in the amounts invested initially, the non-technical companies had to give up more equity per dollar invested than did the technically-based companies.

⁸Danilov, 1966.

TABLE 2-2

Claim on Equity from Initial Investments

	<u>Median</u>	<u>Mean</u>	<u>Standard Deviation</u>
All investments	13%	19.0%	19.1%
Technical	12	18.5	19.3
Non-technical	17	19.9	18.7
Stage I	39	31	26.0
Stage II	19	22	21.6
Debt	15	13	13.0
Mixed	46	21	38.0
Stock	11	64	17.0

2.2. Subsequent Investments

Most companies require additional capital to continue growing, and in some cases to survive. If venture capitalists can supply additional funds, the entrepreneur can save time and expense by not having to search for other sources of capital. For the venture capitalist, the decision to supply additional funds to a new company can be difficult.

Venture capitalists invested additional capital in thirty-one percent (111) of the investments in the sample. Twenty-one percent

Stage I investments had a higher claim on equity than did Stage II investments (.01). Since the initial investment was smaller for Stage I investments, more equity was sold for each dollar invested. However when the new company recieved Stage II financing, that equity might have been reduced if another venture capitalist invested in the company.

The percent of equity of the initial investment is negatively correlated with both the size of the initial investment (-.17, .05) and with the size of the total investment (-.29, .05). This relationship is not surprising since debt investments are larger and Table 2-1 shows that debt investments have smaller claims on equity than mixed (.001) or stock (.01) investments. The negative correlations between size of investment and initial claim on equity imply that the nature of the company receiving the financing changes with the size of the investment. If a larger investment represented simply a larger participation in the same type of company, the correlation would have been positive. The fact that debt investments have a smaller claim implies that one form of control was substituted for another. The covenants of the loan agreement replaced the control by ownership.

(68) received additional financing only once. Thirteen percent (43) received additional financing at least twice. Eighty-two percent (290) had money invested only in the first two years.

The statistics for investments that did and did not receive subsequent financings are presented in Table 2-3. Investments that did receive subsequent financing were smaller initially than investments that did not (.05). For some investments the subsequent financing was part of the initial financing agreement. These agreements, contingent on company performance, might explain the smaller initial size of some investments. The size of the subsequent investment was not significantly correlated with the size of the initial investment (.17, .38).

TABLE 2-3

Size of Initial Investments That Did Receive
and Did Not Receive Subsequent Financing

(000s omitted)

	<u>Median</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>% of Total Sample*</u>
Did not receive subsequent financing	\$250	\$346	\$311	69%
Did receive subsequent financing	200	308	311	31

* N = 354

Table 2-4 lists statistics on the total size of investments in the sample. The total size of an investment is the sum of the initial and all subsequent investments in a specific new company. The mean subsequent investment is the difference between the mean total investment (see Table 2-4) and the mean initial investment (see Table 2-1). For example, the mean subsequent investment for all venture capital investments is \$450,000 minus \$334,000, or \$116,000.

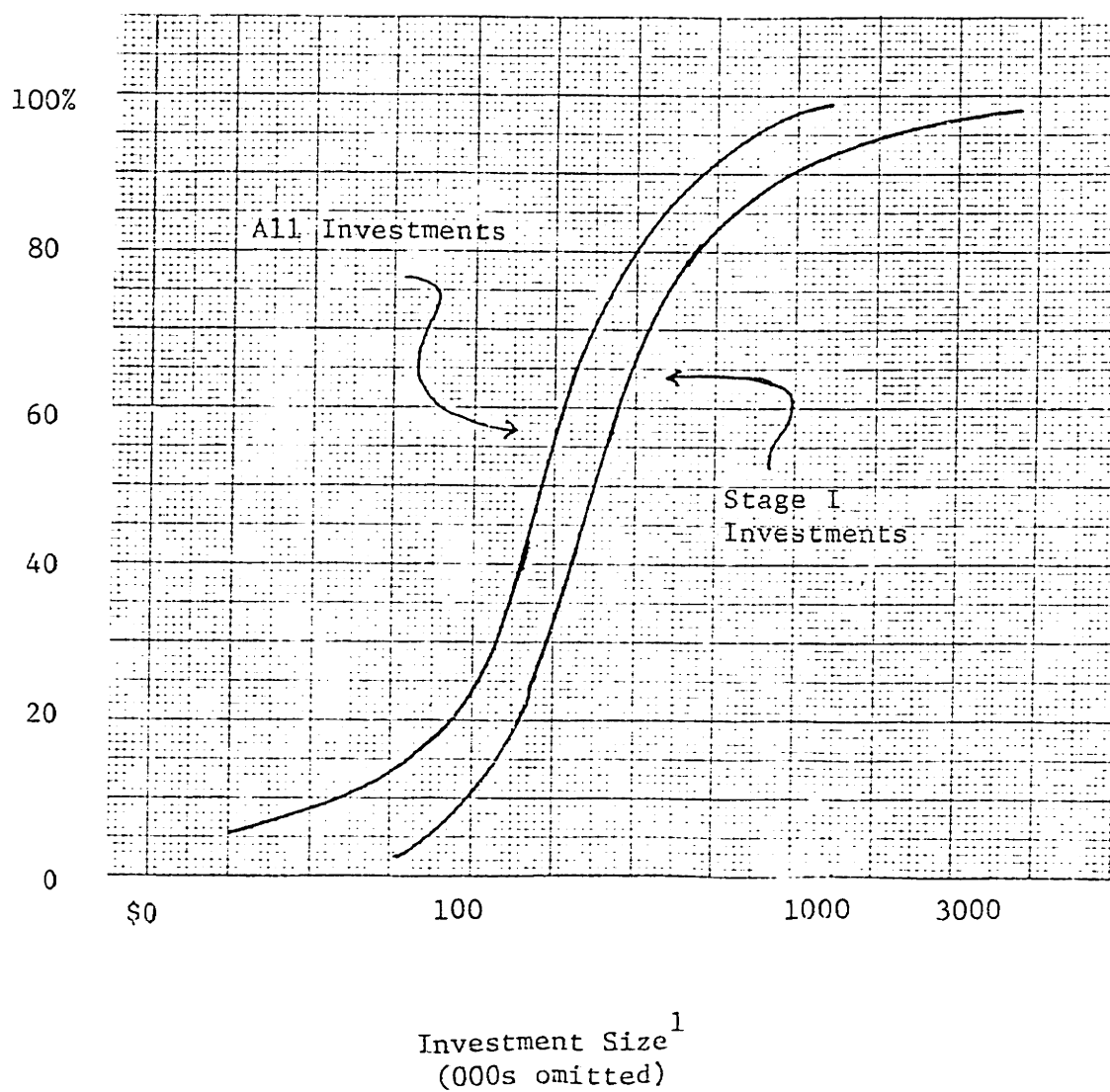
Most of the products and services of the non-technical companies were sold in large consumer markets, whereas most technical companies sold to the government or to a few large industrial manufacturers. In some non-technical markets there are several economies of scale. Promotion and distribution are less expensive for larger companies. A non-technically based company may need greater amounts of venture capital. More technical companies received subsequent financing (.001). However the mean size of the subsequent financing was slightly higher for non-technical companies than for technical companies (.06) and the size of total investments for the non-technical companies was slightly higher (.01).

The Stage I investments differ greatly from the other investments in the sample. More Stage I investments had subsequent financing and the mean size of subsequent financing was larger. Sixty-seven percent of the start-up companies received subsequent financing. The mean size of the additional financing was \$267,000, an amount slightly larger than the mean size of the initial investments in technically-based Stage II companies. The subsequent

FIGURE 2-2

Total Size of Investments

Cumulative
Percent of
Investments



¹Note non-linear scale.

investments for start-ups are larger than for Stage II investments (.03) and for technical investments in general (.01). The distributions of size of the total investment for Stage I investments and for all venture capital investments are shown in Figure 2-2.

TABLE 2-4
Size of Total Investments

(000s omitted)

	<u>Median</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>% Receiving Subsequent Financing*</u>
All investments	\$315	\$450	\$450	31%
Technical	341	442	444	33
Non-technical	300	468	460	28
Stage I	440	567	606	67
Stage II	320	387	319	41
Debt	360	490	476	29
Mixed	352	472	459	30
Stock	238	336	350	26
Did receive subsequent financing	250	346	311	--
Did not receive subsequent financing	500	678	600	--

*N = 354

More debt and mixed investments received additional financing (.01) and the amounts were larger (.06). However the magnitudes of the differences are small. The relationship between additional financing and investment is examined in the next chapter.

2.3. Holding Time

The duration in years that an investment was held by the venture capitalist is defined as holding time. For realized investments, it is the time during which the investment was in the venture capital portfolio. For investments still in the portfolio, the holding time is the number of years since the initial investment was made. For companies that were acquired by larger companies listed on the stock exchanges, the holding time is the number of years from the initial investment to the year of acquisition. In many cases the venture capitalists held stock in the acquiring company after the date of acquisition. In some acquisitions the venture capitalists received restricted stock which could not be sold immediately. Therefore the holding time shown for acquired investments is a lower bound estimate for the time at which investments could be realized. Usually these restrictions were removed within two years after the acquisition, but it was impossible to determine the exact year for each acquired investment.

Venture capital investments are difficult to sell. Public offerings, negotiations of mergers, and repayment of debt require

time and expense. Since no secondary market for venture capital investments exists, the investor might be unable to realize his investment until the new company had grown to Stage III where it can be acquired or financed by other sources. If the new company fails and is liquidated, part of the investment might be recovered.

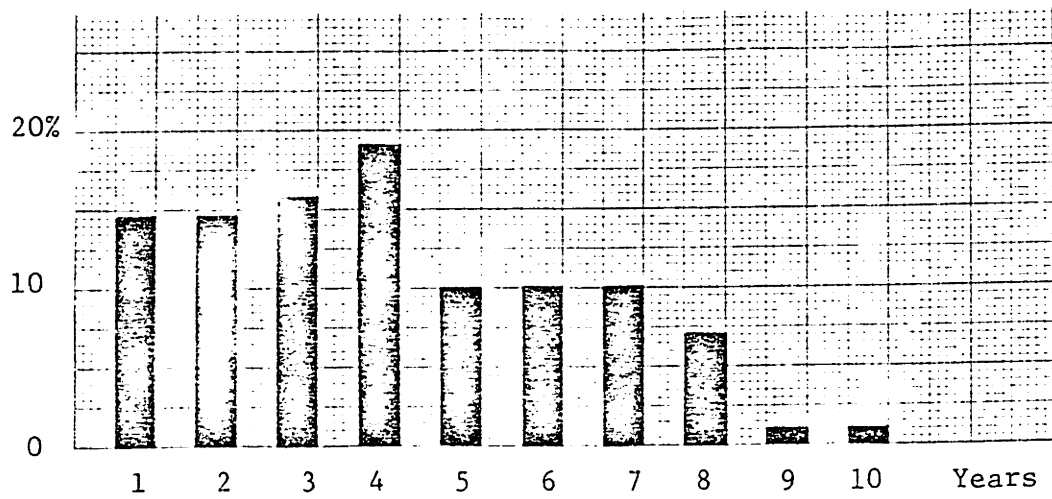
Even if the investment is successful, the venture capitalist faces a difficult decision. Should he include his stock in the first public offering? Probably not, the underwriters and the public would interpret the sale of stock by a major investor of the new company as an unfavorable indication of growth potential. Should he sell his investment privately? Private placements require a price discount. Word of the sale can still reach the market and lower the price. Should he continue to hold his investment? Probably not, the period of accelerated growth is over. Prospects for the company are not different from those of other companies whose stock is publicly traded.

All those factors must be considered in the decision to realize an investment. The results of these decisions are shown in Table 2-5, which presents the statistics for the holding times of the investments in the sample. The investments in the portfolios as of 1970 were divided into those with and without market value. Investments without market value had an average holding time of 2.31 years, a median of 2 years, and a standard deviation of 2.31 years. It is probable that many of the companies without market value are young, at Stage I or Stage II. The investments in these companies could

FIGURE 2-3

Holding Time for Realized Investments

Cumulative
Percent of
Realized
Investments



Holding Time

not have been held as long as investments in older companies. Data from the investments without market value are not included in this research, since it is not possible to determine if additional financing was completed or to measure a rate of return on these investments.

Investments with a market value had a longer holding time than realized investments (.01). Acquired investments had the longest holding times. If all the investments with market value were realized in 1970, those investments would have a median holding time of five years and a mean of 5.35 years. The investments realized before 1970 included investments with and without market value. Investments in companies whose stock is publicly traded are held longer than investments in other companies. These investments did not have a significantly higher proportion of subsequent investments (.39), nor debt investments (.27), nor did they have higher initial amounts (.31). The success of these investments is examined in Chapter Three. The distribution of holding times for realized investments is shown in Figure 2-3.

Stage I investments were held longer than stock investments (.01). The larger investments in the entire sample had longer holding times (.487, .001). If the venture capitalists expected that investments would be held for a long time, and assuming that risk is partly determined by how soon an investment will be realized, debt might have been used to reduce that risk. Alternatively the fact that these companies had large debts to venture capitalists on their balance sheet might have hindered their growth and lengthened the

TABLE 2-5
Holding Times

	<u>Median</u>	<u>Mean</u>	<u>Standard Deviation</u>
All investments	4 years	4.18 years	2.45 years
Technical	4	4.05	2.48
Non-technical	4	4.47	2.35
Stage I	5	5.18	2.81
Stage II	4	4.02	2.31
Debt	4	4.40	2.41
Mixed	4	4.53	2.47
Stock	3	3.34	2.39
Did not receive subsequent financing	5	5.10	2.45
Did receive subsequent financing	3	3.75	2.34
With market value	4	4.35	2.74
Acquired	5	4.56	2.67
Realized	4	4.07	2.24

time at which the investment could be realized. Non-technical investments not only were larger in total size, but they were held longer (.01). Non-technical companies might take longer to become profitable and to attract other sources of capital because of the time necessary to develop a customer base and to achieve economies of scale. The glamor of technically-based companies during the 1960s undoubtedly made it easier to realize technical investments by public stock offering.

CHAPTER THREE

RETURNS FROM VENTURE CAPITAL INVESTMENTS

"For example is no proof."

Proverb

3.1. The Range of Venture Capital Outcomes

American Research and Development Corporation invested \$70,000 in 1957 in a new company that proposed to manufacture digital circuit assemblies. Over the next four years, ARD invested an additional \$410,000. Within twelve years the company had repaid \$397,000, ARD had sold some of its investment to the public for \$26.4 million in cash, and ARD continued to own common stock that had a market value of \$463.4 million. The cash and market value were 102,000% greater than the total amount ARD invested in the company.

Boston Capital Corporation invested \$673,000 in 1964 in a company that manufactured analog computers. In the next three years, Boston Capital Corporation invested an additional \$1.3 million in the company. The total investment was written off in 1967 after Boston Capital Corporation received \$47,900 in cash from the company, i.e. a loss of 97.6% in three years on a \$1.9 million investment.

These two investments might represent the extremes of venture capital investing, but they are not typical of the investments of the fourteen companies in the sample, including ARD and Boston Capital Corporation. Venture capitalists have reported their successes and

Briskman² attempted to measure risk preferences of venture capitalists using utility functions. Both researchers had great difficulty using utility functions to express the risk preferences of the venture capitalist. Baty also found that most investors did not (could not?) specify a cost of capital or a cut-off rate for their investments. The typical response Baty received to an inquiry on risk and return was:

"Risk? Well, I just ask myself, 'What will be the sales of this outfit x years from now? and How much would a company with this much sales be worth?' and 'How much would my share of it be worth' That's how I look at it."³

A venture capitalist on the staff of Greater Washington Investors, Inc., stated his investment policy in terms of an expected compounded rate of return:

We are looking for a compound rate of return on investment, somewhere between 25 and 30 per cent. We don't care how we arrive at that but we want to have a reasonable opportunity of achieving that sort of performance.

We take a three-year period and we say: What is most likely to happen in these three years?

We value equity for the purpose of this sort of analysis at fifteen times prospective earnings. You might say that is a low figure, but we have been around long enough to see fads in the marking up and down. It allows for a little glamor, but not a wild situation; you just work backwards from that.

What is going to happen to the company? We will value our equity, and if there are debt securities involved, we will subtract the interest in figuring compound returns and see how

²Briskman, 1966.

³Baty, 1965, p. 59.

one or two of their failures, but few have reported any measure of average return. This chapter fills in the middle ground between that outstanding success and that dismal failure. Venture capital investments were described in Chapter Two in terms of how much money was invested, in what form, for how long. This chapter examines the outcomes of these investments. How much money was returned to the investors? How was the return related to other characteristics of the investment?

3.2. Measures of Risk and Return for Venture Capital Investments

Financial theory suggests several measures and ranking procedures for selecting investments. In situations where investors operate under budget constraints or can accurately estimate the risks of proposed investments, several programming models have been formulated to assist the financial manager in choosing an optimal set of investments. These theories, measures, and models require explicit, accurate forecasts of the probability distribution of future cash flows, a utility function to transform risk and return into a single dimension, and in some cases, a risk-adjusted cost of capital.

Venture capital investments are made under conditions of great uncertainty. This uncertainty is sufficiently high to render sophisticated financial techniques useless. Baty¹ and

¹Baty, 1965, p. 63.

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What is going to happen to the company? We will value our equity, and if there are debt securities involved, we will subtract the interest in figuring compound returns and see how

²Briskman, 1966.

³Baty, 1965, p. 59.

the equity deal has to be priced today. It is as simple as that.⁴

Compounded rate of return has been used to describe the performance of J. H. Whitney and Company:

Moreover, five-sixths of the increase in capital came from only five ventures. And Whitney had to sink \$2 million or more in each of these five ventures! Actually even this record of appreciation wouldn't have been realized had it not been for one prematurely early success of one firm.

The picture looks even more gloomy when you look at the record on investments under \$500,000...Poor J. H. shelled out less than \$500,000 exactly thirty-eight times. In fifteen cases, Whitney lost his shirt. In six cases, he came out even--not counting all the expenses. In four cases he made something but the return was hardly worth the effort. Only thirteen of the thirty-eight firms brought in a decent return. For the entire group of thirty-eight, the average annual return was less than 2%. For the thirteen successful investments, the annual rate was 9-10%.⁵

(Compound rate of return is synonymous with internal rate of return.)

Rotch used two measures of return in his study of ARD.⁶ Compound rate of return was used to measure the performance of the total portfolio. For the period 1946-1966, the ARD stockholders had a 14% compound rate of return on their investment. Performance of individual investments was measured by the ratio of total realized gain to peak commitment and ranged from 0.0 to 29.4. Peak commitment was defined as the maximum amount invested at any time during the life of

⁴"New Business", 1970, p. 89.

⁵Quoted in Baty, 1965, p. 33.

⁶William Rotch, "The Pattern of Success in Venture Capital Financing", Financial Analysts Journal, September-October, 1968, pp. 141-147.

the investment.

The ratio of money returned to money invested is a simple measure of return, useful for describing the total result of a venture capital investment. Many venture capitalists use this same measure, plus a time horizon, to express their expected return. For example, an investment might be expected to return three times the amount invested within five years. If money were invested only in the first year and returned only in the fifth year, the investment would have a compounded return of 24.6%. If investments have cash flows in the years between the first year and the last year of the investment, then the compound rate of return is a better measure of performance. If, in the example above, the money were invested equally in the first and second years and returned equally in the fourth and fifth years, then the investment would have had a compounded return of 31.5%.

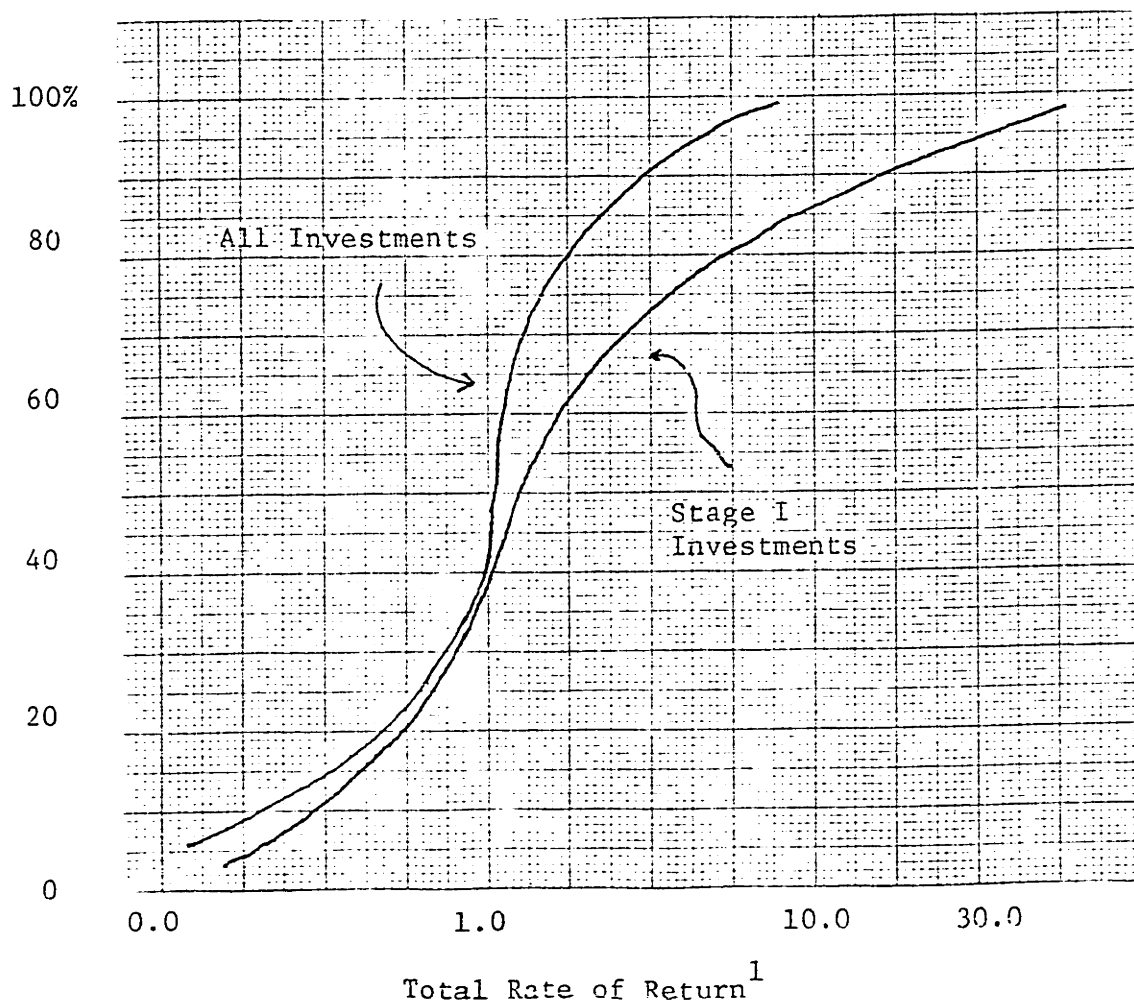
Both the compound rate of return and the total rate of return are used here to describe venture capital investments. The total return is the ratio of money returned to money invested. The returns in this chapter measure only capital gains and losses. Interest, dividends, and fees were not included since these data were unavailable. The magnitude of interest, dividends, and fees is estimated in the next chapter.

Risk is an ex ante concept, as such it cannot be measured ex post. Even so, some measure of dispersion would be useful to indicate whether investments with certain characteristics, e.g. Stage I invest-

FIGURE 3-1

Distribution of Total Rates of Return

Cumulative
Percent of
Investments



¹Note non-linear scale.

ments, have had a wider range of outcomes than other investments. Dispersion is measured here by the coefficient of variation, defined as the ratio of the standard deviation to the mean. These distributions are skewed positively, i.e. more events occurred with values less than the mean than with values greater than the mean. These extremely large, but infrequent values, caused the mean to be greater than the median and the standard deviation to be greater.

3.3. Distribution of Returns

The distributions of the total rates of return for all investments in the sample and for the Stage I investments are shown in Figure 3-1. A priori the risky nature of start-up companies would be expected to produce a distribution that had a large number of losses. However seventy-eight percent of the Stage I investments returned more money than was invested, whereas only sixty-seven percent of all investments did so.

Both distributions are skewed, indicating that the probability of a return greater than the mean is low. Twenty-seven percent of all the investments had returns greater than the mean while thirty-three percent of Stage I investments had greater returns.

The most successful investment in the entire sample was a Stage I investment that returned 3211% of the \$440,000 invested. The lowest total return for the Stage I investments was on an investment that returned 24% of \$625,300 invested. Only one Stage I investment

returned less than 20% of the money invested, whereas nine percent of all investments in the sample returned less than 20%. What can be said of the large number of investments in between?

The 352 investments in the sample represent a total of \$158 million invested and \$370 million returned. The average total return on an investment was 2.39; the median was 1.12. Since the distribution was skewed positively, a few extreme events produced an average much higher than the median. To illustrate the sensitivity of the average total return to these infrequent events, the investments in the top five percent (18 investments) of the total return distribution were examined.

These eighteen investments represented \$6.5 million invested and \$96.4 million returned. Of the eighteen investments, 73% (13) were technical and 33% (6) were Stage I. No investment company had a disproportionate number of investments within the eighteen. Their average return was 13.2; their median return was 11.8. Without these eighteen investments, the average total return for the entire sample was 1.73; the median was 1.09. The shift in the median was small, but the shift in the average was very large. Without that five percent of the investments, the average capital gain decreases about fifty percent, from 130% to 73%.

The total performance of the sample is also very sensitive to these infrequent events. For the entire sample the ratio of total dollars returned to total dollars invested was 2.33. Without the eighteen, the ratio drops to 1.82.

TABLE 3-1

Total Rates of Return

	<u>Median</u>	<u>Mean</u>	<u>Coefficient of Variation</u>
All investments	1.125	2.39	1.62
Technical	1.20	2.46	1.54
Non-technical	1.00	2.23	1.72
Stage I	1.64	4.16	1.58
Stage II	1.20	2.14	1.20
Debt	1.00	1.87	1.60
Mixed	1.32	2.57	1.31
Stock	1.40	3.00	1.48
Did receive subsequent financing	1.09	2.26	1.57
Did not receive subsequent financing	1.18	2.67	1.48
Market value	1.58	3.07	1.41
Acquired	1.935	2.16	0.78
Realized	1.00	1.91	1.92

TABLE 3-2
Compound Rates of Return

	<u>Median</u>	<u>Mean</u>	<u>Coefficient of Variation</u>
All investments	.03	.25	4.56
Technical	.05	.27	4.33
Non-technical	.00	.18	5.17
Stage I	.14	.70	2.58
Stage II	.06	.21	5.53
Debt	.00	.08	8.75
Mixed	.09	.44	3.16
Stock	.09	.42	3.28
Did receive subsequent financing	.02	.09	5.67
Did not receive subsequent financing	.05	.32	4.04
Market value	.09	.43	2.91
Acquired	.15	.29	1.52
Realized	.09	.13	7.61

Table 3-1 summarizes the distribution of the total rate of return measure for several subdivisions of the sample. Table 3-2 summarizes the distribution of compound rate of return.

Technical investments were more successful than non-technical investments using the criteria of simple and compound return (.01). Both the means and medians were higher and the coefficients of variation lower. This does not necessarily indicate that the venture capitalists in the sample should have invested only in technically-based companies. Ex ante the investors might have had high expectations for their non-technical investments, i.e. the expected return and risk were commensurate.

In Chapter Two non-technical investments were shown to be larger and to have been held for longer time periods. These characteristics produced unfortunate results. Not only were the returns lower, but larger amounts of capital were invested at lower returns for longer time periods.

The risk of investing in a new technical product is derived from the investor's inability to predict both the demand for the product and the costs of development and production. Since the number of potential customers is small, it is easier to forecast the market. However the new product usually represents a new and sophisticated technology whose costs are difficult to predict. In many cases the government has borne some of these risks by using cost-plus

development contracts.⁷ For non-technical products the major risk is derived from the inability to predict demand before capital is invested to promote and distribute the product. Usually the development and production are straightforward. The market uncertainties might explain in part the difference in success of technical and non-technical investments.

Stage I investments were more successful than the Stage II investments or the other technical investments in the sample. Their means and medians were higher but the coefficients of variation were also higher. Since Stage I investments had a smaller proportion of losses than did other investments (.001), the larger coefficient of variation is a result of a few extremely high returns rather than many capital losses. Ex ante, Stage I investments may be risky, but ex post this risk is not seen in the dispersion of returns. Stage I investments had smaller initial investments, larger total investments and longer holding times than did Stage II or all technical investments.

If venture capitalists were able to invest additional funds only in the more successful start-up companies, then Stage I investments would represent ideal venture capital investments. By investing small amounts initially, the venture capitalist could accumulate information to determine which were the most promising companies and then invest accordingly. However the correlation between the amount

⁷Cohen, 1970.

of subsequent investment and the compound return is weak and insignificant (.11, .29). Venture capitalists may be able to predict successes. These data do not support such a conclusion. Nevertheless, Stage I investments have been outstanding investments. They resulted in large amounts of money invested with long holding times at high returns.

Debt investments exhibit the same characteristics as non-technical investments.⁸ The senior position of debt investments may have protected these investments from greater capital loss, but it did not produce large capital gains. The rates of return for debt investments were lower than those for mixed and stock (.01). Fifty percent of the debt investments returned less money than was invested. Thirty-three percent returned less in the sample of mixed and stock investments. Some debt investments were successful. One debt investment was a convertible debenture purchased for \$350,000. After seven years some of the investment was converted to stock and sold for \$1,382,000 and the remainder had a market value of \$3,357,000. That investment is the exception. The typical debt investment had a large amount of money invested for a long time at a low rate of return.

Realized investments had lower median and mean returns and higher coefficients of variation than the investments with market value. The higher coefficient of variation and the smaller difference between the median and the mean indicate that the distribution is less

⁸The proportion of debt investments for non-technical investments was not significantly different from the proportion for technical investments, see page (42).

skewed and has a higher proportion of losses. Realized investments had shorter holding times than investments with market value,⁹ which might indicate that venture capitalists realize losses early and hold more successful investments longer. This possible relationship is investigated further in section 3.4.

A small fraction (10%) of the investments were realized when the company was acquired by a larger company listed on a stock exchange. The distribution of returns for those investments is not as skewed as the distributions for realized investments or for investments with market value. The differences between the mean and the median and the coefficient of variation are small. The mean returns are approximately equal to the returns for all investments but the medians are much higher. The distribution is relatively narrow; there are few extreme losses or gains. This atypical distribution of returns plus the long average holding time, 4.6 years, indicates that the companies represented by these investments differ from the other companies represented in the sample. Assuming that the characteristics of the investments reflect those of the company, these observations indicate that larger firms have acquired companies that were mature and moderately successful.

Investments that did receive subsequent financing were less successful than those without subsequent financing (.05). For both the compound and the total rate of return, the investments with

⁹ See section 2.4.

subsequent financing had lower means and medians and higher coefficients of variation. Furthermore these investments were held longer and had more capital invested.

The lack of success of investments with subsequent financing does not imply that the venture capitalists made poor decisions to invest these additional funds. What would have been the returns on these investments if they had not received subsequent financing? Nevertheless this is one example of the problems and dilemmas of investing venture capital. Thirty-one percent of investments had subsequent financing. These investments were held an average 5.1 years and had an average return of only nine percent.

3.4. Pattern of Success

The rates of return associated with qualitative factors in the sample have been examined. Technical investments, Stage I investments, investments that did not receive subsequent financing, stock and mixed investments were shown to have high rates of return. All these investment categories, with the exception of Stage I investments, were shown (in Chapter Two) to have had low initial and total amounts invested, short holding times and high claims of equity. In this section, these quantitative factors are related to the rates of return on an investment.¹⁰

¹⁰All correlations in this section are rank order correlations. Multiple regression was not used because the assumption of heteroscedasticity is not valid for the total return variable.

Holding time was significantly correlated with total return (0.49, .01) and with compound return (0.47, .01).¹¹ The successful investments were held longer. The average holding time for investments with capital losses was 3.8 years; for investments with capital gains it was 4.6 years.

The correlation of claim on equity and average total return was small (0.17, .01). However an initial examination of the data suggested that a U-shaped relationship might exist. It appeared that low claims on equity were associated with moderate rates of return, those in the middle of the distribution, and that high claims on equity were associated with the tails of the distribution.

To determine whether that relationship did exist, the sample was divided into subsamples of capital losses and capital gains. For the subsample with capital gains the correlation between claim on equity and total return was 0.55 (.001); for the subsample with capital losses the correlation was -0.60 (.001). These correlations indicate that both the mean and the dispersion of actual returns increase as the claim on equity increases.

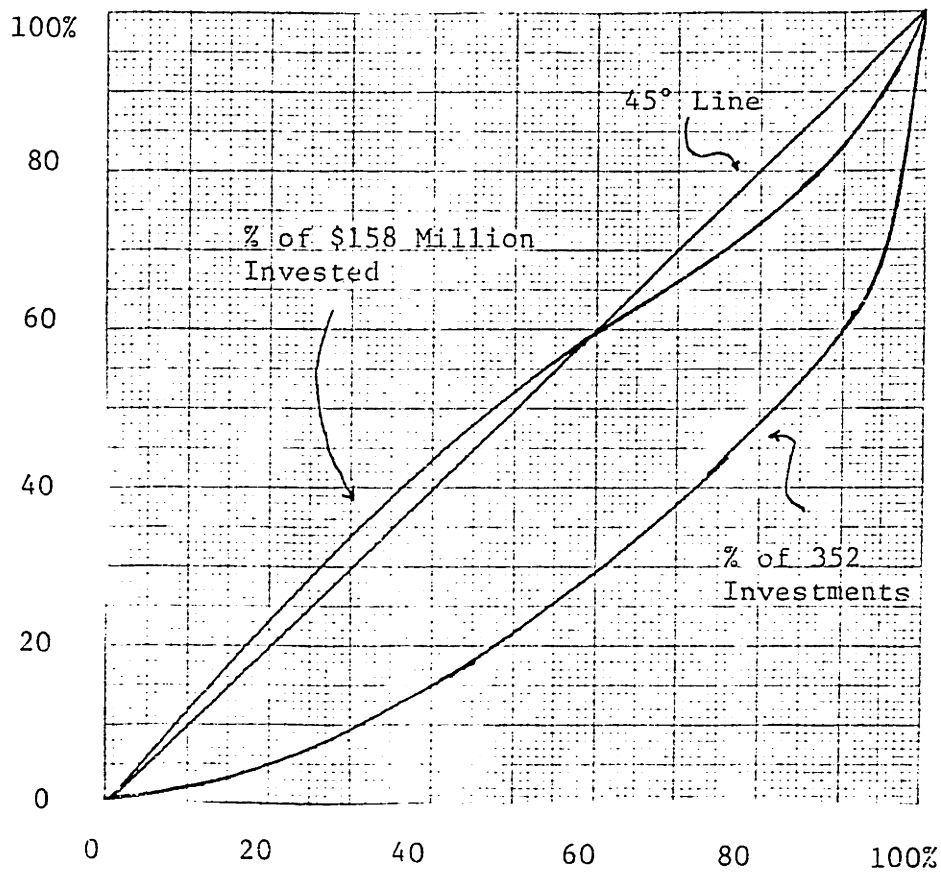
The correlations of total return and size of investment were small. The correlation with the initial investment was 0.10 (.01), the correlation with the total investment was 0.18 (.01). The rela-

¹¹The total rate of return is highly correlated with the compound rate of return (0.99, .001). Even though the compound rate is an annualized measure of return, both measures produce essentially the same ranking of investments.

FIGURE 3-2

Relationship Between Amounts Invested and Amounts Returned

Cumulative
Percent of
\$370 Million
Returned



Cumulative Percent of 352 Investments
and Cumulative Percent of \$158 Million Invested

tionship between total dollar amounts invested and total dollar amounts returned is shown in Figure 3-2. The 352 investments were ordered in increasing size of total amount invested. The horizontal axis of Figure 3-2 represents the cumulative percentage of the 352 investments and of the \$158 million invested in the sample. The vertical axis represents the cumulative percentage of the \$370 million returned.

If each investment, independent of size, were equally likely to return the same amount, then the relationship between the cumulative percentage of investments and of amounts returned would produce a 45° line in Figure 3-2. The actual relationship is a concave line, indicating that a large percentage of the investments produced a small percentage of the total amount returned. For example, 80% of the 352 investments produced only 46% of the \$370 million returned.

If each amount invested were equally likely to have the same total return, then the relationship between the cumulative percentage of amounts invested and amounts returned would produce a straight line in Figure 3-2. The actual relationship is approximately a straight line indicating that small investments had approximately the same average total return as large investments. That straight line also indicates that to return large dollar amounts, an investment had to have large dollar amounts invested.

A pattern of success has emerged. Stage I investments were the most successful. Technical investments, stock investments, investments that did not receive subsequent financing had higher returns.

Investments with higher returns were held longer and had slightly higher claims on equity.

CHAPTER FOUR

MANAGEMENT OF THE VENTURE CAPITAL COMPANY

"All sorts of things and weather
must be taken together
to make up a year
and a sphere"

Fable, The Mountain
and the Squirrel

4.1. Portfolio Risk and Return

Each venture capital company has a portfolio of investments. The characteristics and the success of individual investments were examined in the previous two chapters. The characteristics and successes of the portfolios are examined here.

Portfolio management adds another set of management issues to the investing of venture capital. How much does it cost to manage a portfolio? How much of the portfolio should be invested in cash and marketable securities? Are larger portfolios more successful?

Rates of return as measures of success have been published for two venture capital companies. Rotch found that the annual compound rate of return to the stockholders of ARD for the period 1946-1966 was 14%, compared to a return of 11.5% on the Dow Jones Index over the same period.¹ J. H. Whitney and Company, a private venture

¹Rotch, 1968.

capital company, was reported to have increased its assets twelve times in twenty years, equivalent to a 13.5% annual compound return.²

The success of the fourteen venture capital investment companies in this sample was measured by their annual compound rate of return and their total return. Table 4-1 presents the initial size and the rates of return for each of the fourteen companies. Returns were computed using the cash flows into and out of the investment company. When the common stock of an investment was distributed, the market value of the stock at the time of distribution was considered a cash outflow. For companies started prior to 1960, the market value of their common stock during 1960 was considered as the initial cash inflow. Electronics Capital Corporation became an operating company at the end of 1967; its returns were computed for the period 1960-1967. Four companies did not make a public offering until 1962; their returns were computed for the period 1962-1970. Average market value of the common stock during December, 1969, was considered the final cash outflow. Stock prices were taken from the Wall Street Journal and Moody's Bank and Finance Manual. The initial size of each investment company was measured by the book value of stockholder's equity after the first public stock offering. Except for a few minor differences, that book value is equivalent to the capital paid in by the stockholders at the time each investment company began investing.

²Robert Kolodny and Gabriel Pepino, "Venture Capital for Entrepreneurs", European Business, October, 1968, p. 22.

TABLE 4-1

Investment Company Rates of Return to Stockholders

1960 - 1970

<u>Investment Company¹</u>	<u>Total Return</u>	<u>Annual Compound Return</u>	<u>Initial Size²</u>
1	14.90	0.36	\$38.88 ³
2 ⁴	0.76	-0.03	2.65
3	1.71	0.06	20.60
4	2.03	0.11	5.04
5 ⁴	1.08	0.01	2.39
6 ⁴	1.52	0.05	14.88
7	2.41	0.11	3.11
8 ⁵	1.35	0.05	16.54
9	4.20	0.23	1.14
10	3.93	0.18	4.81
11 ⁴	6.35	0.29	2.52
12	1.26	0.03	14.38
13	1.47	0.06	16.10
14	1.17	0.04	10.02
Median	1.61	0.06	7.53
Standard & Poors Stock Price Index	2.27	0.11	--

¹The investment companies are listed by name in Appendix I.

²Book value of stockholder's equity after first public stock offering, 000,000's omitted.

³Book value, 1960.

⁴For the period 1962-1970.

⁵For the period 1960-1967.

The most successful venture capital company in the sample was Company #1, ARD. The success of ARD might be explained in part by its longer period of operations. Before 1960, ARD had been investing for fourteen years, accumulating experience within its organization and a reputation within the financial community. The two most successful investments of ARD were High Voltage Engineering made in 1946 and Digital Equipment in 1957. Both of these investments were in the ARD portfolios from 1960-1970. Digital Equipment was the successful investment described in section 3.1. Over 90% of ARD's capital, as of 1970, was produced by its investment in Digital Equipment. Throughout the period 1960-1970, the ARD portfolio contained many investments made prior to 1960 which made it impractical to compute a portfolio return on only the investments made from 1960 to 1970.

The average total return was 3.15 and the average compound return was 11%. Without the most successful company in the sample, ARD, the average total return was 2.30 and the average compound return was only 9%. The difference between these average returns for the portfolios and the average returns for the individual investments is small.³ Since the total returns and compound returns of the portfolios are highly correlated (.99, .001), either measure of success can be used in ranking portfolios.⁴ No strong relationship between

³See section 3.3.

⁴All correlations in this chapter are Spearman's r_s .

initial size and performance was shown in Table 4-1. The rank order correlation was small and insignificant (.28, .25). The variation in the percent of capital in technical investments or--debt investments in the fourteen portfolios was small.

Laurence Rockefeller stated that investing venture capital is no more successful than investing in listed common stocks, but that it is more fun.⁵ The fun of investing venture capital cannot be measured from the data, but the first part of the statement can be examined. From 1960 to 1970, the Standard and Poors Stock Price Index had an annual compound rate of return of 11%, which was the average return for the investment companies in the sample.⁶

The growth and profitability of new companies is closely correlated with the state of the economy. When the economy is growing rapidly, small companies grow rapidly; when the economy slows down, the growth of small companies slows. This correlation prevents diversification from eliminating the risk entirely. The results of this section agreed with Mr. Rockefeller. Assuming that risk of venture capital investment companies is at least equivalent to the risk

⁵James Ensor, "Venture Capital and Europe", Financial Times (London), December 11, 1970, p. 18.

⁶The total return was less for the Standard and Poors Index because the dividend component of the return was higher. The total return measure does not make any assumption about the re-investment of dividends. The Standard and Poor's Index is a broader base than the Dow Jones, and is a better indication of the performance of a typical common stock.

of the typical common stock listed on a stock exchange. The fourteen venture capital companies studied were no more successful than the typical listed common stock. Whether the return on these portfolios was less successful requires a quantitative measure of risk or volatility.⁷

4.2. Operating Income and Expenses

Venture capital companies must spend time and money investigating proposals and monitoring investments. Auditing and reporting to stockholders is an expense. Borrowing from either the Small Business Administration or from banks incurs an interest expense. These expenses can be paid from current revenue, capital gains, or the capital of the investment company. Eleven of the investment companies in the sample had deficits in their early years when their operating expenses were greater than their current revenues. Current revenue is produced by interest, dividends, and management fees paid by the companies that received financing and by interest on marketable securities, e.g. Treasury Bills and commercial paper.

Since the amount of income and expense varies with the size of the investment company, ratios are useful measures for comparisons among companies. Table 4-2 lists the ratios of the fourteen

⁷ For an approach to such measurements, see William F. Sharpe, Portfolio Theory and Capital Markets (New York: McGraw-Hill, 1969). The lack of market prices throughout the period 1960-1970 prevented using that approach in this research.

TABLE 4-2

Income and Expense Ratios

<u>Investment Company</u>	<u>Revenue Ratio</u>	<u>Income Ratio</u>	<u>Operating Ratio</u>	<u>Interest Ratio</u>	<u>Expense Ratio</u>
1	0.037	0.026 ¹	0.017	0.000	0.474
2	0.038	0.034	0.036	0.000	0.958
3	0.044	0.046	0.033	0.006	0.909
4	0.088	0.101 ¹	0.020	0.012	0.376
5	0.063	0.067	0.033	0.026	0.950
6	0.045	0.037	0.025	0.003	0.625
7	0.045	0.044 ¹	0.028	0.027	1.215
8 ²	0.034	0.026 ¹	0.025	0.006	0.731
9	0.058	0.059	0.030	0.007	0.642
10	0.058	0.078	0.053	0.016	1.204
11	0.049	0.048	0.039	0.011	0.890
12	0.048	0.048 ¹	0.029	0.019	0.997
13	0.041	0.027	0.029	0.003	0.644
14	0.058	0.055	0.069	0.038	1.827
Average	0.050	0.050	0.032	0.012	0.889

¹Estimated by assuming 5% return on marketable securities.

²For the period 1963-1967.

investment companies averaged over the period 1965-1970. The data for the entire ten year period were not used because the investment companies were started at different times. Their income and expenses in the period 1960-1965 were not directly comparable. By 1965 all companies were well-established, fully invested, and had begun to realize some of their successful investments. The ratios are defined as follows:

Invested Assets = Cash + Marketable Securities + Venture
Capital Investments, at Book Value

Revenue Ratio = $\frac{\text{Current Revenue}}{\text{Invested Assets}}$

Income Ratio = $\frac{\text{Income from Venture Capital Investments}}{\text{Total Venture Capital Investment}} \\ \text{at Book Value}$

Operating Ratio = $\frac{\text{Operating Expenses}}{\text{Invested Assets}}$

Interest Ratio = $\frac{\text{Interest Expense}}{\text{Invested Assets}}$

Expense Ratio = $\frac{\text{Operating Expense} + \text{Interest Expense}}{\text{Current Revenue}}$

Most companies reported income from venture capital and interest on marketable securities separately. For the companies that did not report the sources of income separately, income from venture capital investments was estimated by assuming that marketable securities yielded five percent and subtracting that yield from current revenue.

The controversial issue of requiring interest, dividends or management fees from financed companies was discussed in sections

2.1 and 3.3. Some venture capitalists believe that these fees and interest are too heavy a burden on the financial position of the company. Others point out that interest and fees are needed to support the venture capital company that provided the financing. There was zero (0.00) correlation between the investment income ratio and compound annual return. Despite the popular belief that venture capitalists charging high fees and interest might reduce their chances for success, that relationship is not indicated here.

Expenses of the venture capital company could be paid out of capital, capital gains, or by the interest earned on marketable securities. Venture capitalists traditionally have not used capital to pay for expenses except in the early years of their existence. However capital gains are uncertain and have large fluctuations. Using only marketable securities to cover expenses might require the venture capital company to forego investing in attractive proposals to meet its expenses.

Three companies in the sample did run deficits. Their operating and interest expenses were greater than their current revenue. On the average the investment companies kept their operating and interest expense ratios to approximately 90% of their current revenue ratio. Companies with lower operating ratios did not have significantly higher current revenue ratios (-.12, .65), but did have lower operating expense ratios (.70, .02) and lower interest expense ratios (.61, .05). Higher profit margins came from lower expenses, not higher revenues. The correlation between operating expense ratio and

compound return was negative (-.57, .07); those who spent more did not perform better.

4.3. Scale of Operations

Large venture capitalists have greater freedom to invest. They can invest large amounts without sharply reducing the diversification of their portfolios. Their fixed expenses can usually be paid by income from investments.

Table 4-3 presents some statistics related to the size of an investment company. Size is measured by averaging the book value of assets at the beginning and the end of the period. The investment ratio equals the average ratio of venture capital investments to total invested assets. By definition, companies with a lower investment ratio have a larger percentage of their assets invested in cash and marketable securities.

The larger companies in the sample made larger average initial investments (.60, .03), larger average total investments (.75, .01), and a greater percentage of their investments received subsequent financing (.75, .01). These characteristics were not associated with successful investments and they were not correlated with successful portfolios. The correlations with the annual compound return of the portfolios were .39, .36, and .36, respectively. None of the correlations were statistically significant.

On the average 75.7% of the total invested assets of an invest-

ment company were venture capital investments. The remaining 24.3% were cash and marketable securities. Since the correlation between size and investment ratio was small and insignificant (-.28, .45), the data suggest only a slight tendency for larger investment companies to hold disproportionately more cash and marketable securities.

In section 4.1, the correlation between investment success and size was shown to be zero. Hayes and Wood found that small SBICs could not diversify as easily and were more risk averse than large SBICs.⁸ From their research one could conclude that SBICs larger than one million dollars in stockholders' equity would be more successful. Rotch has stated that SBICs with less than one million dollars in equity could not be considered venture capital companies.⁹ Such companies could not achieve adequate diversification and could not afford to employ experienced investment managers, and the risks of venture capital would result in a high probability of bankruptcy. Each of the fourteen companies in this research had more than one million dollars in equity. For these companies, larger size appeared not to have an important advantage, since no correlation was found between compound return and size. The operating ratio did decrease as the size of the investment company increased (-.55, .04). Larger investment companies in the sample did have higher profit margins.

⁸ Hayes and Woods, 1963.

⁹ Rotch, 1968.

TABLE 4-3

Characteristics of Investment Company Size

Investment Company	Average Size ¹	Average Initial Invest. ¹	Average Total Invest. ¹	% Invest. with Subsequent Financing	Invest. Ratio ²
1	\$287,000	\$323	\$456	37.1%	0.535
2	2,680	235	243	12.5	0.625
3	34,100	300	587	60.3	0.846
4	5,050	318	360	18.7	0.694
5	2,590	294	299	8.7	0.700
6	23,240	396	538	32.6	0.888
7	4,100	209	209	0.0	0.947
8	21,770	530	1197	35.7	0.655 ³
9	2,360	180	214	23.1	0.977
10	13,300	213	266	40.0	0.617
11	6,020	339	339	0.0	0.829
12	17,840	491	547	20.0	0.845
13	12,630	285	382	25.0	0.669
14	5,520	159	166	9.1	0.644
Median	9,320	298	319	21.6	0.757

¹000s omitted.

²For the period 1965-1970.

³For the period 1964-1967.

4.4. Tax Issues

The tax laws governing regulated investment companies and SBICs are complicated and contradictory. This section presents a brief description of the more important regulations.¹⁰

The fourteen companies were regulated investment companies, as such they were required to

- 1) register with the SEC
- 2) maintain a diversified portfolio
- 3) have at least 90% of their current revenue come from investments
- 4) distribute at least 90% of their ordinary income to the stockholders

Regulated investment companies do not pay tax on their ordinary income. Capital gains may be retained or distributed. If capital gains are retained, the investment company must pay a 25% capital gains tax. Stockholders receive a tax credit on any tax paid on retained capital gains.

As shown in section 4.2, the operating ratios of these companies averaged 90% of their current revenue, before taxes and provisions for capital losses. After provision for capital losses most of the companies had insignificant ordinary income. Capital gains and losses occurred irregularly and in varying amounts, as shown in section 3.2. With few exceptions, the investment companies retained the

¹⁰For a more detailed discussion of these tax laws see R. E. Kelley, SBICs in Action, Fourth edition (Los Angeles: Key Fax Publications, 1965).

capital gains and paid the tax.

Thirteen of the companies were SBICs or had SBIC subsidiaries. The Internal Revenue Code provides an ordinary loss deduction "on convertible debentures acquired pursuant to Section 304 of the SBIA of 1958."¹¹ However this was not an important advantage since ordinary (current) income of the SBICs was so small.

Stockholders of SBICs received a second advantage which might have been important. They could deduct capital losses on the sale of their stock from their ordinary income. For high tax bracket investors, that provision could have decreased the risk of investing in a SBIC. A potential capital gain would be taxed at a maximum rate of 25%, but a capital loss could be used to offset other ordinary income resulting in possible tax savings on that other ordinary income up to 70%. However at least five of the investment companies concluded that this last advantage was not important enough for their stockholders to warrant continued operation as an SBIC. ARD has never been an SBIC; Boston Capital and Electronics Capital are now operating companies; Capital Southwest and Greater Washington are regulated investment companies with SBIC subsidiaries.

The investment practices of these companies made the effect of these tax regulations insignificant. Ordinary income was small and, after provision for capital losses, often was nil. The tax on capital gains was paid, directly or indirectly by the stockholders.

¹¹Quoted in Kelley, 1965, p. 95.

Capital gains were probably timed to coincide with capital losses. All fourteen companies turned over investments with sufficient frequency to be able to avoid large capital losses without off-setting capital gains.

CHAPTER FIVE

SUMMARY AND SUGGESTIONS FOR FUTURE RESEARCH

"Life is the art of drawing sufficient conclusions from insufficient premises."

Samuel Butler

5.1. Summary and Conclusions

This thesis studied the management and the investments of fourteen venture capital investment companies. The growth stages and the sources and uses of venture capital were described. The financial characteristics and the distribution of returns of the investments were examined. The returns to the stockholders on the common stock of the investment companies were examined and related to the revenues, expenses, and size of the venture capital companies. The major conclusions from the research were:

1. Technical investments were more successful than non-technical investments. Technical investments had lower initial and total size, lower initial claim on equity, shorter holding times, and received lower average subsequent financing compared to non-technical investments. Technical investments had higher total and compound returns and lower coefficients of variation than non-technical investments. Venture capitalists should re-examine their reasons for investing in non-technical companies, and the reasons for the lower level of success in those investments.

2. Stage I investments were the most successful category of investments in the sample. Stage I investments had lower initial size but higher total size of investment, and received higher average subsequent financing than Stage II investments. Stage I investments had considerably higher total and compound rates of return and slightly higher coefficient of variation than Stage II investments. Venture capitalists should actively search for more of these investments. They should change their investment strategies to improve their ability to finance start-ups.

3. Debt investments were much less successful. Over half the investments in the sample were debt. These investments were larger initially, and in total, had longer holding times, and much lower rates of return than did stock investments. Venture capitalists should carefully re-examine their investment policies and their rationale for using debt.

4. Investments that received subsequent financing were smaller initially, but larger in average total size, compared with investments that did not receive subsequent financing. They had longer holding times, lower total and compound returns, and higher coefficients of variation. Venture capitalists should re-examine the rationale for supplying subsequent financing and the available alternatives.

5. Investments with longer holding times had higher total and compound returns, and had large amounts invested. However the correlation between size and total return was small and had little practical significance. Venture capitalists should re-examine the perfor-

mance of their large investments and attempt to determine why they were less successful.

6. For the entire sample the distribution of returns was highly skewed, which indicated that the measures of success were highly dependent upon a few extreme investments. When the top five percent of the total return distribution was omitted, the average total return dropped from 2.39 to 1.73.

The returns to the stockholders of these fourteen investment companies were similar to those in the stock market as a whole. The average compound return was 11%, which was also the return on the Standard and Poors Stock Price Index for approximately the same time period. Venture capital investors should be aware that in this time period for these investment companies, there were a few investments and few investment companies with extremely high returns. The majority of investments and investment companies had low returns compared with other sectors of the capital markets. Further analysis of these few may indicate characteristics of successful venture capital investing.

7. Larger investment companies had lower operating ratios, higher size of investments, and supplied more subsequent financing. No relationship was found between size of investment company and stockholder rate of return. No relationship was found between the interest, dividends, and fees received from venture capital investments and the stockholder rates of return. Venture capital investors should be aware that something other than merely the size of the

venture capital investment companies must be the decisive factor in investment success.

5.2. Future Research

During the design and execution of this research several promising areas were identified for future research. The models and the information available on venture capital investing are limited. The greatest impediment to research in these areas is the difficulty in obtaining data. Entrepreneurs and new companies are difficult to identify until they become successful. Wealthy individuals who invest in venture capital are not easily identified.

Most venture capitalists are interested in research and want more information on their activities. In the preliminary stages of this research many venture capitalists discussed their investment strategies, successes, and problems. However, in all cases, written information was difficult or impossible to obtain. Documentation was lost or did not exist and memory was incomplete. These data problems must be solved before more research can be done. Listed below are five areas for research that should improve the understanding and increase the resources for venture capital investing.

1. A better understanding of how enterprises grow is necessary to explain more fully the successes and failures of venture capital investments. The research cited in section 1.3 focused primarily on the entrepreneurs who start new companies. More information is need-

ed on the products and markets of these entrepreneurs. A better knowledge of how the business organization develops is required. How does the growth of technical companies differ from that of non-technical companies? With a model of entrepreneurship and corporate growth, venture capitalists would have a better basis for investment judgments.

2. Research is required to better identify the current venture capital investment practices regarding the products, management, and organizations in which venture capitalists invest, and how these factors correlate with success. Examining the differences between current investment practice and models of successful entrepreneurship should improve venture capital decision-making and investment success, especially in financing start-ups.

3. This research indicates that Stage I investments are extremely successful. More research must be done to determine how efficient and effective investment companies can be developed to increase financing available to start-ups.

4. This research studied venture capital investment companies. Both the Federal Reserve study and Baty's research indicated that wealthy investors are the primary source of venture capital. Additional research can identify further what roles these individuals play in the development of new companies. Since these investors are the major source of start-up venture capital, studying them will not only increase the understanding of how companies grow from Stage I to Stage II, but also how these companies can best be assisted in

their growth.

5. Research is needed to identify how venture capitalists help and hinder the development of the companies they finance. What resources, in addition to capital, can a venture capitalist provide to new companies to help them grow and prosper? What are effective strategies for supplying that help? Why did investments that received subsequent financing have lower returns?

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APPENDIX

A. Investment Companies in the Initial Sample

Advance Growth Capital Corporation
American Research and Development Corporation
Anderson New England Capital Corporation
Boston Capital Corporation
Business Funds, Inc.
Business Capital Corporation
California Growth Capital Inc.
Capital Investments, Inc.
Capital Southwest Corporation
Capital for Technical Industries Inc.
Citizens and Southern Capital Corporation
Continental Capital Corporation
Electronics Capital Corporation
First Midwest Capital Corporation
First Small Business Investment Company of New Jersey
Franklin Corporation
Greater Washington Investors, Inc.
Growth Capital Inc.
La Salle Street Capital Corporation
Marine Capital Corporation
Monroe Capital Corporation
Midland Capital Corporation
Mid-State Business Capital Corporation
Midwest Technical Development Corporation
Narragansett Capital Corporation
St. Louis Capital Corporation
Science Capital Corporation
Sierra Capital Corporation
Small Business Investment Corporation of New York
Techno Fund, Inc.
Texas Capital Corporation
Water Industries Capital Corporation
Westland Capital Corporation

B. Investment Companies in the Final Sample

1. American Research and Development Corporation, Boston
2. Anderson New England Capital Corporation, Boston
3. Boston Capital Corporation, Boston
4. Business Capital Corporation, Chicago
5. California Growth Capital Corporation, Los Angeles
6. Capital Southwest Corporation, Dallas
7. Continental Capital Corporation, San Francisco
8. Electronics Capital Corporation, San Diego
9. First Midwest Capital Corporation, Minneapolis
10. Greater Washington Investors, Inc.
11. La Salle Street Capital Corporation, Chicago
12. Midland Capital Corporation, New York
13. Small Business Investment Corporation of New York, New York
14. Westland Capital Corporation, Los Angeles