THE INFORMAL VENTURE CAPITAL MARKET: ASPECTS OF SCALE AND MARKET EFFICIENCY

WILLIAM E. WETZEL, JR.
University of New Hampshire

EXECUTIVE SUMMARY

Risk capital is a resource essential to the formation and growth of entrepreneurial ventures. In a society that is increasingly dependent upon innovation and entrepreneurship for its economic vitality, the performance of the venture capital markets is a matter of fundamental concern to entrepreneurs, venture investors and to public officials. This article deals with the informal venture capital market, the market in which entrepreneurs raise equity-type financing from private investors, (business angels). The informal venture capital market is virtually invisible and often misunderstood. It is composed of a diverse and diffuse population of individuals of means; many of whom have created their own successful ventures. There are no directories of individual venture investors and no public records of their investment transactions. Consequently, the informal venture capital market poses many unanswered questions.

The author discusses two aspects of the informal venture capital market: questions of scale and market efficiency. The discussion draws upon existing research to extract and synthesize data that provide a reasonable basis for inferences about scale and efficiency.

Private venture investors tend to be self-made individuals with substantial business and financial experience and with a net worth of $1 million or more. The author estimates that the number of private venture investors in the United States is at least 250,000, of whom about 100,000 are active in any given year. By providing seed capital for ventures that subsequently raise funds from professional venture investors or in the public equity markets and equity financing for privately-held firms that are growing faster than internal cash flow can support, private investors fill gaps in the institutional equity markets.

The author estimates that private investors manage a portfolio of venture investments aggregating in the neighborhood of $50 billion, about twice the capital managed by professional venture investors. By participating in smaller transactions, private investors finance over five times as many entrepreneurs as professional venture investors; 20,000 or more firms per year compared to two or three thousand. The typical angel-backed venture raises about $250,000 from three or more private investors.

Despite the apparent scale of the informal venture capital market, the author cites evidence

Journal of Business Venturing **2**, 299–313 (1987) 0883-9026/87/$03.50

that the market is relatively inefficient. It is a market characterized by limited information about investors and investment opportunities. Furthermore, many entrepreneurs and private investors are unfamiliar with the techniques of successful venture financing. The author's scale and efficiency inferences, coupled with evidence documenting gaps between private and social returns from innovation, prompt questions about public as well as private initiatives to enhance the efficiency of the informal venture capital market.

The article concludes with a discussion of Venture Capital Network, Inc. (VCN), an experimental effort to enhance the efficiency of the informal venture capital market. VCN's procedures and performance are described, followed by a discussion of the lessons learned during the first two years of the experiment.

INTRODUCTION

Entrepreneurial ventures require access to capital; venture capital in particular. Consequently, the performance of the venture capital markets is a matter of concern to entrepreneurs and to venture investors. These concerns extend to issues of public policy in a society that increasingly depends upon entrepreneurs and venture investors for its economic vitality.

The market for venture capital consists of three major segments:

- the public equity market,
- the professional venture capital market, and
- the market for informal venture capital.

The public equity market and the professional venture capital market are visible, efficient, and well understood. The informal venture capital market, on the other hand, is often misunderstood. It is composed of a virtually invisible population of individual investors who provide equity-type financing for entrepreneurial ventures of all types, including those that ultimately raise funds from professional venture investors or the public equity market.

Despite their low profile, wealthy individuals, (business angels), appear to represent the largest venture capital resource in the United States. There are, however, compelling reasons to believe that the high cost of information about investors and investment opportunities, and limited familiarity with the techniques of successful venture investing, constrain the flow of informal venture capital.

Unanswered questions about the market for informal venture capital include the number and characteristics of individual venture investors; the size of the capital pool they control; the intensity of their interest in venture investing; the investment decision models they employ; the number and characteristics of the ventures they finance; the size and structure of their investment transactions; the performance of their portfolios; the relative efficiency of the informal venture capital market; and the extent of regional differences in the market for informal venture capital. Scattered pieces of data suggest the answers to some of these questions.

The following discussion deals with two issues: the scale of the informal venture capital market and market efficiency. The discussion draws on existing research to extract and synthesize data that provide a reasonable basis for inferences about scale and efficiency. The article concludes with a discussion of Venture Capital Network, Inc. (VCN), an experimental effort to enhance the efficiency of the informal venture capital market.

SCALE ESTIMATES

A sense of the scale of the informal venture capital market provides the background for addressing other questions. Readers who are uncomfortable with inferences drawn from limited data, data that are at best suggestive, will be uncomfortable with the following discussion. Better data do not exist.

Supply-Side Indicators

The supply side of the informal venture capital market is composed of a diverse and diffuse population of individuals of means, many of whom have created their own successful ventures. For discussion purposes, individual venture investors (business angels) are defined as follows:

1. Net worth over $1 million and annual income over $100 thousand.
2. Substantial business and financial experience.
3. Capable of evaluating the merits and risks of prospective investments.
4. Unaffiliated with portfolio ventures, i.e. excludes founders, friends and relatives.
5. Willing to take substantial financial risks to earn substantial returns.
6. Willing to commit funds for extended periods to earn substantial returns.

There are no directories of individual venture investors and no public records of their investment transactions. Despite the lack of hard data, clues to the scale of informal venture investing can be found.

Millionaires and Mega-Millionaires

U.S. News and World Report (1986), reported that the U.S. population included 833,000 millionaires at the end of 1985, and that the number would exceed one million by the end of 1986. Based on these figures, millionaires comprise less than 1/2 of 1% of the United States population. The net worth of 95% of U.S. millionaires is between $1 million and $10 million. The following excerpts from the article are pertinent to a discussion of informal venture capital:

- "The typical millionaire is a self-made entrepreneur in his early 60s–fewer than 10% are under 40. He works 10 or 12 hour days and, more frequently than not, his business caters to the ordinary needs of ordinary Americans."
- "The average annual income of millionaires is $121,000, of which three fourths comes from earned income."
- "80% of American millionaires come from middle or working-class families."
- "In fact, 85% of America's millionaires own their own business or a share in a private company."

Case in point: Samuel Moore Walton, Bentonville, Arkansas, claimed by *Forbes* (1986) to be the wealthiest individual in the United States, opened a discount store with his brother James in Rogers, Arkansas in 1962. He now operates 950 Wal-Mart stores. Walton Enterprises, the family investment company, is valued at $4.5 billion.

The Forbes Four Hundred (1986) richest people in America represent a combined net worth of about $156 billion. Their average net worth is $390 million and the net worth of

the 400th mega-millionaire is $180 million. Compared to 80% of all millionaires who apparently are self-made, only 44% (174) of the Forbes Four Hundred built their fortunes without benefit of a significant inheritance. The six wealthiest individuals on the Forbes list are all self-made and represent a combined net worth in excess of $14 billion.

In a study of consumer finances, Avery and Elliehausen (1986) found that the net worth of 1.3 million U.S. families (almost 2%) is at least $1 million. According to their data, most wealth is saved out of accumulated earnings, not inherited. The wealth, income, and asset distribution of the top 1% of U.S. households (840,000 families) are displayed in Table 1 and provide an approximation of the potential supply of informal venture capital.

Based on the data in Table 1, 311,000 families (37% of the top 1% of U.S. households) have invested $151 billion in non-public businesses in which they have no management interest. The nature of these investments was not discussed by the authors. If one third could be described as venture financing, existing informal venture investments are in the neighborhood of $50 billion. Credence is provided to this inference by Avery and Elliehausen's data describing attitudes toward financial risk and liquidity of the *super rich* (top 1/2%) and the *very rich* (next 1/2%). These data are displayed in Table 2.

Based on stated attitudes toward risk and liquidity and the fact that the top 1% of U.S. households have invested over $150 billion in non-public businesses in which they have no management interest, it is not unreasonable to believe that venture-type financing in the portfolios of the top 1% may be at least $50 billion.

Informal Risk Capital in the Sunbelt

Research conducted by Applied Economics Group, Inc. (AEG) (1986) provides further clues to the supply of informal venture capital. AEG examined how and where small firms in SBA Regions III, IV, and VI obtain equity capital for start-up and growth. Regions III, IV, and VI include Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia; Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee; and Arkansas, Louisiana, New Mexico, Oklahoma and Texas respectively.

AEG estimated that Regions III, IV, and VI contain 99,000 informal venture investors. In a typical year 68,700 of these individuals provide equity capital to entrepreneurial ventures, an average of one $38,000 investment every eighteen months for each investor. The annual dollar value of these investments totals $2.6 billion, ten times the capital invested in these regions by venture capital firms. AEG's data indicate that informal investors extend another

TABLE 1 Wealth, Income, and Asset Distribution of U.S. Households

	Top 1/2%	Next 1/2%
Number of households	420,000	420,000
Net worth (millions)	≥$2.5	$1.4–$2.5
Family income (thousands)	≥$280	$150–280
Percent owning non-public business–no management interest (3% of all families)	46% (193,200)	28% (117,600)
Mean holding of owners	$621,279	$263,437
Mean percent of assets for owners	14%	10%

TABLE 2 Attitudes toward Financial Risk and Liquidity

	Top 1/2%	Next 1/2%
Financial Risk		
Take substantial financial risk to earn substantial return (6% of all families)	10%	5%
Take above-average financial risk to earn above-average return (11% of all families)	34%	36%
Liquidity		
Tie up money for long term to earn substantial return (12% of all families)	26%	22%
Tie up money for intermediate term to earn above-average return (26% of all families)	47%	56%

$2.5 billion to portfolio firms in the form of loans and loan guarantees. The typical firm in AEG's sample raised $220,500 of equity and near-equity financing, typically from three informal investors.

Since Regions III, IV, and VI represent 28.6% of the U.S. population, extrapolation suggests that there are about 345,000 informal venture investors in the United States, an inference not inconsistent with Avery and Elliehousen's data. AEG estimates the median net worth of informal investors at $750,000 and their median family income at $70,000. According to AEG's data, informal investors commit some 10–24% of their net worth to venture investments. If there are 345,000 informal venture investors in the U.S. with an average net worth of $750,000, and with 10–24% of their net worth available for venture investments, the aggregate informal venture capital pool is between $25 billion and $62 billion.

Demand-Side Indicators

The demand side of the informal venture capital market is almost as elusive as the supply side. The ventures funded by individual investors appear to fall into two broad categories. The first includes technology-based inventors and start-up firms of all types requiring less than $1 million of seed capital. A few of these ventures survive and grow fast enough to become substantial companies in a short period of time, five years or less. These *high potential* ventures typically attract second and third round financing from professional venture capital firms before being acquired by a larger company or undertaking a public stock offering.

The second category is made up of established, privately-held firms that are growing faster than internal cash flows and retained earnings can support. Seldom can even the most profitable firms rely exclusively on retained earnings when growth rates exceed 25% per year. The most dynamic small firms are growing at annual rates exceeding 100%. Between 1980 and 1984, sales growth for the Inc. 500 Fastest-Growing Private Companies (1985) averaged 94% per year.

Indications that self-made individuals play an important role in the financing of both categories of ventures can be traced at least back to the 1960s.

Small Technology-Based Firms

Baty (1964) found that wealthy individuals were the largest source of capital for new, technology-based companies. Baty found that individual investors were not only more likely to supply initial risk funds than venture capital organizations, but were likely to supply them on more liberal terms. He also discovered that initial investors in new, research-based enterprises were predominantly affluent individuals, and that those who were self-made tended to be more venturesome than those with inherited wealth. Self-made investors tended to invest in the industries in which they had made their wealth.

Brophy (1982), examined sources of financial support for new, technology-based firms incorporated and operating from 1965–1970. In a sample of Boston-area firms, Brophy found that private individuals (excluding founders, friends, and relatives) provided 14.3% of total financing, SBICs and private venture capital firms provided 15.1%. Regional differences were evident in Brophy's data. Figures for a sample of Ann Arbor/Detroit firms were 15.7% and 2.3% respectively.

Charles River Associates (CRA) (1976) examined the composition of external funds received by small, technology-based firms making initial public offerings from 1970–1974. CRA found that unaffiliated individuals accounted for 15% of external funds while venture capitalists accounted for 12%. When the data were segmented by stage (age of venture), CRA found that unaffiliated individuals provided 17% of external funds during the start-up year, while venture capitalists provided 11%. CRA excluded "individuals who act informally as providers of venture funds" from their examination of capital market imperfections. Yet CRA speculated that "they may represent the largest source of venture capital in the country."

Start-up Ventures

Shapero's study (1983) of the initial financing of new ventures in Columbus, Ohio and Louisville, Kentucky sheds more light on the characteristics of angels. Shapero collected data from 33 private individuals who had made investments in start-up or very young companies. Shapero found that the individuals most likely to invest in new ventures were those who had made it themselves,–first generation money. He also found that the decision to consider an investment is highly related to personal knowledge of the business field or the entrepreneur, or a high regard for the third party who brought the investment opportunity to the investor for review.

SEC Data

Two reports prepared by the U.S. Securities & Exchange Commission (1983, 1984), support the conclusion that individual investors are a significant source of risk capital. Corporate private placements reported to the SEC in 1981 under Rule 146, exceeded $1 billion. A sample of Form 146 filings revealed that corporate issuers were engaged primarily in high technology or in other manufacturing and nonfinancial services. They were generally young companies employing few workers. 87% of the investors in corporate issues were individuals or personal trusts. Note that Rule 146 data exclude offerings exempt from filing because of their intrastate nature (Rule 147), or financing by closely-held firms under small-offering exemptions (Rules 240 and 242).

On April 15, 1982, Regulation D replaced the exemptive provisions of Rules 146, 240, and 242. Issuers claiming exemption under Regulation D during its first year offered

$15.5 billion of securities in over 7,200 filings. Corporations accounted for 43% of the value ($6.7 billion) and 32% of the offerings (2,304). Under Rule 504 of Regulation D (limited offerings under $500,000), 1,103 corporations reported offering securities totalling $220 million. The typical corporate issuer under Rule 504 had five or fewer employees (60.7%) and an operating history of two years or less (68.8%).

Scale Inferences

Drawing on the data cited above, some simple mental exercises suggest the scale of the informal venture capital pool. If the average net worth of millionaires is between $1 million and $2 million, then, excluding borrowed funds, the total wealth controlled by the one million or more U.S. millionaires is between $1 trillion and $2 trillion. If the average millionaire commits 10% of his or her net worth to venture investing, the total informal venture capital pool is between $100 and $200 billion. If only one fourth of U.S. millionaires have any interest in venture investing, the pool of informal venture capital controlled by these 250,000 individuals lies in the $25–$50 billion range, about twice the capital managed by professional venture investors.

It appears that each year over 100,000 individual investors finance between 20,000 and 50,000 firms for a dollar investment totalling between $5 billion and $10 billion. The typical firm financed by angels raises about $250,000 from three or more investors. The typical investor provides between $25,000 and $50,000 per firm, about half in the form of equity and half in near-equity (loans and loan guarantees). During 1985 professional venture investors financed about 2,500 firms for a total of about $2.5 billion, an average of about $1 million per firm.

CAPITAL MARKET EFFICIENCY

Perceptions that gaps exist in the equity markets serving entrepreneurs led to passage of the Small Business Investment Act of 1958. The Act created the Small Business Investment Company (SBIC) program. Though capital gaps have never been documented convincingly, perceptions of gaps endure, at least in the minds of entrepreneurs. Perceived capital shortages include product development financing for technology-based inventors, start-up and early-stage financing for ventures that fail to meet the size and growth criteria of professional venture investors, and equity financing for closely-held firms that are growing faster than internal cash flows can support.

Research documenting entrepreneurs' perceptions of capital gaps include work by Obermayer (1983) and Wilson (1984). Recent efforts to deal with the gap include the Small Business: Investment Incentive Act of 1980, the Small Business Innovation Development Act of 1982, and the SEC's Regulation D.

The capital gap folklore is based upon the observable behavior of financial institutions, including SBIC's and professional venture capital firms. However, the folklore overlooks the investment record of informal venture investors–business angels. Angels not only exist, they tend to invest in precisely the areas perceived as gaps in the capital markets for entrepreneurs. For an expanded discussion of angel financing, Wetzel (1983, 1986).

Despite the apparent size of the informal venture capital pool, the effect of capital gaps can be created when markets fail to function efficiently. Modern financial theory rests on assumptions of efficient markets–markets in which information about sources of funds and about investment opportunities is fully and freely available to buyers and sellers of

capital. The evidence suggests that this necessary condition is far from fulfilled in the angel segment of the venture capital markets. In the absence of efficient markets, capital cannot flow from less productive to more productive investment opportunities.

> "At the heart of free market systems is the issue of whether or not prices accurately reflect all the information necessary for scarce resources to be efficiently allocated among an infinite variety of alternative and competing uses." (Weston and Copeland 1986)

Bean, Schiffel and Mogee (1975), found little support for assertions that technological innovation by new/small firms is impeded by an inadequate supply of capital. However, they noted that the majority of venture capital firms do not fund start-up companies, a pattern that still prevails. *Venture Capital Journal* (1986) reported that 13% of the funds disbursed by all venture capital firms in 1985 were *seed* or *start-up* investments. Seed and start-up investments represented 12.6% of *Venture Magazine's* (1986) November, 1986 Index of Venture Capital Activity. One of Bean, Schiffel and Mogee's observations is worth quoting.

> "The issue of little knowledge of the venture capital/new technological enterprise is multi-faceted. Entrepreneurs and potential entrepreneurs seem to need better information on financial sources while capital suppliers seem to need better information on new-venture/technological investment opportunities."

The Charles River Associate's study (1976) also found "no evidence of substantial market imperfections that restrict the flow of funds to small, technology-based firms." Recall, however, that they excluded from their study of capital market imperfections "individuals who act informally as providers of venture funds." Despite their conclusions, CRA made the following point:

> "It is not clear whether the existing system for generating and disseminating information about investment opportunities is efficient. In other words, it is not clear whether it could be improved in a cost-effective manner."

Networks and Market Efficiency

Data describing the channels through which information about opportunities for investment in new/small companies is transmitted to individual investors can be found in several studies. Without exception, these studies cite the dominant role of informal networks of trusted friends and business associates in the referral process.

Early in the development of the venture capital industry in the United States, Rubenstein (1958) found that private investors were more dependent on informal networks than were large venture capital institutions.

> "The fraternity of individual backers of small businesses appears to be rather close knit, at least on a local level. A good deal of information is passed about by word of mouth. If one investor who enjoys considerable prestige among his associates, believes a situation to be promising and recommends it to others, his friends may participate merely on the basis of his recommendations . . ."

The significance of a respected lead investor in attracting the participation of associates was evident in a case study of the Taplin & Montle Development Fund, an informal association of individual investors in the Boston area (Wetzel 1983). The work of Baty (1964) and Shapero (1983) also document the catalytic role played by respected lead investors.

The importance of informal venture investment networks was cited by the Panel on Venture Capital of the U.S. Department of Commerce Technical Advisory Board (1970). The Panel reported that they:

". . . became increasingly aware of an informal network of people, institutions and relationships that are significant in the process of financing new enterprises."

". . . it is apparent that the network does not operate with the same degree of effectiveness in every geographic region of the country."

Subsequent research has documented both the significance of informal networks and regional differences in the effectiveness of these networks. For example, Hoffman (1972) explored the process by which individual investors identify, evaluate and structure investments in new, small companies. Data were collected from 39 investors in Waco and Austin, Texas. Hoffman found that friends and business associates referred more new and small companies to these investors than any other source. He also found that differences in the venture capital investment process between more developed and less developed areas relate more to the dynamics of the local venture capital networks than to the absolute availability of venture capital, the number of venture capitalists, the opportunities to invest, or the absolute propensity to invest. Shapero (1983) also found that the existence or nonexistence of investor networks was an important difference between communities in the propensity to invest.

In a study of informal risk capital in New England, Seymour and Wetzel (1981) collected data from 133 individual investors who fit the description of business angels. These investors reported risk capital investments totalling over $16 million in 320 ventures between 1976 and 1980, an average of one deal every two years for each investor. The average size of their investments was approximately $50,000, while the median size was about $20,000. 60% of their investments represented participations with other individuals in larger transactions.

52% of the New England sample cited business associates as a frequent source of investment opportunities, 50% cited friends, and 41% cited active personal search. The next most common source, investment bankers, was cited as a frequent source by 15% of the sample. All other sources, including business brokers, commercial bankers, attorneys, and accountants were insignificant. Since individual investors tend to be found in clusters, these data may understate the significance of professional intermediaries in the referral process. While most investors learn of investment opportunities from friends and business associates, the typical opportunity may be introduced to one member of the cluster by a banker, broker, attorney or accountant.

New England investors totally dissatisfied with existing channels of communication between entrepreneurs and individual investors outnumbered definitely satisfied investors by over four to one. 58% expressed a strong interest in a service that would direct investment opportunities to their attention. 38% expressed a moderate interest in such a service.

In their Sunbelt study, AEG (1986) found that informal investors' most common and reliable sources of investment information were friends and business associates. One third of the Sunbelt investors were dissatisfied with information channels currently available. The average investor wanted to invest 83% more than he did, but could not find sufficiently attractive opportunities. Given sufficient opportunities, funds available from investors in the three regions would total about $9 billion per year. Extrapolated to the United States, the total would exceed $30 billion annually.

Krasner and Tymes (1983), replicated the Seymour and Wetzel study (1981) in the San Francisco Bay area. Data were collected from 41 investors, 30 of whom were private individuals and 11 were professional venture capitalists. California investors relied upon the same informal network of friends and business associates for most of their investment

opportunities. However, 61% of the California investors were either definitely satisfied or basically, but not totally satisfied with the effectiveness of existing channels of communication between entrepreneurs and investors. Only 28% of New England investors shared those opinions.

External Economies and Public Policy

For public policy purposes, it must be noted that the absence of market imperfections does not imply that the flow of funds to entrepreneurial ventures is in some sense ideal. The innovation process, of which venture investing is a part, generates significant external or social benefits. The nature of the marketplace typically precludes an innovator from capturing fully the benefits of an innovation, implying that the market allocation of resources for innovation will be suboptimal. Social returns that cannot be captured by private investors include an enhanced flow of new jobs, innovative technology, and new tax revenues. See, for example, *The State of Small Business: A Report of the President* (1982, 1983, 1984, 1985, 1986).

Mansfield (1983) was the first to measure the external economies associated with technological entrepreneurship. In a sample of 17 industrial innovations, Mansfield estimated the median private rate of return at 25% and the median social rate of return at 56%. Tewksbury, Crandall and Crane (1980) and Robert R. Nathan Associates, Inc. (1978) found similar evidence of substantial gaps between the private and social rates of return from innovation.

Building on the three studies referenced above, Romeo and Rapaport (1984), tested the hypothesis that innovations carried out by small firms (under 500 employees) tend to have a larger gap between private and social rates of return than the innovations carried out by larger firms. Romeo and Rapaport's results confirmed their hypothesis. While cautioning that their results were suggestive rather than definitive, Romeo and Rapaport described the public policy implications of their work as follows:

> "This study suggests that the gap between private returns and social returns is related to firm size. This would appear to provide some support for the argument that in designing policies to encourage innovation, the government should pay particular attention to small firms. These firms are less able to appropriate the economic gain from their innovations. The extent of market failure is greater here and the case for government policy is stronger. Our results suggest that encouragement of innovative activity by small firms would yield a larger social payoff than encouragement of large firms."

With respect to externalities and information, CRA (1976) raised the following issue:

> "To the extent that investments in small, technology-based firms produce external economies, too few resources will be allocated to all phases of investing in them, including generating information about investment opportunities."

Inefficient capital markets also contribute to a phenomenon known as the *discouragement effect*.

> "Analagous to the discouragement effect in labor markets that lowers the official number of job seekers, there is undoubtedly a similar discouragement effect operating among unsuccessful seekers of venture capital, would-be seekers of venture capital, and would-be entrepreneurs." (Boylan, 1981)

For entrepreneurs prematurely abandoning the search for funds, the effective cost of risk capital is infinite, and society bears the cost of lost opportunities to establish new ventures or rejuvenate old ones.

The research on private versus social rates of return from innovation, coupled with

the apparent inefficiency of the informal venture capital market, suggest that efforts to facilitate the flow of information between entrepreneurs and individual venture investors would be an appropriate public policy tool for promoting innovation by small firms.

VENTURE CAPITAL NETWORK–AN EXPERIMENT IN CAPITAL FORMATION

Perceptions of the scale and inefficiency of the informal venture capital market, combined with the significance of entrepreneurial ventures to the vitality of the U.S. economy in general and the New England economy in particular, prompted the formation of Venture Capital Network, Inc. (VCN). VCN is a not-for-profit corporation managed by the Office of Small Business Programs of the University of New Hampshire. VCN's essential purpose is to introduce entrepreneurs to individual venture investors and to venture capital firms interested in early-stage financing. VCN places no geographic restrictions on its services.

Financial support for VCN has been provided by the Business and Industry Association of New Hampshire, the University Center for Technical Assistance, the U.S. Economic Development Administration, the Ellis L. Phillips Foundation, and a group of sponsoring organizations. Sponsors include Deloitte Haskins & Sells; Peat, Marwick, Mitchell &Co.; Price Waterhouse; and the Shawmut Bank of Boston, N.A.

VCN Entrepreneurs

Entrepreneurs most likely to benefit from participation in VCN require between $50,000 and $750,000 of equity-type financing. They are often referred to VCN by accountants, attorneys, bankers, and venture capitalists. Entrepreneurs are required to submit an Executive Summary of their business plan when they register with VCN.

Table 3 presents a frequency distribution by business categories of the investment

TABLE 3 VCN Client Data

	Investment interests	Investment opportunities
Agriculture/Fishing/Forestry	12%	0%
Communications/Publishing	42%	5%
Computer Software	32%	9%
Education/Training	12%	2%
Energy/Natural Resources	23%	3%
Financial Services/Banking/Insurance	37%	2%
Manufacturing–High Tech	60%	21%
Manufacturing–Indust. and Comm.	65%	13%
Manufacturing–Consumer	57%	10%
Medical/Health Care	45%	13%
Real Estate/Construction	37%	2%
Recreation/Tourism	22%	5%
Retail Trade	10%	1%
Service–Technology related	45%	6%
Service–Other	32%	4%
Transportation	5%	2%
Wholesale Trade	20%	2%
		100%

opportunities represented by VCNs entrepreneur clients as of June 1, 1986. Over 80% of the ventures seeking financing through VCN are under five years old. Table 3 includes a frequency distribution of the investment interests of VCN investors.

VCN Investors

VCN investors are primarily affluent individuals. Seed capital venture funds represent about one fifth of VCNs investor clients. Since VCN permits investors to specify up to six business categories, the Investment Interest column in Table 3 totals over 100%.

VCN investors are required to certify that they are accredited investors as defined in Rule 501 of the SEC's Regulation D (Rules Governing the Limited Offer and Sale of Securities under the Securities Act of 1933) or that they have such knowledge and experience in financial and business matters that they are capable of evaluating the merits and risks of prospective investments, as specified in Rule 506 of Regulation D.

VCN Operating Procedures

VCN maintains a confidential data base of Investment Opportunity Profiles submitted by entrepreneurs and a confidential data base of Investment Interest Profiles submitted by investors. Using a two-stage process, VCN submits to investors those investment opportunities that meet their screening criteria. Both parties remain anonymous throughout this process. At the conclusion of the process, entrepreneurs are introduced to those investors interested in pursuing an investment opportunity. VCN provides no assurances that particular entrepreneurs will be introduced to any prospective investors. VCN's role terminates with the introduction of entrepreneurs and investors.

VCN is neither an investment advisor nor a broker–dealer of securities, and has received the appropriate no-action letters from the SEC. VCN provides only an information service for entrepreneurs and investors. VCN neither evaluates nor endorses the merits of investment opportunities presented through its services. VCN conducts no investigations to verify the accuracy or completeness of information provided by entrepreneurs and investors. VCN reports to entrepreneurs the reasons cited by investors for rejecting their investment proposals.

VCN Performance

From the inception of operations in July, 1984 through June, 1986, VCN arranged in excess of 1,000 introductions for over 200 entrepreneurs from 30 states and over 300 investors from 33 states. VCN maintains no systematic contact with clients once introductions have been concluded. However, at least seven entrepreneurs are known to have raised funds from VCN investors.

- Nine individual investors and a small venture capital fund provided medium six figure financing for a manufacturer of patented magnetic clutches with multiple product applications.
- A developer of composite materials technology employing fiber-reinforced resins raised a low six figure amount from a single VCN investor.
- Through VCN, a producer of interactive video-disk learning systems for health-care professionals arranged a six figure investment from a major venture capital firm.

- Several individuals and a venture capital fund provided moderate six figure financing for a company producing electronic image processing and display components with applications in real-time machine vision, automated inspection, and robotics.
- A company that has developed a new brewing process for an alcohol-free beer obtained five figure financing from one VCN investor.
- A small manufacturer of electronic components for high tech equipment was acquired by a subsidiary of a manufacturing conglomerate.
- A university spin-off venture developing new technology for application in a basic industry received funding from four VCN investors. In addition to capital, these investors provided valued management advice and were instrumental in attracting other financing.

VCN Counterparts

VCN provides assistance to not-for-profit organizations replicating VCN outside New England. Through September, 1986 working relationships had been established with the Indiana Institute for New Business Ventures, Inc., the State University of New York at Plattsburgh, St. Louis University, the Atlanta Economic Development Corp., Northern Michigan University, the Ontario, Canada, Chamber of Commerce, the Kenan Institute for Private Enterprise at the University of North Carolina, and the Technology Commercialization Center at Northwestern University.

Additional groups exploring the creation of VCN counterparts are located in Arkansas, Minnesota, Mississippi, New Jersey, Oregon, South Carolina, Texas, Washington, Wisconsin, and Wyoming. Ultimately VCN expects to establish VCN-International, a service that will link regional networks, thereby contributing to the efficiency of the international market for informal venture capital.

Lessons from VCN's First Two Years

VCN is still an experimental project. While early results are encouraging, it can scarcely be claimed that VCN has had a major impact on the flow of informal venture financing in New England. Several lessons are emerging. First, VCN's experience confirms the diverse and diffuse nature of the informal investor population. Informal venture investors are tough to reach. Second, new concepts do not sell themselves. They need to be explained, often on a face-to-face basis. Where this has occurred participation tends to follow. Third, building a track record takes time. But performance builds the credibility and awareness that in turn lead to spreading interest. VCN's second two years are expected to be significantly more productive than its first. Fourth, the intensity of an individual's interest in venture investing appears to be dependent in part upon the investor's familiarity with the techniques of successful venture investing, as well as upon the availability of opportunities. Venture investing is not a full-time occupation for informal investors. Learning the tricks of the trade takes time and time is scarce. Faced with more familiar alternatives, otherwise qualified venture investors may pass up opportunities to back entrepreneurs. This dimension of market efficiency was not anticipated when VCN was launched. During its second two years VCN will experiment with a variety of methods to overcome this perceived obstacle. Much has been learned during VCN's first two years. Overriding the lessons is the conclusion that VCN's original premises are still sound.

CONCLUSION

The informal venture capital market poses many unanswered questions. Issues of scale and market efficiency have been addressed in this article. The available data suggest that the informal venture capital market is twice the size of the professional venture capital market. The number of ventures financed by informal investors appears to be at least ten times the number of ventures financed by professional venture capital firms.

Market efficiency is a more difficult issue to address. Limited information about investors and investment opportunities appears to be a significant obstacle to the financing of particular types of entrepreneurial ventures. The flow of informal venture capital appears to be further constrained by unfamiliarity with the techniques of successful venture investing on the part of entrepreneurs and potential informal investors. If Venture Capital Network and its counterparts endure as self-sufficient enterprises it will demonstrate that market efficiency can be improved in a cost-effective manner. That face alone would confirm the inefficiency of the random process that currently brings entrepreneurs and investors together. Gaps between private and social rates of return from innovation justify public as well as private efforts to enhance capital market efficiency, especially efforts directed at entrepreneurial ventures where the gaps are greater than for large firms.

Of equal significance, the survival of VCN and its counterparts will provide an international roster of informal venture investors. With this unique data base in hand, other unanswered questions can be addressed: questions about the characteristics of business angels, the investment decision models they employ, the characteristics of the ventures they finance, the structural characteristics of their venture investments, the performance of their portfolios, and questions concerning regional differences in the informal venture capital markets.

REFERENCES

Avery, R.B., and Elliehausen, G.E. March, 1986. Financial characteristics of high-income families. *Federal Reserve Bulletin.*

Baty, G. 1964. *Initial Financing of the New Research-Based Enterprise in New England.* Boston, Mass.: Federal Reserve Bank of Boston.

Bean, A.S., Schiffel, D., and Mogee, M. E. 1975. The venture capital market and technological innovation. *Research Policy.*

Boylan, M.G. December 28, 1981. What we know and don't know about venture capital. *Proceedings of the American Economic Association Annual Meeting.*

Brophy, D.T. 1982. Venture capital research. In *Encyclopedia of Entrepreneurship,* Calvin A. Kent, Donald L. Sexton and Karl L. Vesper, eds. Englewood Cliffs, N.J.: Prentice Hall.

Charles River Associates, Inc. 1976. *An Analysis of Capital Market Imperfections.* Prepared for the Experimental Technology Incentives Program, National Bureau of Standards, Washington, D.C.

Forbes, October 27, 1986.

Gaston, R.J., and Bell, S. January, 1986. *Informal Risk Capital in the Sunbelt.* Applied Economics Group, Inc., Knoxville, Tenn.

Hoffman, C.A. 1972. *The Venture Capital Investment Process: A Particular Aspect of Regional Economic Development.* Unpublished Ph. D. dissertation. Austin, Texas: The University of Texas.

Inc. December, 1985.

Krasner, O.J., and Tymes, E.R. 1983. Informal risk capital in California. In *Frontiers of Entrepreneurship Research,* Wellesley, Mass.: Babson College.

Mansfield, E. 1983. Entrepreneurship and the management of innovation. In *Entrepreneurship and the Outlook for America,* Jules Bachman ed. New York, N.Y.: The Free Press.

Robert R. Nathan Associates, Inc. 1978. *Net Rates of Return on Innovation*. Prepared for the National Science Foundation. Washington, D.C.

Obermayer, J.H. 1983. *The Capital Crunch: Small High-Technology Companies and National Objectives During a Period of Severe Debt and Equity Shortages*. Research & Planning, Inc. Cambridge, Mass.

Romeo, A.A. and Rapaport, J. 1984. *Social versus Private Returns to the Innovations by Small Firms Compared to Large Firms*. Prepared for the Office of Advocacy. U. S. Small Business Administration. Washington, D.C.

Rubenstein, A.H. 1958. *Problems of Financing and Managing New Research-Based Enterprises in New England*. Boston, Mass.: Federal Reserve Bank of Boston.

Seymour, C.R., and Wetzel, W.E. Jr. 1981. *Informal Risk Capital in New England*. Prepared for the Office of Advocacy U.S. Small Business Administration. Durham, N.H.: University of New Hampshire.

Shapero, A. 1983. *The role of the Financial Institutions of a Community in the Formation, Effectiveness and Expansion of Innovating Companies*. Columbus, Ohio: Shapero-Huffman Associates.

The State of Small Business: A Report of the President. 1982, 1983, 1984, 1985, 1986. Washington, D.C.: U.S. Government Printing Office.

Tewksbury, J.G., Crandall, M.S., and Crane, W.E. August, 1980. Measuring the societal benefits of innovation. *Science* 209:658–662.

U.S. Department of Commerce. 1970. *Financing New Technological Enterprise*. Report of the panel on Venture Capital, Commerce Technical Advisory Board. Washington, D.C.

U.S. Securities and Exchange Commission. 1983. *Report of the Rule 146 Exemption in Capital Formation*. Directorate of Economic and Policy Analysis. Washington, D.C.

U.S. Securities and Exchange Commission. 1984. *An Analysis of Regulation D*. Directorate of Economic and Policy Analysis. Washington, D.C.

U.S. News & World Report. January 13, 1986.

Venture Capital Journal. February, 1986.

Venture, November, 1986.

Weston, J.F., and Copeland, T.E. 1986. *Managerial Finance*, 8th ed. Dryden Press.

Wetzel, W.E., Jr., Summer, 1983. Angels and informal risk capital. *Sloan Management Review*.

Wetzel, W.E., Jr. The Taplin and Montle Development Fund: a case study in finance. In *Frontiers of Entrepreneurship Research*, Wellesley, Mass.: Babson College.

Wetzel, W.E., Jr. 1986. Informal risk capital: knowns and unknowns. In *The Art and Science of Entrepreneurship*, Donald L. Sexton and Raymond W. Smilor, eds. Cambridge, Mass.: Ballinger Publishing Co.

Wilson, I.G. 1984. *Financing High Growth Companies in New Hampshire*. Department of Resources and Economic Development, State of New Hampshire. Concord, N.H.