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An Economic Geography Of Venture Capital Investment In Canada

Rod B. McNaughton

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An Economic Geography of
**VENTURE CAPITAL INVESTMENT
IN CANADA**

By

Rod B. McNaughton

Department of Geography

Submitted in partial fulfilment
of the requirements for the degree of
Doctor of Philosophy

Faculty of Graduate Studies
The University of Western Ontario
London, Ontario N6A 5C2
April 1989

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ISBN 0-315-49308-9

ABSTRACT

This dissertation investigates the supply and demand components of Canadian venture capital investment. Four areas are addressed: (1) where venture capital firms and their investments are located, (2) investment specialization of firms in different urban markets, (3) the spatial pattern of portfolio firm industrial sector and funding stage characteristics and (4) the economic impact of portfolio firms. These investigations are based on data gathered from industrial directories, surveys of both venture capitalists and their investments, and an online database of export oriented firms.

Venture capital investors are highly concentrated and regionally biased in their portfolio selections. Further, investors located in particular urban markets specialize in certain geographic regions, funding stages and industrial sectors. The resulting spatial patterns are the aggregate result of efforts to minimize uncertainty and reduce the inherent risk of ventures. Investigation of the performance and economic impacts of venture backed firms showed that venture capitalists usually invest in the elite of small and medium sized companies. These firms typically have above average rates of growth, and strong financial positions. They commit relatively large amounts of capital to research and development activity, and are highly export oriented. As a result of their rapid growth, they generate many new employment opportunities.

ACKNOWLEDGEMENTS

The author would like to thank the research director and membership of the Association of Canadian Venture Capital Companies (ACVCC), and Venture Economics Canada for their help in conducting the surveys of investors and portfolio firms. My advisor, Dr. Milford Green was very helpful in obtaining funding and preparing this dissertation. Our association over the past three years might best be described as an apprenticeship: one that I am happy to have served. Dr.s W. Code, and D. Janelle provided comments on an earlier version of the manuscript. The support of my parents and of Landon Spruce was essential to the completion of this work. The financial support of the ACVCC, the Social Sciences and Humanities Research Council, and The University of Western Ontario is gratefully acknowledged. Any errors or omissions are the responsibility of the author.

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Chapter One

INTRODUCTION

I. Venture Capital in Canada

A significant amount of Canadian investment capital is available from institutional venture capital firms. These firms are sophisticated investors, combining equity participation and managerial skills in an organizational setting that lends a formal structure to the process of commercializing new products and processes. Venture capital firms draw on the financial and human resources of various institutions, including other venture capital firms, commercial banks, large corporations and universities to help with the formation and expansion of small firms.

By evaluating proposals for additions to their investment portfolios, venture capitalists act as filters in the new firm formation and expansion process. The thesis of this dissertation is that the investment procedures of institutional venture capitalists provide a selection of firms with higher than average rates of growth. This translates into high levels of employment creation, exports, and research and development activity. The potential economic impact of these firms is an important reason for the investigation of their locational and structural (funding stage and industrial sector) characteristics.

This dissertation investigates both the supply (venture capital firms) and demand (portfolio firms) components of venture capital investment activity in Canada. The following questions are addressed:

- (1) Where are venture capital firms and their investments located?
- (2) To what degree does location influence the types of investments that venture capitalists consider?
- (3) What is the spatial pattern of portfolio firm industrial sector and funding stage characteristics?
- (4) What is the economic impact of portfolio investments, and are there significant differences in that impact by location, industrial sector or funding stage?

Data to support these investigations are provided by industrial directories, surveys of both venture capitalists and their investments, and an online database of export oriented firms.

This research is significant for two areas of established geographic enquiry. First, it complements the literature on aggregate patterns of new firm formation and growth by examining the locational, structural and performance characteristics of venture backed firms. Second, it contributes to research on regional capital flows which is hampered by the paucity of spatially disaggregate data about the investment of risk capital.

II. What is Venture Capital?

Venture capital is distinguished from traditional investment forms by the following characteristics:

- (1) Investment in high risk financial ventures.
- (2) Investment in unproven ideas, products or start-up situations.
- (3) Investment in going concerns that are unable to raise funds from conventional public or commercial sources.

(4) Investment in large publicly traded companies, and possibly obtaining a controlling interest when levels of uncertainty are high (Liles, 1974).

Venture capital is associated with equity financing. "It is thought of as a type of direct investment in the securities of new speculative firms or technologically oriented enterprises undergoing internal expansion (Dominguez, 1974, 1)." Venture capital is further distinguished from traditional investment forms by its concurrent provision of marketing, production and financial advice to the borrower. This is usually accomplished through a seat on the investee's board of directors, though sometimes an additional fee is levied for management consulting.

The institutional venture capital industry in Canada is relatively small. The capital commitment in Canada is \$2.3 billion, roughly 7 percent of the commitment made by investors in the United States (Gittins, 1988). This volume of investment is small when compared with the mature equity market, representing only one week's worth of trading on the Toronto Stock Exchange. The venture capital market consists of three major components: (1) independent private firms, (2) subsidiaries of major financial and industrial corporations, and (3) crown corporations and related government venture capital programs. The core actors in the market are represented by The Association of Canadian Venture Capital Companies (ACVCC). There are 66 firms that have met the criteria for full membership in the ACVCC. These criteria are:

- (1) at least \$1 million invested or available for investment on an equity basis,
- (2) have a full-time professional commitment to venture investment,

(3) have not more than 20 percent of their funds invested in any one enterprise,

(4) are willing to reduce their equity participation as their investees mature and grow (Ernst, Whinney and Venture Economics Canada, 1986).

III. The Investment Process

Institutional venture capitalists take on a variety of roles over the course of their portfolio investments. These include an organizational function, an assistance function and an exit-liquidation function (Florida and Kenney, 1988d). These correspond to a firm's funding requirements for start-up, expansion and restructuring. All three of these roles have both financial and non-financial (managerial) components (Figure 1.1).

For technology intensive firms, venture capital is most important during the start-up stage. At this stage, most new firms have limited capital requirements and rely heavily on personal savings, family and friends, second mortgages and personal loans (Vaughan, 1977; Oakey, 1984). However, technologically oriented firms require capitalization in excess of what can be provided from these sources. Further, they present marketing problems that are not easily evaluated by traditional lenders (Kline and Rosenberg, 1985). Venture capitalists become adept at evaluating the technological potential, financial requirement and organizational capacity of these new high technology firms. They act as lenders of last resort for firms that require more capital than is available from informal sources, and have levels of risk that are too high for traditional commercial sources.

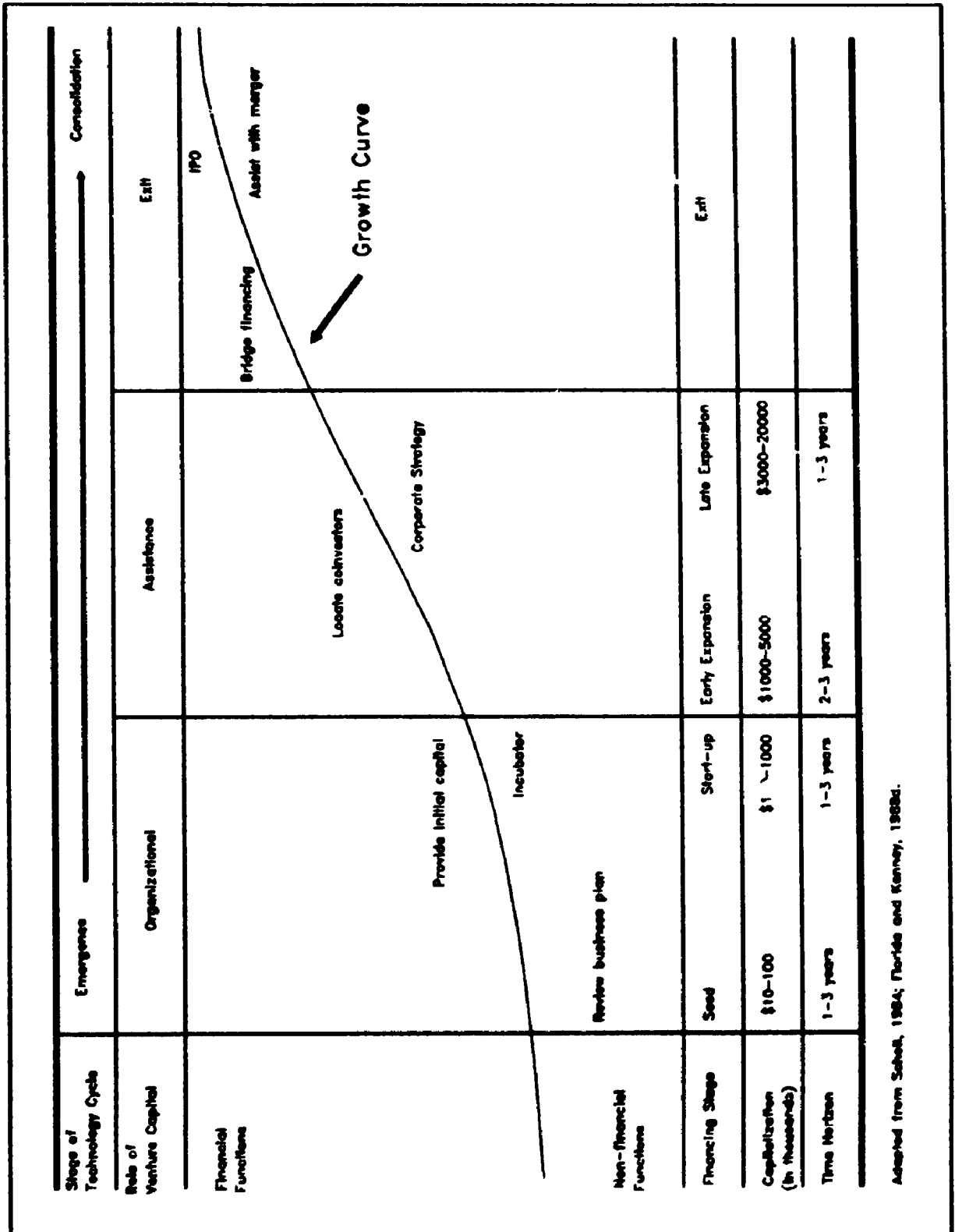


Figure 1.1 Stages in the Venture Capital Investment Process

Venture capitalists evaluate investment proposals based on carefully prepared business plans that outline the nature of the product, process or service, market potential, capital requirements and the experience of the existing management. The references that accompany these proposals are very important; nearly two-thirds are referred from other venture capitalists, personal acquaintances, banks, accountants or investment brokers (Tyebjee and Bruno, 1984). A large reputable venture capitalist may receive 300 to 500 proposals annually, of which 25 to 30 are selected for careful screening, and one to five actually receive funding (Florida and Kenney, 1988d).

When evaluating business plans, venture capitalists are concerned not only with technological feasibility, but with the ease of commercialization and marketability. Other important considerations are: potential competitors, business strategy and projected sales, availability of patent or other proprietary protections, exit opportunities and the experience of the management team (Florida and Kenney, 1988d). Venture capitalists place particular emphasis on the management of a potential investment, conducting extensive interviews and seeking outside information from references, potential customers and suppliers (MacMillan, Siegel and Narashima, 1985). This process of evaluating a business plan can be complex. Sandberg, Schweiger and Hofer (1987) used verbal protocol analysis to show that the initial screening of a proposal may constitute as many as 44 distinct tests (or thought units) of which the majority are related to either business strategy or use of funds.

The acceptance of a business plan is coupled with the provision of equity capital, subordinate debt, or a mix of the two in exchange for ownership shares or part of the operating revenue. This financial assistance is accompanied by the experience and contacts of the venture capitalist. Access to the information networks of the investor is important in obtaining specialized business services (legal counsel, accountants, advertising agents), in recruiting additional management personnel and in obtaining outside technical expertise. Affiliation with a reputable venture capitalist is also an asset in approaching commercial banks for additional operating debt. Further, venture capitalists can often arrange strategic partnerships between their various portfolio companies, or between a portfolio firm and a large corporation with which they are affiliated. This facilitates demand and supply relationships, and technology transfers. They may take on an incubator role and help new companies by providing office or production space at below market rates.

Once a business is organized and launched, the venture capitalist is less paternalistic. Rather than taking an active role, venture capitalists act as an independent source of expertise to help with difficult problems associated with rapid growth. As firms grow, production and marketing become more important than technological innovation and the organizational structure begins to change. At this stage the need for entrepreneurial risk-taking is superseded by the need for competent management. Venture capitalists help with the upscaling of

production, increasing marketing capabilities, management restructuring and more extensive distribution strategies (Kozmetsky *et al.*, 1985).

During later stages of expansion, venture capital firms help in securing additional rounds of financing for their portfolio firms. The funds required will often exceed the capacity of one investor and a syndicate of coinvestors is formed. Syndications serve four functions: (1) they are a means by which large sums of capital can be raised, (2) they provide access to additional complementary skills, (3) they link a larger number of portfolio firms in terms of the potential for strategic partnerships and (4) they spread financial risk over more investors. Investment syndications create larger information networks, and often involve investors that have expertise that is not available from the lead investor.

Finally, venture capitalists must liquidate their investments. Several exit vehicles are possible: repurchase by the entrepreneur, merger, initial public offering (IPO) or writeoff. IPOs are preferable because they provide the largest capital gains to the investor, and because they provide the quickest exit opportunity. The more quickly investment portfolios are liquidated, and the higher multiples of the original investments that are achieved, the faster capital can be recycled through the market.

IV. Venture Capital Versus Traditional Markets

The venture capital investment process is unlike that of traditional markets for corporate finance because of: (1) a high degree of

information asymmetry, (2) their long time-horizon, (3) investment in stages and (4) the interdependence of investor and investee (Carleton, 1986). The first of these characteristics, information asymmetry, refers to the discrepancy between the ability of the entrepreneur and an external investor to assess the potential performance of a new small firm. As small firms cannot disseminate information through the public market, their securities are difficult to value and to sell. Thus, in the short-run, investors must rely on the cash flows of their investments to realize a return. In the long-run, it is hoped that portfolio firms will grow sufficiently to enter the public market and reduce information asymmetry.

Information asymmetry is particularly high in new high technology firms because it is difficult to separate the worth of the technology from that of the entrepreneur. The venture capitalist works to reduce information asymmetry by building a strong management team that will ensure the growth prospects of the firm are independent of the entrepreneur. In so doing, the venture capitalist creates an institutional corporate setting that helps to speed the commercialization of new technology.

The second unique feature of venture capital investment is the long time-horizon before liquidation is possible. This time period typically ranges from three to seven years, but may be as long as ten years. Further, almost one third of all investments end as writeoffs, while another twenty to thirty percent fail to grow, but continue to require infusions of capital. Few firms achieve rapid sustained growth, but these

investments provide substantial returns to venture capitalists and contribute to adequate average returns on the portfolio as a whole.

The third characteristic is largely a function of this long time-horizon. Venture investments are made in several stages or financing rounds. The venture capitalist makes an initial investment in order to lessen information asymmetry about ultimate payoffs. Given this additional information, the venture capitalist decides whether to continue with the investment through successive rounds, or abandon the investment.

The final characteristic is the degree of interdependence between the entrepreneur and the venture capital investor. Traditional investment situations involving secured debt are contractually simple, and the investor's return is assured regardless of the entrepreneur's level of motivation to continue the project. With venture capital investments, however, the return to the investor is dependent upon the entrepreneur's ability to bring about profits. Considerable effort is expended in the design of complex contracts that both motivate the entrepreneur and reward the investor.

V. Research Questions

The success of venture capitalists in identifying and supporting firms that have the potential for rapid growth suggests that the spatial pattern of venture capital investment is likely to have a significant impact on regional economies (Nelson and Winter, 1982). Thus, the first area of investigation is the location of venture capital firms, the location of their portfolio investments and the flow of funds between the

two. The patterns of venture capital firm location and portfolio investment location are similar; both are concentrated in the largest cities in the national hierarchy. These cities provide the widest array of technically skilled labour, business services, and basic research institutions, thereby acting as incubators of new products, processes and firms (Leone and Struyk, 1976). For the venture capital firm, they also prove to be the most intensive source of information about investment opportunities.

The flow of funds is largely intraregional because of the need for frequent face-to-face contact in effective monitoring. Interurban investment shows a marked distance decay effect that correlates well with a decline in the frequency of monitoring interaction. Anomalies are accounted for by branch office location and deal syndication. Thus, the regional impact of venture capital investment is the reinforcement of existing patterns of dominance within the Canadian urban system.

A second area of investigation concerns the specialization of venture capital firms in particular locations. As the result of the information intensive nature of the market, investors find that they must specialize in the investments they make in order to develop the expertise needed to build profitable portfolios. Venture capitalists specialize in certain geographic regions, funding stages, industrial sectors, or a combination of the three. Firms within a particular urban market develop similar interests, creating an aggregate pattern of specialization. This pattern emerges because firms in the same urban market have access to

similar levels of information, and a similar range of prospective projects.

A third area of investigation is the structural (industrial sector and funding stage) characteristics of portfolio firms. While aggregate characteristics are widely known, this section shows that there are significant differences in the focus of investments by region. These variations arise for two reasons (Gertler, 1984). First, regions are characterized by different technical relationships between the factors of production; they are not simply operating at different points along the same production function (Lande, 1978). This causes differences between regions in what is seen to be innovative, and results in a bias toward those sectors where there is a competitive advantage. The second cause of these variations arises because the optimum environment for production is likely to change as a product passes through its technology cycle (Rees, 1979; Malecki, 1981). The demands of early stage development and growth, for example, may best be supported in innovative core regions. Later stage investments that support imitative mass production or management restructuring may be in older or more peripheral economic regions.

A final area of investigation is the economic impact of venture capital investment. Economic impact can only be easily estimated in terms of the absolute contribution to the first round of the economic multiplier: exports generated, taxes paid, expenditures on research and development and jobs created.

VI. Importance of Venture Capital Research

The results of these investigations are significant for two areas of established geographic inquiry. First, they complement the growing literature on spatial variations in new firm formation and expansion. This literature is reviewed by Mason and Harrison (1985), and includes the aggregate analysis of spatial variations in new firm formation and growth, the performance of new firms in specific regional environments, and interindustry differences in rates of new firm formation. There is considerable evidence in this literature that a small proportion of new firms achieve rapid growth, and that these make the significant contributions to job generation and economic growth often attributed to the small business sector as a whole (Storey, 1981). One method of identifying these successful firms is through the portfolio selections of venture capitalists (Brinkley and Nicholson, 1979).

Second, the results of this research contribute to the development of current thought on regional capital flows recently reviewed by Gertler (1984) and Clark, Gertler and Whiteman (1986). Classical and neo-classical theories of both firm location and capital allocation implicitly assume that investment capital is both perfectly mobile and equally available everywhere within a developed country. Regional capital investment is thought to be determined through perfectly competitive supply, demand and market clearing functions. As Airov (1963), Gertler (1984), and others have noted, these assumptions preclude the consideration of models that are uniquely geographic. The availability of investment capital from various sources is relegated to a minor role

in theoretical considerations of both the location decision of the firm and the aggregate impact of new firm formation and expansion on regional development.

A barrier to the consideration of these issues is the paucity of pertinent data. Kieschnick (1979) pointed out that the lack of evidence on how capital market characteristics vary geographically can be traced to the lack of investment data collected on a regional basis. Without a reliable database upon which to base rigorous description, the differential availability of investment capital has become a neglected aspect of regional theory and modelling (Bolton, 1980).

Finally, this research yields insight into the venture capital investment process that may be of use in the practical development of economic policies. There is a resurgence of interest in the role of the entrepreneur and of small business in the economy. At all levels of government there is substantial interest in the purported contribution of small business to innovation, job generation and economic development. Policies have been proposed to provide small firms with tax breaks, increase the availability of debt and equity, reduce the constraints of regulation and increase market shares. Much of this effort is directed toward enlarging the venture capital community through matching funds schemes and government sponsored venture capital firms. A spatially disaggregate description of current investment patterns and characteristics, and a better understanding of how these characteristics are related to economic development will be of use in improving the design of these programs.

VII. Outline

The remainder of this dissertation is arranged into eight chapters. Chapter Two provides a theoretical context for the four primary areas that are addressed: location, specialization, investment characteristics and economic impact. The location of venture capital firms and their investments is explained in terms of recent developments in our understanding of high technology agglomerations. Market specialization is explained as a learning process whereby sufficient expertise is gained to build profitable portfolios in the face of high levels of uncertainty. The functioning of individual urban markets is explained using the concepts of information asymmetry and idiosyncratic capital. Finally, the economic impact of venture capital investment is couched within the framework of entrepreneurial economics, which emphasizes the roles of innovation and imitation in uneven economic development.

Chapter Three reviews previous studies of both the Canadian and American venture capital industries. Venture capital is a topic of recent interest to economic geographers, marked by numerous research publications over the past two years. A broad context for this research is set by reviewing the venture related research streams pursued by business researchers and economists. The following chapter explains in detail the nature of the four data sets used in later chapters: industry directories, surveys of both venture investors and portfolio firms and an online database of export oriented firms. The survey instruments used are included as Appendices I and II.

The body of this dissertation is Chapters Five through Eight. Chapter Five provides an historical background for the development of sources of institutional venture capital, and traces the location of venture capital office locations over time. Chapter Six presents an empirical investigation of investment specialization in Canadian urban markets in comparison with American urban markets. Spatial and aspatial patterns of the funding stage and industrial sector characteristics of venture investments are explored in Chapter Seven. This chapter traces the path of portfolio investments from selection, through monitoring, valuation and finally exit. The financial characteristics, rates of

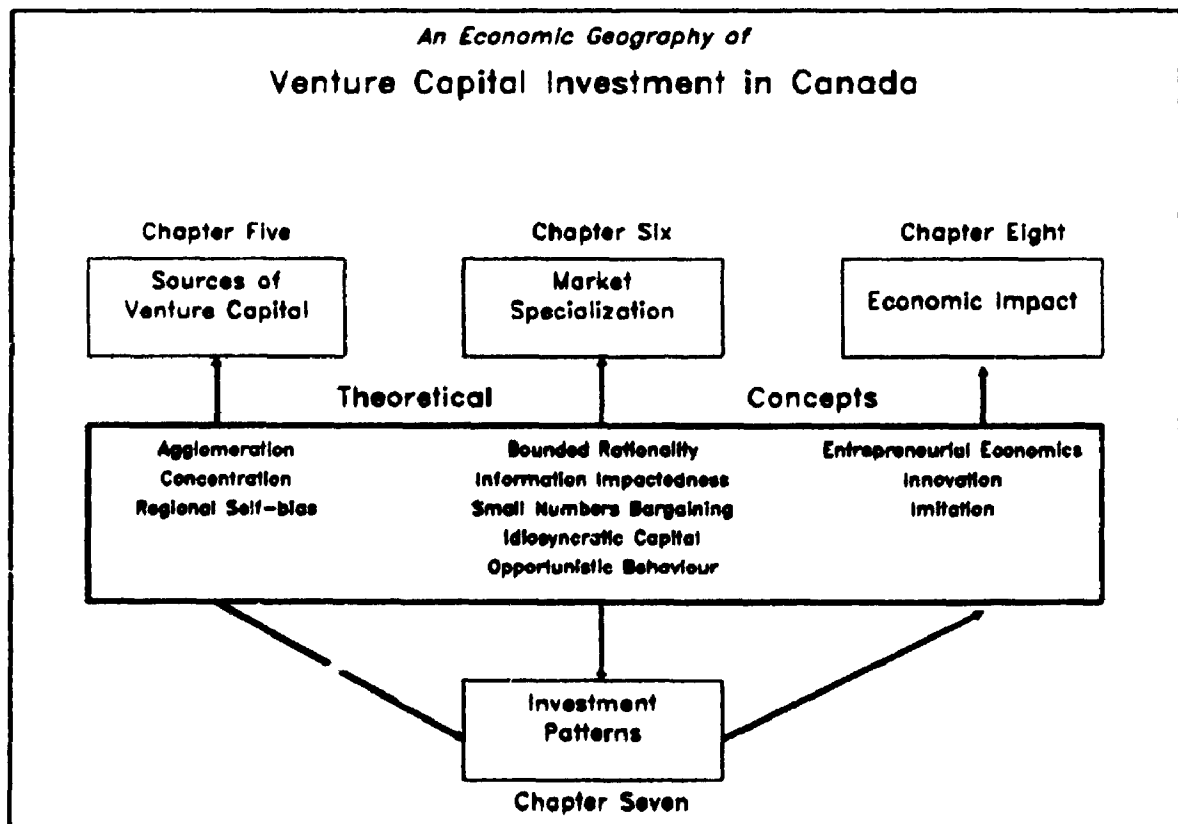


Figure 1.2 Body of Dissertation

growth and economic impacts of portfolio firms are described in Chapter Eight. Figure 1.2 describes the relationships between these four chapters and the theoretical concepts discussed in Chapter Two. The final chapter suggests directions for future research.

Chapter Two

THE ECONOMIC GEOGRAPHY OF VENTURE CAPITAL

I. The Neoclassical Approach

Economic geographers have traditionally ignored the potential role of capital availability in determining regional rates of firm formation and growth. Neoclassical approaches to industrial location, for example, assume that capital has little influence on locational choice. Gertler (1984) identified five canonical assertions about the spatial distribution of capital that are perpetuated in geography by major texts including O'Sullivan (1981), Heilbrun (1981) and Smith (1971):

- (1) Investment capital is perfectly mobile in space, hence, equally available anywhere within a given developed country.
- (2) Geographic differentials in the costs of capital are non-existent or insignificant.
- (3) Regional rates of investment bear little relationship to regional rates of saving.
- (4) Capital is allocated by its price (interest rate) and flows to the highest available return.
- (5) Physical capital is virtually immobile in space, once installed, and exerts a positive inertial force on subsequent capital flows.

The first four of these canons preclude capital accumulation models that include determinants that are uniquely regional, geographic or spatial (Airov, 1963; Bolton, 1980). Researchers who moved beyond the neoclassical framework found that the multiregional market for investment capital is far from perfect (Carr, 1960; Meyer, 1967). This is

particularly true of highly specialized investment capital markets oriented toward the early development financing of new products and processes (Obermeyer, 1983; Pryde, 1984).

The venture capital market is poorly described by the neoclassical notion of a perfectly functioning capital market. It is concentrated both spatially and sectorally. Further, investors exhibit extreme regional-self bias in their investment selections, suggesting limited capital mobility. Gertler (1984) provides three explanations for the externalities that cause these investment patterns. First, the institutionalization of money supplies resulted in more concentrated control of all capital markets (Scott, 1979; Francis, 1980). This caused the redirection of investment funds away from small ventures that are unable to meet the criteria of institutional investors seeking lower risk opportunities for their funds. The spatial consequence of this process is a concentration of capital availability in those regions containing significant numbers of large corporate headquarters (Taylor and Thrift, 1983). Similar arguments are presented by Hayes (1979), Osborne (1980) and Hayes et al (1983).

Second, the ability of an investor to participate in a nationally integrated market is a function of access to information and other resources. The small capital base of many venture investors, risk aversion on the part of larger investors and the prohibitively high transaction costs associated with entering the public market prevent many small firms from accessing nationally oriented investment markets. This theme is reiterated by Gertler (1984), Estall (1972), Sullivan (1978),

Light and White (1979), Litvak and Daniels (1979), Meyer et al (1980) and Vaughan (1980).

Finally, concentration of investment activity may occur because investors consistently overestimate the external economies that accrue from reinvestment in proven regions (Hirschman, 1958). There is a belief that performance can be increased by investing and reinvesting in proven areas - anything worth doing is worth copying (Silver, 1985). This results, at the extreme, in a total disregard for the potential profit that may be gained by investing in more peripheral regions. Elements of this argument are expressed in Hirschman (1958), Friedmann (1966), Alonso (1968), Richardson (1973) and L'Esperance (1979).

These externalities are considered within the broader context of models of uneven economic development. In particular, they play roles of varying importance in core-periphery models (Friedmann and Alonso, 1964), dependency theory (Galtung, 1971; Goulet, 1973; Sunkel, 1973), and cumulative causation models (Nurkse, 1953; Hirschman, 1958; Myrdal, 1965) to name a few prominent examples. The study of the venture capital market is particularly difficult to place within one of these perspectives, however, because the actions of venture capitalists blur the common distinction made between the capitalist and the entrepreneur (Florida and Kenney, 1988d).

Venture capitalists fulfil many of the accepted characteristics of entrepreneurs: (1) their primary motive is individualistic rather than social, (2) they exercise discretion in the face of uncertainty, (3) they help to induce changes in the technology for the production of goods and

services and (4) they create and manage business enterprises (Harbison, 1956; Hebert and Link, 1982). This is particularly true of the growing number of investment opportunities that are created by venture capitalists themselves. Most theories of economic development ignore the role of the entrepreneur, treat it as a dependent variable (Wilken, 1979), or deny that a lack of entrepreneurship is an obstacle to economic growth at all (Hirschman, 1958).

Florida and Kenney (1988d) argue that the study of the venture capital market and its relationship to economic development is properly couched in terms of theories of entrepreneurial economics reviewed by Casson (1982), Storey (1982) and O'Farrell (1986). Much of this literature emphasizes the role of information in the economic decision-making of the firm and thus on the aggregate functioning of markets. In this sense, it shares a common link with such information-theoretic works in economic geography as Thorngren (1970), Pred (1977) and Tornqvist (1979).

While the theories of entrepreneurial economics provide a ready conceptualization of the economic impact of venture capitalists' behaviour, they provide little insight into the locational tendencies of venture capital firms or the composition of aggregate portfolios in different locations. Thus, the agglomeration model provides a theoretical framework for understanding the locational choices of venture capital firms. The concepts of information impactedness (or asymmetry), and idiosyncratic capital (as defined by Phillips, 1986 after Williamson, 1975) are discussed as they contribute to an understanding of the

characteristics of aggregate portfolios. The final sections of this chapter provide a fuller discussion of entrepreneurial economics, and review the available empirical evidence on the economic impact of venture capital portfolio investments.

II. Location and Agglomeration

The agglomeration model provides an elegant conceptualization of the locational tendencies of the venture capital industry (Florida and Kenney, 1988b). Recent developments in the understanding of high-technology agglomeration economies (in particular Oakey 1984, 1985; Walker, 1985 and Scott 1985) set a broad context that includes the roles played by information linkages, personal contacts, specialized labour supplies, material linkages and transportation costs in the creation of technology based agglomerations. These factors are important in determining the spatial concentration of venture capital sources. Venture capitalists and the networks they create are the conduits for the distribution of both capital and information. Investors rely heavily on personal contacts to locate potential investments, assess market potential, recruit management personnel and create exit opportunities. Further, regional biases in the market are the result of the physical and opportunity costs of travel to portfolio investments. The participatory nature of venture capital makes location near established technology centres imperative.

Technology intensive locations are usually the largest centres in the urban system where access to specialized labour markets and business services is maximized. Another important consideration is the presence

of large research universities (Hambrecht, 1984). These universities provide the labour pool and technical infrastructure necessary for an active research and development (R&D) program. A synergistic relationship between sources of capital and innovators at these research institutions is hypothesized (Malecki, 1985; Bullock, 1983; Dorfman, 1983; Zegveld and Prakke, 1978). Venture capitalists are supplied with promising investment opportunities, while entrepreneurs receive the capital and managerial skills needed to produce and market their innovations. A natural agglomeration is thought to form between research universities, spin-off firms and venture capitalists.

Glasmeier, Hall and Markusen (1983), Buswell, Easterbrook and Morphet (1985), Oakey (1984), Cooper (1970), Gibson (1970) and Deutermann (1966) all documented such agglomerations. However, the existence of a large research centre does not automatically ensure that agglomerations of spin-off companies and venture capitalists will occur. Silver (1985), noted that the much publicized Research Triangle near Raleigh, North Carolina was not able to attract a venture capital fund. In Canada, the hopes of a Northern Silicon Valley in the Ottawa Valley were never realized for the same reason. Nor are large research centres directly responsible for spawning either venture capital or entrepreneurial activity. Dominguez (1974) found no relationship between patterns of degree conferment and venture capital activity. In 1970, for example, 47,000 degrees were conferred in Massachusetts, which compares with 47,000 in Illinois, 49,000 in Texas, 51,000 in Ohio, and 49,000 in Michigan; all of which had far fewer venture capital firms than did Massachusetts.

Oakey (1979) found that contacts between high-technology firms and universities in Britain were infrequent and of a low technology, supportive nature when they occurred. In a survey of San Francisco Bay Area firms, Oakey (1984) found that only 23 percent maintained any external research contacts that were important in developing products or processes. The impression created by earlier literature (Deutermann, 1966; Cooper, 1970) that high-technology firms maintain abundant and important interactive links to research universities is in doubt.

There is some evidence to suggest that agglomeration effects do not exist at all in the formation of high-technology firms. In a study of technology development across 35 SMSAs, Armington, Harris and Edle (1983) found no measurable association between high-technology firm formations and the local employment share in high-technology industries. Indeed, negative relationships were found between growth rates and some sector shares. Glasmeier, Hall and Markusen (1983) used an entropy index to measure the spatial dispersion of high-technology industries for 100 four digit SIC sectors across all counties in the U.S. between 1972 and 1977. Individual high-technology industries were shown to be highly dispersed across the country. A regression analysis yielded only two variables that were significantly related to measures of high-technology location patterns: per capita defense spending and percent black population. The study concluded that "individual high-technology industries are highly heterogeneous and display quite disparate spatial tendencies that can only be understood by analyzing disaggregated sectors (1983, 46)."

In contrast, Weinstein, Gross and Rees, (1985, 77-80) concluded (from Malecki, 1980, 1981) that the concentration of federal R&D funding (similar to that of venture capital activity) may be attributed to the agglomeration of R&D personnel which fosters local spin-offs of innovative activity, and attracts additional companies and funding to an area. Examples of major agglomerations are: New York-Newark-Jersey City, Los Angeles-Long Beach-Anaheim, Chicago-Gary, Philadelphia-Wilmington-Trenton, Boston-Lawrence-Lowell, and San Francisco-Oakland-San Jose. In a series of regression analyses, Malecki found that the number of R&D labs per capita and the number of R&D employees are significantly associated with the proportion of the work force employed in manufacturing, the number of research universities in various SMSAs, and the dollar amounts of R&D spent at those universities. Proximity of R&D labs to corporate headquarters helped to explain the continued predominance of the Northeastern states as the area of greatest R&D concentration.

The agglomeration hypothesis characterizes the aggregate pattern of venture capital firms reasonably well, especially the intense concentration of firms in the largest centres: Toronto in Canada, New York, Boston and San Francisco in the United States. However, a more exacting explanation of venture capital firm location has to consider local variations in the orientation of venture capital activities. The high-technology firm location literature suggests that each agglomeration has its own cause. They are not supported by a supply of innovation and entrepreneurial talent from major research centres, but by the maintenance of personal contact networks and specialized physical linkages. The

implication for venture capital firms is that they locate near the type of investment opportunities they specialize in, or come to specialize in those opportunities that are available in the immediate vicinity. Agglomeration is an attempt to increase access to information, reduce uncertainty and limit the inherent risk of investment decision-making.

III. Investment Specialization

Venture capital investors operate under conditions of uncertainty where accurate information is expensive or impossible to obtain. In this situation, optimal investment strategies are difficult to define and to achieve. Thus, portfolios are based on a series of satisficing rather than optimal decisions. Under these circumstances, repeated transactions can build an information base that will improve the quality of subsequent decisions. This is particularly true if the amount of information that is unique to each investment can be limited so that increasing expertise reduces the learning costs for subsequent transactions.

One method of reducing these learning costs is through specialization. The specialization of investment, particularly in terms of technology or industrial sector, results in transactions that are characterized by learning curves of increasing slope and greater overall information gain (Figure 2.1). In practice, specialization emerges within the staff of venture capital firms because information asymmetries are not easily corrected through purchasing, and because there is the possibility that proprietary information will be lost through the opportunistic behaviour of experts external to the investment firm.

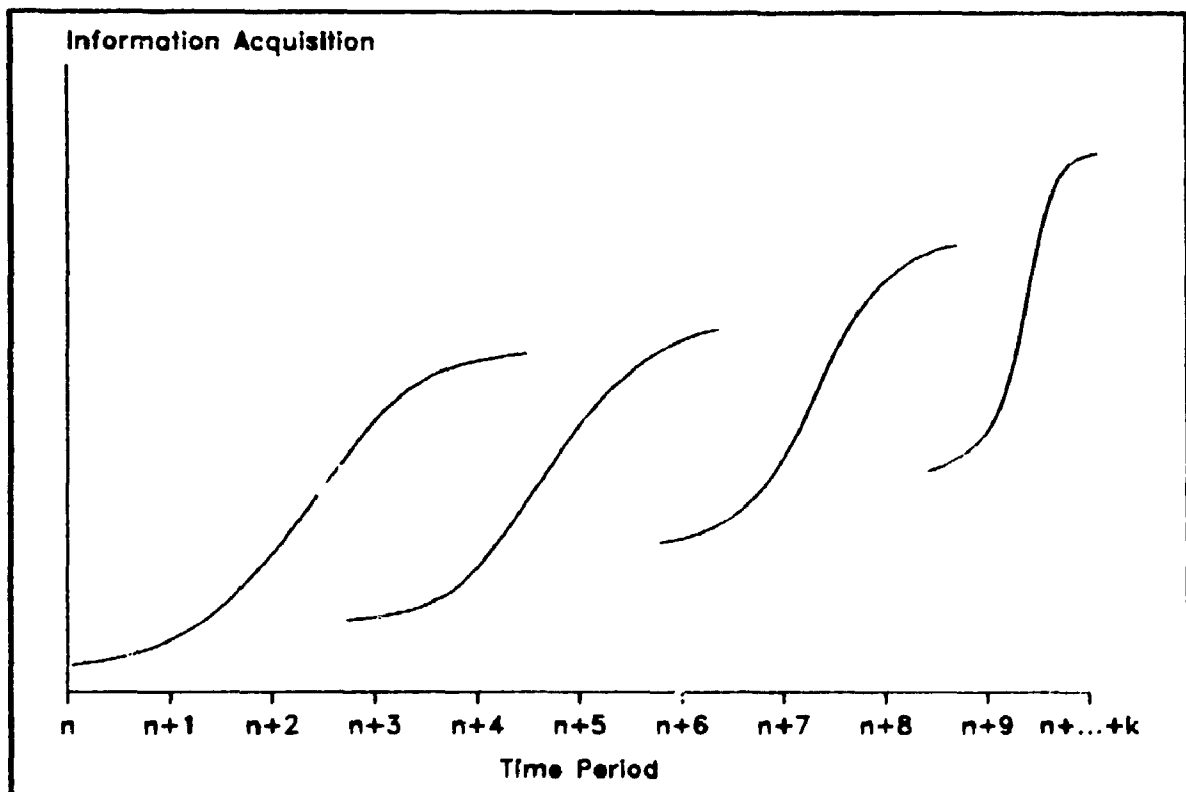


Figure 2.1 Hypothetical Learning Curves with Investment Specialization

The fact that the entrepreneur seeking financing and potential investors have differing amounts of information available with regard to risk/reward payoffs is referred to as information impactedness or information asymmetry. In perfectly functioning markets where there are many investors and investees, price conveys complete information and transaction costs are low. In the venture capital market, there are few investors and sometimes even fewer entrepreneurs offering projects with acceptable risk/reward payoffs. In this case, information asymmetry is high as no market price is established. If a transaction fails to be satisfactory for either party, there are limited alternatives for subsequent transactions. Both parties have invested human and financial capital that is fully useful in only one transaction. Venture capital is

thus idiosyncratic because it is difficult to shift transactions among parties in the marketplace.

In an idiosyncratic market, the role of market mediation is often replaced by managerial control. Phillips (1986) suggests that this occurs for two reasons: (1) market based contingent claims contracts are incomplete and difficult to enforce, and (2) opportunistic behaviour may arise among either party even though success is only assured through mutual cooperation. Managerial control is established by the venture capitalist through active management of the enterprise or through options to replace existing management. In addition, the ownership interest that accompanies most venture capital investments amounts to a vertical integration of production with financial capital further isolating both parties from the open market.

The idiosyncratic nature of the venture capital market leads investors to specialize in those stages of the funding cycle where the opportunities for managerial control are the greatest. Silver (1985) defines five risks inherent in the funding cycle of firms: (1) development risk, (2) manufacturing risk, (3) marketing risk, (4) management risk, and (5) growth risk (Figure 2.2). Typically, venture investors accept no more than two of these risks. Development risks are usually borne by the entrepreneur, and manufacturing risks are shunned because it may turn out that the product cannot be produced at a price low enough to make it attractive or competitive. The venture capitalist cannot exert managerial control over either development or manufacturing risks. The risks resulting from marketing and management are the best

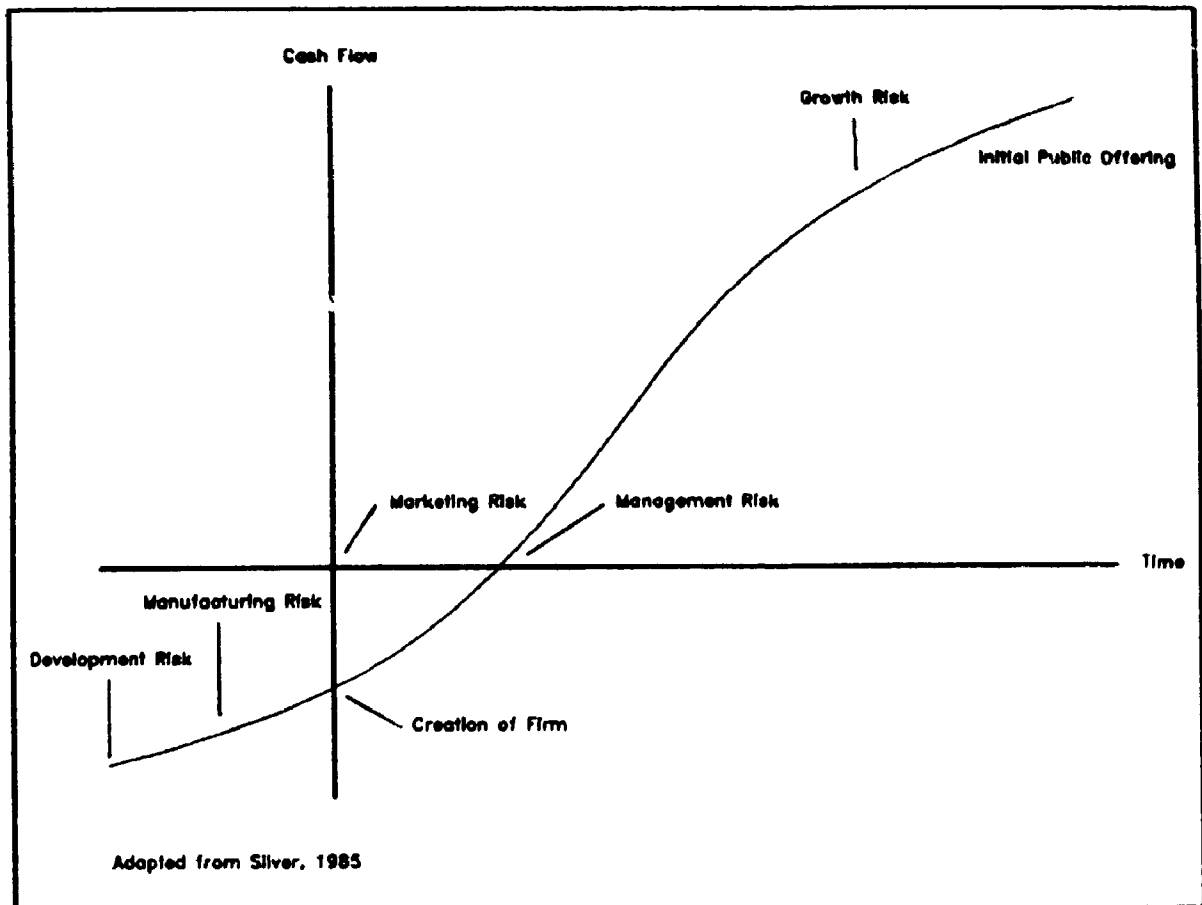


Figure 2.2 Five Risks of a Startup Company

understood and the most easily controlled by the venture capitalist. The final risk, that due to growth, ... typically borne by public investors on the open market after the venture capitalist has exited the investment.

Individual venture capital firms become specialized because of information impactedness and the idiosyncratic nature of the market. However, firms within particular urban markets often invest in similar projects, creating an aggregate pattern of specialization. This pattern emerges because firms in an urban market have access to similar levels of information, and a similar range of prospective projects. The amount of information available in a market is largely dependent on the size of the

market (Pred, 1977). The number of investment opportunities available is partly a function of market size, but it is also dependent on the ability of venture capitalists to act as catalysts in spawning additional spin-off opportunities. Thus, large markets do not necessarily offer proportionally greater numbers of investment projects with acceptable risk/reward payoffs. The industrial sector and funding stage characteristics of investment opportunities are in large part dependent on the economic base of the urban market. Thus, the choice of market in which to operate restricts the range of projects that are likely to be undertaken. Information on a broader range of projects available in other markets can be gained through the establishment of branch offices and through coinvestment.

The degree of specialization evident in a market is, in part, determined by the competition between firms for projects and information. In large markets there is greater information about projects; there is also greater competition for projects. Large markets are less idiosyncratic, and venture capitalists must specialize in order to organize, interpret and use available information. Specialization results in the creation of a distinct market niche. In small markets there is less information and fewer projects to choose from. Small markets are highly idiosyncratic, and venture capitalists must specialize in order to generate enough expertise to make satisficing decisions. There is little competition in these markets and firms have a partial spatial monopoly.

Bygrave (1987, 1988) tested Pfeffer and Salancik's (1978) resource exchange model in the context of the American venture capital market.

According to the resource exchange model, the interconnectedness of a firm is a function of uncertainty, munificence and the degree of concentration of its industry. That is:

$$\text{Interconnectedness} = f(\text{uncertainty, munificence, concentration})$$

Where,

(1) Interconnectedness is the degree to which firms within an industry link together and cooperate. Common mechanisms include joint ventures and interlocking directorates. In this case interconnectedness refers to the number of coinvestments made by venture capitalists.

(2) Uncertainty is the degree to which the outcome of an event cannot be predicted. Uncertainty arises in the venture capital market because risk/reward ratios are especially difficult to evaluate for new small and high technology firms.

(3) Munificence is the degree to which the resources that a firm needs are abundant or scarce. In the venture capital market information and managerial skill are usually scarce resources.

(4) Concentration is the number of competing firms in a market.

Bygrave found that the relationship between interconnectedness (coinvestment) and concentration follows an inverted U. When there are few firms in a market there is little need for links to improve coordination, and when there are many firms it is impossible to have enough links to improve market coordination noticeably. The number of coinvestments is an inverse measure of the level of uncertainty in a market, as Bygrave found that venture capitalists syndicate deals not to spread financial risk but to share information. He also found that specialization increases with uncertainty about innovations, technology and people in specific industry segments. Thus, if specialization instead

of coinvestment is used to measure uncertainty, the relationship between market size, concentration and uncertainty can be described by a U-shaped function. Specialization is high when market concentration is low, reaches a minimum at intermediate levels of concentration and is again high when concentration is high.

IV. Economic Impact

The activities of venture capital investors, from portfolio selection to exit, impose an organizational structure on the process of funding new firm formation and expansion. Venture capitalists act as financial intermediaries, supplanting the informal role often played by lawyers, accountants and bank managers. They are important agents in the new firm formation and expansion process, using their extensive contact networks to moderate and direct the flow of both capital and information. Venture capitalists act to: (1) identify critical barriers and discontinuities in the market, (2) reduce uncertainties over the adoption of new technologies and (3) fashion the requisite set of organizational adaptations necessary to push major innovations through the technology cycle (Florida and Kenney, 1988d).

Venture capitalists affect changes to existing economic structures by impacting the rate of innovation and the length of technology cycles. The relationship between innovation and economic development is the primary focus of entrepreneurial economics. The modern view of entrepreneurship in economic theory can be traced to two sources: (1) the work of those economists who have been influenced by the writings of

Joseph Schumpeter and (2) the so-called Austrian School of Economics. Early developments in entrepreneurial theory, including the work of Schumpeter, are reviewed in Marshall (1961), Baumol (1968) and Kilby (1971). Recent contributions include Swales (1979), Calvo and Wellisz (1980), Kanbar (1980), Hebert and Link (1982) and Ronen (1983).

The seminal works of Schumpeter (1934, 1939, 1950) are frequently credited with ascribing the role of innovator to the entrepreneur. His analysis begins with a general equilibrium, in which all markets are perfectly competitive and consumer tastes and production technologies are given. The entrepreneur upsets the equilibrium by carrying out new combinations of the means of production and credit. For a time this act brings proprietary or monopoly profits, but imitators eventually erase these profits and drive the economy back to equilibrium.

The effect of the entrepreneur on the economy is phrased in terms of the creation and destruction of markets: "It is not price competition which counts but the competition from the new commodity, the new technology, or the new type of organization... competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives (1950, 84)." In the Schumpeterian view, the venture capitalist-entrepreneur contributes to economic development by fostering the introduction of new goods, services, processes, markets, or industrial organizations, thus shifting existing socio-technical trajectories onto new accelerated development paths. This technological

gatekeeping function helps to cause temporary disturbances in the economic cycle, establishing the context for economic restructuring and renewal.

In comparison, the Austrian School of Economics emphasizes the role of information in the entrepreneurial decision-making process, leading to a parallel emphasis on the effects of ignorance and error. In the absence of perfect information, buyers and sellers agree on rational but uneconomic prices in the sense that they differ from those that would occur under conditions of perfect knowledge (Menger, 1981). The combination of knowledge, ignorance and error leads to entrepreneurial action. The entrepreneur acts, not on the basis of past and present conditions, but on a vision of the future. The successful entrepreneur sees the past and the present as other people do; but he judges the future in a different way (Mises, 1966). Because market participants have differing information and perceptions, uneconomic prices prevail; the difference between the successful and the unsuccessful entrepreneur is in the ultimate accuracy of their market expectations.

This perspective leads to the conclusion that the entrepreneur does not upset the equilibrium state, instead his actions move the economy toward equilibrium to the extent that he correctly anticipates future conditions. In this view, disequilibrium is a necessary condition for entrepreneurial success, not a consequence of it. These two views are not as diametrically opposed as it would first seem. In fact, each addresses an important component of technological change. Schumpeter's entrepreneur causes disequilibrium in the market by introducing a new innovation. The Austrian's entrepreneur takes advantage of the uneconomic prices that

result from this initial monopoly through imitation. The anticipation of future market demand drives prices down, reduces the monopoly of the innovator and moves the economy toward equilibrium. The key to this process is the identification of those innovations that have the potential for rapid market growth.

The role of innovation and imitation in technological innovation is often discussed within the context of small versus large firms. Large firms and basic research institutions establish the scientific base and technological context necessary for major innovations and act as incubators of technological change (Cooper, 1985). These technological opportunities are then exploited and commercialized by small entrepreneurial firms. This interrelationship is facilitated by the movements of top-level employees and the attendant transfers of technology and managerial capabilities (Roberts and Hauptman, 1985), as well as through the informal exchange of information, research and professional associations, suppliers and vendors (Allen, Hyman and Pinckney, 1983). Large firms may eventually recoup their losses by imitating the developments in small firms, applying their economies of scale to production, or by internalizing growth through acquisition.

Pence (1979) and Florida and Kenney (1988d) both provide models of the sequence that relates entrepreneurial activity to new firm formation and growth. Pence's model is the simpler of the two, beginning with two general sources of entrepreneurs: (1) existing corporations or (2) the academic and research communities (Figure 2.3). Entrepreneurs who come from small established companies bring with them experience operating new

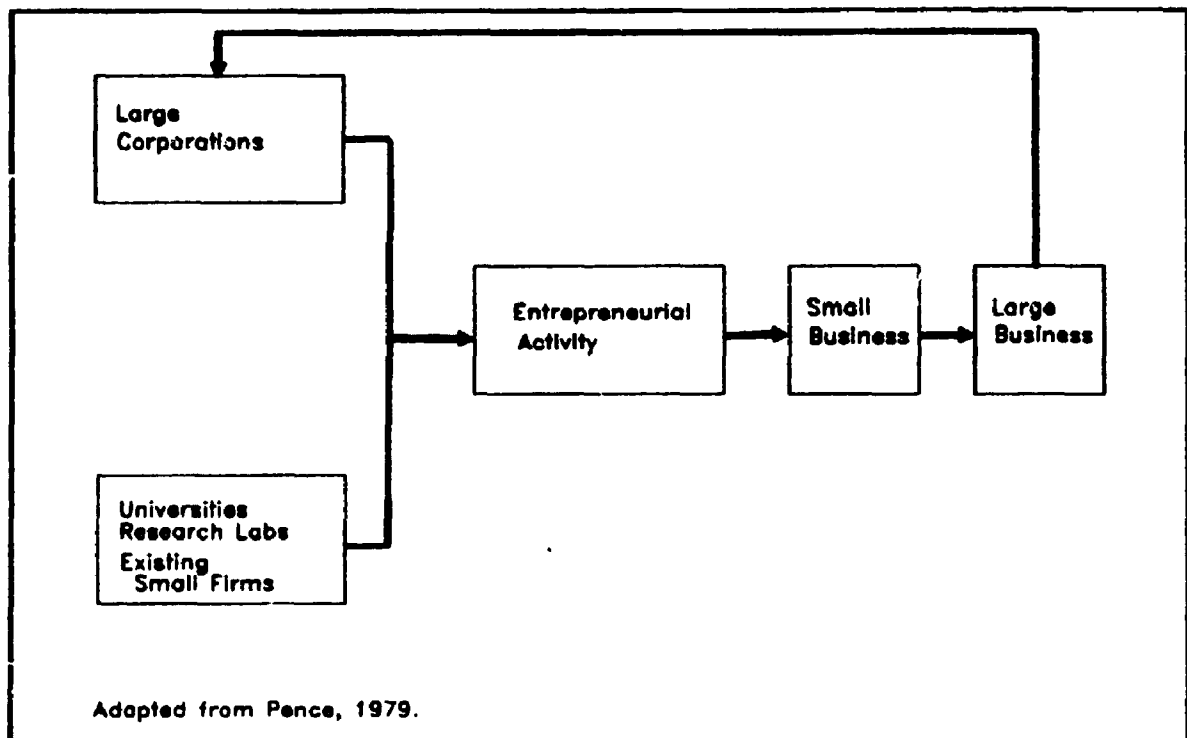


Figure 2.3 Typical Sequence of Firm Formation and Growth

small firms and keeping them moving toward larger market shares. Those from large established firms have proven management ability and a desire to try it on their own. They may bring with them important product information. Those from academic and research environments have technological abilities, but often need to seek help with managerial aspects of the business. In any case, a prototype is developed, and a new business is formed. Subsequent high growth should change the size of the firm from small to large and the entrepreneurial process can again recycle.

The Florida and Kenney model considers the role of additional actors in this system, situating venture capitalists as the central actors (Figure 2.4). Investors take on a role that exceeds the mere provision

of funds; they command elaborate networks that reach into large corporations, universities and financial markets. Venture capitalists combine and organize personnel from a variety of these institutions in order to form new firms. They review and screen business proposals, assess market potentials, evaluate technological possibilities and then mobilize the requisite resources to launch new firms. These new firms affect existing production patterns and market structures and thus have an economic impact determined by the degree of their profits or losses. As the central actors in this system, venture capitalists lend structure and coherence to the dynamic process posited by entrepreneurial economic theory.

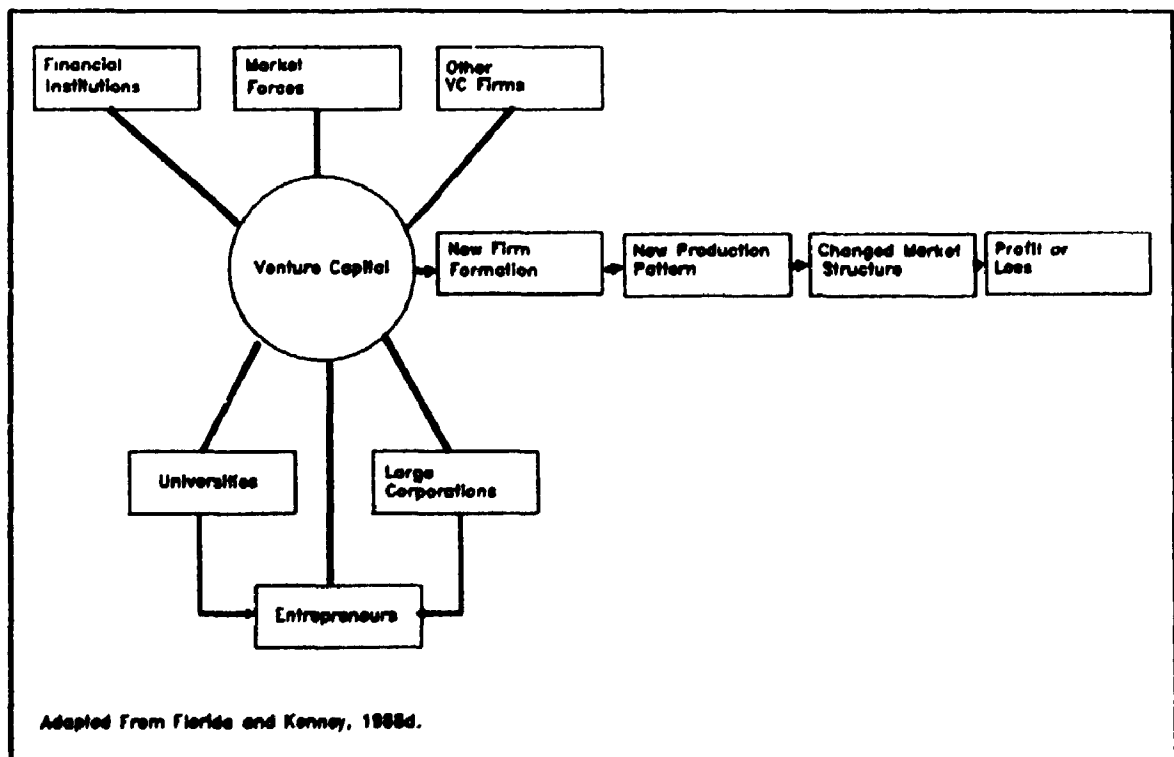


Figure 2.4 Venture Capital in the Institutional Framework for Innovation

The activities of venture capitalists do not always have positive economic effects; sometimes they result in misallocations of resources (Florida and Kenney, 1988d). A short-term focus on rapid growth and capital gains may move some firms into the IPO market before they have developed a mature organizational structure. In addition, the success of one firm can lead to the support of numerous similar companies, decreasing the market potential. Sahlman and Stevenson (1985) call this effect venture capital myopia. This myopia appeared in the United States when venture capitalists supported many hard disk drive manufacturers, but failed to assist in the development of competitive technologies, such as CD ROMs.

The competitive entrepreneurial environment created by venture capitalists increases the likelihood of job-hopping, erodes employee commitment and disrupts ongoing research projects. While movement of talented managers and researchers from large corporations and universities to small entrepreneurial firms can aid technology transfer and speed the commercialization of innovations, at the extreme it is self-defeating and disruptive. Venture capitalists that specialize in raiding the talent of large corporations are known as vulture capitalists (Wilson, 1984). Finally, in providing equity capital, venture capitalists dilute the ownership share of the entrepreneur. This is of concern to entrepreneurs as (1) returns are diminished and (2) managerial autonomy may be threatened. From the venture capitalist's point of view, some measure of control is necessary to ensure continued managerial competency as the firm

makes the transition from a small entrepreneurial enterprise to a large production oriented company.

V. Empirical Studies

There are few examples of attempts to quantify the economic impacts of venture-backed firms. A study by Ernst and Whinney (1981) commissioned by the Association of Canadian Venture Capital Companies (ACVCC) is the primary exception in the Canadian context. There is, however, a growing literature on the performance and impacts of small and high-technology firms, much of which is reviewed by Bollinger, Hope and Utterback (1983). It is clear from this literature that the economic value of these firms is multi-faceted and must be measured by several variables. Bollinger *et al* isolated the following key variables: revenues, expenditures on taxes, research and development, exports and employment generation.

The results of several surveys of high technology firms show extraordinary growth in terms of revenues and tax expenditures. Morse (1976) in comparing sales data for the period 1969 to 1974, found that young technology based businesses had a mean annualized growth rate of 42.5 percent, compared to 11.4 percent for the mature firms in his sample. Similarly Zschau (1978) reported on a survey of the members of the American Electronics Association. The youngest firms (those founded between 1971 and 1975) generated a mean of \$70,000 in export sales, \$15,000 in federal corporate income taxes, \$5,000 in state and local taxes, and \$33,000 in R&D expenditures for every \$100,000 of equity investment. In the Canadian context, Ernst and Whinney (1981) found that,

for every \$100,000 in equity invested by venture capitalists, portfolio firms generated \$348,000 in export sales, \$48,000 in corporate and personal taxes, and \$8,000 in R&D expenditures. One of the problems with these studies is that the authors infer that equity investment by venture capitalists is the cause of these large economic multipliers. In fact, the influence of the venture investment is impossible to separate from the other sources of equity accessed by these firms. It is clear, however, that venture capitalists are generally involved in firms that have rapid rates of growth, thus maximizing the economic benefits of their investments.

Considerably more evidence exists for the purported job generating capabilities of small businesses. Birch (1979) in examining job generation by establishments of different ages, found that in all regions, young establishments less than four years of age created at least two-thirds of the new gross employment between 1974 and 1976. He also found that between 1969 and 1976, independent firms with fewer than twenty employees created over half of all net new jobs. These findings led to the conclusion that young small firms are, on balance, the major generators of new jobs in the economy.

The research conducted by Birch has been called into question because it failed to distinguish between an establishment (any place of business) and a firm (the business organization made up of one or more establishments). Armington and Odle (1982), in attempting to replicate Birch's results using firms rather than establishments as the unit of observation, found that small firms create only a slightly

disproportionate share of jobs. The results of their research indicated that firms with fewer than twenty employees accounted for 20.5 percent of total employment in 1976 but 38.5 percent of the net new employment between 1976 and 1982. This represents a significant deflation of the figures originally presented by Birch.

Despite the controversy surrounding the exact employment contribution of firms of varying size, available evidence continues to point to the importance of smaller firms. Kieschnick (1979), for example, demonstrated that the relative importance of small business in the job generation process increased between 1958 and 1977. From 1958 to 1963 the number of firms employing fewer than 100 persons grew by 3.9 percent, while those employing over 1000 persons grew by 13.7 percent. Between 1967 and 1972, however, small business employment increased 13.2 percent, while employment in large firms increased only 8.9 percent. This trend continued; from 1970 to 1977 Fortune 1000 companies contributed only 3.9 percent of the new jobs in the economy, while all other private sector employment grew by 65 percent.

Similar patterns of employment growth have been found in Canadian firms. Ernst and Whinney (1981) found that venture backed firms founded between 1976 and 1979 created a mean of 109 new jobs per firm during that same period. Firms founded in the previous three five year periods created means of 98, 53 and 24 new jobs, respectively. The Canadian Federation of Independent Business (1987), using data obtained from Statistics Canada, estimated that 814,000 new private sector jobs were created in Canada between 1978 and 1984. Of these, 69 percent were in

firms having fewer than five employees, and 23 percent were in firms having between 5 and 20 employees. Firms having less than 20 employees were thus responsible for 92 percent of net employment creation during the period. The distribution of new employment varied significantly by province, with almost half of all net new jobs located in Ontario. The creation of new jobs in small firms was particularly important for Quebec, in order to offset a sharp decline in employment by larger firms.

VI. Summary

The venture capital industry finds its success in organizing the process of finding, evaluating and funding promising ideas. It capitalizes on the opportunities offered by accelerating changes in technology, and conspicuously supports the development of new high-technology products and processes at a time when many mature economies are suffering the dual effects of declining productivity and increasing external competition (Wilson, 1985; Bowen, 1979). Venture capitalists provide financial and managerial assistance to small firms during the difficult early stages of growth and expansion. By helping to ensure the survival of these firms, venture capitalists increase the overall rate of innovation, and have an economic impact through tax and R&D expenditures, export activity and employment creation.

The activities of venture capitalists are spatially biased toward the largest centres in the urban system, and investment flows are similarly biased. This is the result of the information intensive nature of the market; venture capitalists must gather information about potential

investments and have access to specialized business services. The resulting concentration of venture capital sources can be explained as an agglomerative process. Each agglomeration is supported by specialized contact networks that provide information about the types of technological opportunities that are available locally. Thus, depending on the range of these opportunities and the level of information in the market about alternative investments in other locations, investment patterns are also sectorally biased within each agglomeration. The likely result is that the economic impact of venture capital investment and portfolio firms is both spatially and sectorally uneven.

PREVIOUS STUDIES

I. Venture Capital Research

Venture capital is unique in the business community as it plays an interstitial role between many actors that are individually of interest to researchers in several disciplines. Venture capital is related to such diverse topics as pension fund investment, corporate finance, leveraged buyouts, small business management, entrepreneurship, business incubators, technology transfer and regional development. The study of the venture capital market itself is largely the domain of business and economic researchers who have shown concern for (1) the investment decision-making behaviour of venture capitalists, (2) the performance of venture capital portfolios and (3) the availability and cost of venture capital.

The interest of researchers has followed that of the business community as a whole; when levels of investment are high, so is interest in venture capital research. This is evidenced by many publications in the late 1960s and early 1970s, a paucity throughout the late 1970s and early 1980s, and a recent increase in the number of such publications. In part, this is the result of the introspective nature of the industry which sponsors a significant amount of research in its efforts to lobby governments for legislative changes. The funding of this research is coordinated through national venture capital organizations, such as the Association of Canadian Venture Capital Companies, the National Venture

Capital Association and the National Association of Small Business Investment Companies. A second impetus for venture capital research comes from various government programs concerned with the adequate funding of small business. For example, the Technological Innovation Studies Program (TISP) in Canada, the Experimental Technology Incentive Program (ETIP) in the United States, and several U.S. Senate Select Committees and Congressional Hearings on small business. The Canadian Technological Innovation Studies Program, for example, has sponsored more than eighty research projects on entrepreneurship, technology and small firms.

The latest round of venture capital research is distinct from earlier work in two respects: (1) the topics addressed are more specific and (2) a wider range of perspectives are employed. Of primary relevance here is the adoption of a spatial component into this research. The distinct regional biases in the venture capital market have not gone unnoticed. Tribus (1970, 52) was one of the first to recognize regional variations in venture capital availability:

...supplies of venture capital are adequate, but the total supply is not distributed very evenly geographically. And we find that new entrepreneurs do not have access to all of the sources of capital.

However, the literature throughout the 1970s considered the geographic pattern of investment in the grossest of terms. Anecdotal descriptions (for example, Dominguez, 1974) merely suggested the possibility of economic impacts arising from the concentration and regional parochialism evident in the market. It is only within the last two years that economic geographers have shown interest in the market, though a history of interest in capital flows extends back several decades.

This chapter provides a brief overview of the more important empirical studies of the venture capital market. Particular attention is paid to recent contributions by geographers, though a wider context for the current study is set by a discussion of research conducted by business researchers. This review of previous studies is by no means exhaustive; an attempt is made to highlight the findings that are most relevant. The reader will find references to additional literature throughout this dissertation, especially in Chapters Two and Five.

II. Geographic Perspectives

Venture capital is a topic of recent interest to economic geographers, marked by several research publications over the past two years. These publications explicitly address spatial aspects of venture capital investment behaviour, including: the regional distribution of venture capital firms and their investments, typologies of regional market structures, market specialization and economic impact (Table 3.1). Most of this research concerns the large and highly developed American venture capital market, but one paper addresses the Canadian market, and two others explore regional differences in the availability of venture capital in the United Kingdom and New Zealand. The literature has progressed rather quickly from simple empirical description to a more sophisticated consideration of the relationship between location, decision-making and economic impact.

Availability. Leinbach and Amrhein (1987) can be attributed with the first attempt to examine the regional availability of venture capital

Table 3.1 Geographic Research on Venture Capital Markets

Author(s)	Year	Data Source	Method of Analysis	Major Finding(s)
<u>Regional Distribution of Firms and Investments</u>				
Leinbach and Aarhein	1987	Pratt, 1982, 1983 Timmons <u>et al</u> , 1983	- concentration index	- regional concentration
Florida and Kenney	1988a			- criticism of Leinbach and Aarhein, 1987
Leinbach and Aarhein	1988			- response to Florida and Kenney 1988a
Florida and Kenney	1988b	<u>Ven. Cap. Yearbook</u> OTA, 1984 Venture Economics	- tables	- VC clusters near established financial and high-tech centres
<u>Typologies of Venture Capital Markets</u>				
McNaughton and Green	1987	SBA	- WBLOC	- flows can be grouped into three market types
Florida and Kenney	1988c	Venture Economics OTA, 1984	- tables	- three types of VC agglomerations: high-tech, financial and mixed
<u>Specialization</u>				
Green	1988	Venture Capital Directories	- median polish - coded tables	- diffusion of firms - market specialization
Green and McNaughton	1988	Venture Capital Directories	- median polish - coded tables - gravity model	- market niches - strong distance-decay for investment
<u>Economic Impact</u>				
Florida and Kenney	1988d	<u>Ven. Cap. Yearbook</u>	- tables	- VC provides an institutional setting for innovation
<u>Canada</u>				
McNaughton and Green	1988	Survey of Investors	- graphs - tables	- concentration of firms - investment is regionally biased
<u>United Kingdom and New Zealand</u>				
Mason	1987	Venture Economics Survey of BVCA	- tables - maps	- investment concentrated in South East
Perry	1988	Survey of NZVCA	- tables	- investment concentrated in Auckland

and its implication for small high-technology firms. They made two significant contributions: (1) a time series of the location of venture capital sources and (2) regional flow of funds data. Leinbach and Amrhein noted a pronounced concentration of sources, with California, New York, Massachusetts and Illinois accounting for over 75 percent of the national total. The destination of funds showed an even more concentrated pattern, with the California/Southwest region receiving 45.7 percent of the nation's total, followed by New England with 15.3 percent.

Leinbach and Amrhein also attempted to establish a theoretical justification for the geographic analysis of venture capital, suggesting that it contributes to the growing literature on behavioural approaches to industrial location. In addition, they predicted a role for venture capital research in the development of structural theories of external business environments.

Florida and Kenney (1988a) criticized Leinbach and Amrhein for their lack of attention to the structure of the venture capital industry, and for the use of highly aggregate data that obscured important characteristics of the market. In particular, they felt Leinbach and Amrhein had overestimated the importance of government licensed Small Business Investment Corporations (SBICs), and had mistakenly portrayed informal investors (angels) as part of the institutional industry. Further, they pointed out that the geographic concentration observed in the market is in part a function of the concentration of potential investments and their technological environment. The aggregate nature of the data used by Leinbach and Amrhein hid the extreme concentration of

sources in a few cities, and even in a few zip codes (Florida and Kenney, 1988b, 1988c, 1988d). Florida and Kenney also felt that Leinbach and Amrhein left the impression that considerable long distance investment takes place, when much of this can be accounted for by deal syndication and branch office locations. Leinbach and Amrhein (1988) replied to these criticisms by agreeing that the use of more disaggregate data would have been desirable if it had been available, and reiterating the introductory and exploratory nature of the work.

Typologies. In an attempt to present a spatially disaggregate evaluation of the organization and functioning of the venture capital market, McNaughton and Green (1987) and Florida and Kenney (1988c) both presented market typologies. McNaughton and Green used a weighted blocking algorithm (WBLOC) to partition inter-state venture capital flows according to their degree of interconnectivity and strength of linkages. Three groupings of states were identified: (1) those with nationally oriented investment patterns (California, New York, and Massachusetts), (2) those with investment patterns that are dominated by their linkages with nationally oriented states (Connecticut, New Jersey, and Texas) and (3) those states that invest only in themselves. This research provided clear evidence that the venture capital market is not integrated into a unified national system with equal availability at a spatially invariant price.

Florida and Kenney (1988c) presented their typology based on the reasons for the concentration of venture capital investors. Venture capital complexes were found to exist in three distinct types of areas:

(1) those with high concentrations of financial resources, (2) those with high concentrations of technology intensive small businesses and (3) those with both. New York and Chicago are examples of the first type, San Francisco is an example of the second and Boston is an example of the third. This research showed that the relationship between technology-oriented and financial-oriented venture capital complexes is symbiotic. While a local venture capital industry is not necessary to facilitate high-technology business formation, the existence of well-developed venture capital networks provide incentives for entrepreneurial startups. Venture capitalists were shown to act as both catalyst and capitalist, providing the networks, contacts, linkages and resources necessary to launch new enterprises.

Specialization. Green (1987) and Green and McNaughton (1988) both investigated interurban differences in the specialization of venture capital investment preferences. Green developed a market specialization model that helped to explain the development and diffusion of the venture capital industry. This model postulated that the industry began with a few firms located in the largest urban centres that acted as training grounds for future venture capitalists. These initial firms had a spatial monopoly, which in turn implied constraints on the firms' operational areas. As associates left and formed their own firms, the erosion of the monopoly market led to a search for distinct market niches. Niches were created by manipulating three major components: (1) firm location, (2) industrial sector specialization and (3) funding stage specialization.

New venture capital firms found that they could, at least temporarily, gain a spatial monopoly by establishing themselves in second and third order urban centres. Within these centres, specialization became the norm in order to reduce information gathering requirements and because of limited capital pools. Linkages to larger investment pools were maintained through personal contact networks that include the more established firms in first order centres. These established firms were able to expand by either indicating with the new firms in lower order centres, or by opening their own branch offices.

The results of an empirical analysis of interurban variations in venture capital investment characteristics found that most centres display a high degree of regional bias in their investment preferences. New York is an exception in that its investment patterns are nationally oriented. Los Angeles and, to a lesser degree, San Francisco and Boston specialize in seed capital. Most centres specialize in startup, early growth and leveraged buyout financing. San Francisco specializes in the computer sector, and Minneapolis in medical related ventures. Houston and Dallas specialize in resources related ventures.

Regional Development. The most theoretically advanced consideration of the relationship between venture capital investment and economic development to date is provided by Florida and Kenney (1988d). Florida and Kenney presented a model that situates the venture capital industry at the centre of an institutional framework for innovation. As the central actors in the innovation process, venture capital firms add an organizational structure to the process of innovation originally outlined

by Schumpeter (1934, 1939, 1950). By commanding elaborate information networks that reach into large corporations, universities and financial markets, venture capital firms become uniquely equipped to help with the formation or expansion of new firms. Florida and Kenney's model is discussed in greater detail in Chapter Two.

Canada. McNaughton and Green (1987) provided an exploratory examination of the geography of Canadian venture capital investment. This study was based on the survey of investors used in this dissertation, and provides an empirical description of both firm and investment location. A more sophisticated analysis of the full survey can be found in parts of Chapters Five and Seven.

United Kingdom. A study by Mason (1987) found that the availability of venture capital is highly concentrated within the United Kingdom. The primary investment target is the South East, already the most prosperous region of the U.K.. Little investment flows into peripheral regions, especially Northern England, which lacks its own development agency (like those of Scotland and Wales) to help fill its equity gap. Mason provides two explanations for this concentration that can be generalized to the venture capital markets in other countries as well: (1) the problem is the lack of entrepreneurial prospects with good growth potential in peripheral regions, or (2) the problem is the result of historical legacy, perpetuated by regional prejudice, lack of awareness of local investment opportunities, or the logistical difficulties of adequately monitoring investments in more distant locations.

Perry (1988) investigated the spatial and sectoral distribution of venture capital in New Zealand using a survey of New Zealand Venture Capital Association (NZVCA) members. He found that the traditional role of venture capital in supporting high-technology firms is not met in New Zealand; rather theatrical promotions and primary sector activities are the principal beneficiaries. Further, more than one quarter of New Zealand venture capital funds are invested outside of the country and do not contribute to the support of indigenous enterprise. As in other national settings, the spatial distribution of venture capital investment within New Zealand is highly concentrated; 32.4 percent is invested in the Auckland economic heartland. Perry noted that the necessity of spatial proximity requires that the office locations of venture capitalists, not simply investment flows, will have to diffuse in order to serve more peripheral locations. He also recognized that improving the quantity of new ventures in these locations requires more than greater availability of capital. The necessary conditions for entrepreneurial take-off also include fundamental shifts in the socio-economic composition of these regions.

III. Business and Economic Perspectives

While geographers have yet to explore in depth the Canadian venture capital market, the distinctive regional biases in the market have long drawn comment from business researchers. In particular, the concentration of firms and their investments is noted in surveys of Canadian investment activity (for example: Crane, 1972; Knight, 1973; Mao, 1974), and in

industry sponsored reviews of the industry (for example: Ernst and Whinney, 1979-1986). Much of the existing literature arises from business concerns for the general availability of venture capital funds (Grieve, 1972; Butler, 1973; Fells, 1974, 1975). Knight is particularly prolific in the field, having investigated the criteria used by venture capitalists in selecting their portfolio firms (Knight, 1986), the performance of firms rejected by venture capitalists (Knight, 1985) and the success of government sponsored programs (Knight and Ker Ferguson, 1984).

Sahu (1988) provides an up-to-date general survey of trends in the Canadian venture capital market from a business perspective, using data gathered by Venture Economics Canada and the Small Business Census. Sahu characterizes the industry as one that is still developing and encountering numerous problems. He sees the two most important of these being a shift away from innovative production oriented high-technology firms toward consumer services, and the trend away from beginning stage equity investments toward later stage expansion and acquisition activity. Despite these problems, he notes that venture capitalists have played a significant role over the past decade in supporting the growth of successful job creating small businesses.

The business literature about the American venture capital market is considerably more substantial. Libecap (1986), for example, provides a bibliography of 140 references about the economics of technical change, 45 about finance and venture capital, 327 about entrepreneurship and intrapreneurship and 64 about small business. Three salient research streams have developed (Timmons and Bygrave, 1986). The first approach

addresses concerns for the investment decision-making behaviour of venture capitalists, the second focuses on the evaluation of the performance of venture capital portfolios and the third on the availability and cost of venture capital. In addition, researchers have studied such diverse topics as the strategic role of the venture capital director, syndicated investment relationships, criteria used to evaluate new venture proposals, the investment patterns of informal risk capital investors, the performance of firms rejected by venture capitalists and several others. Churchill and Hornaday (1987) provide a useful bibliography of this research.

Decision Making. Many of the studies on decision-making and characteristics of successful investments are unpublished dissertations, as noted by Tyebjee and Bruno (1981, 1984). Further, they tend to point out the difficulties and uncertainties of this type of research. Wells (1974), was one of the first to address the decision-making behaviour of venture capitalists. In a descriptive study of seven venture capital firms, he attempted to analyze perceived risk/return tradeoffs in terms of three variables: operating risk, man-time risk and stock market risk. A major problem arose in attempting to establish a common definition of risk that would universally characterize all portfolio investments. Wells concluded that venture capitalists are indeed risk-averse, given that their expectations of return can be equated with actual returns.

Later, Hoban (1976) in his dissertation began by identifying a universal set of venture characteristics that could be operationalized into a set of predictive variables. These variables were used in an

attempt to determine the ultimate success or failure of individual portfolio investments. Hoban found, however, that all risk factors could not be reduced to a single scale. The individuality and uniqueness of each investment prevented the creation of a constant set of predictive variables. Intervening factors such as general economic conditions, market forces and entrepreneurial ability were found to be impossible to model. At approximately the same time, Poindexter (1976) attempted to measure the amount of risk venture capitalists accept as a first step in determining the efficiency of the market, as represented by the Capital Asset Pricing Model. Poindexter showed that this model inadequately predicts risk differentials in the venture capital market. Again, the primary problem was found to be the lack of a common definition of market risk.

Pence (1979) attempted to control for the large number of potentially relevant variables that may comprise a definition of market risk by limiting the universe of investments to those involving early-stage startup companies displaying a high degree of technological innovation. She concluded that venture capitalists' investment behaviour is based on the same fundamentals as are most financial decisions - those of risk, return and liquidity. A set of predictive variables still did not emerge. Pence suggested that a further restriction of the study universe is needed - particularly by geographic location. According to her, "it would be interesting to conduct a more intensive study using similar techniques in one geographic location." This because "the entrepreneur should first consider investors who are located close to a

new enterprise... if they want both to benefit from the financier's expertise and to improve their chances of finding adequate financing quickly (1979, 53)."

Performance. Several studies on performance that were conducted throughout the early 1970s showed that new ventures supported by venture capital companies had a significantly lower failure rate (20 to 30 percent) compared with the failure rate of companies in the economy at large (80 to 90 percent) (Taylor, 1969; Roberts, 1970; Faucett, 1971). Huntsman and Hoban (1980) studied 110 investments made by three institutions prominent in the funding of new companies. An annualized rate of return generated by the composite portfolio of 18.9 percent was found over the fifteen year period 1960-1975. More importantly, the study illustrated that about one in six investments failed and that relatively few investments had extraordinarily high rates of return. This observation was confirmed by DeHudy, Fast and Pratt (1981) who analyzed the portfolios of five prominent venture capital firms (218 investments). They reported a failure rate of 14.7 percent and an average annual return of 18.9 percent for the three leading venture capital firms.

Availability. Bean, Schiffel and Mongee (1975) concluded that little is known about the potential market imperfections involving venture capital. In contrast, Charles River Associates (1976) concluded that small technology based companies paid higher interest rates and yielded a higher rate of return than did other small ventures. This study concluded that no significant imperfections existed in the venture capital market. Thus, they could not support the argument that venture

capitalists make inordinately high average returns. As a result of this study, it became accepted that public policy should be designed so that it would not interfere with the efficient operation of the market.

IV. Summary

A resurgence of interest in the venture capital industry in the past few years has resulted in an increased number of research publications. This research explores a wider range of topics than in the past, and is conducted in part by researchers outside of the traditional fields of business and economics. The contribution of economic geographers is particularly conspicuous in this regard. Over the past two years geographers have added empirical evidence to anecdotal observations of market concentration and investment parochialism. They have also extended interest into new areas, such as the specialization and spatial extent of markets, and the consequent implications for regional economic development. Business researchers have expanded beyond their traditional interests in portfolio selection, performance and capital availability to explore more specific questions about the role of venture managers and directors, syndication, evaluation criteria and several other topics.

The research reported in this dissertation is a clear addition to the existing literature given the following considerations:

- (1) the investigation of spatial aspects of venture investment is in an early developing stage
- (2) the paucity of studies of the venture capital investment process outside of the larger developed American market (in particular, the lack of any explicit consideration of a spatial component in the Canadian context)

(3) the lack of comprehensive studies that (either conceptually or empirically) trace the investment process from its source, through investment selection, monitoring and valuation to its final output to the economy in terms of expenditures, innovation and employment creation.

This dissertation addresses all three of these deficiencies in our state of knowledge about the venture capital industry, providing a more complete conceptualization of the venture capital investment process than previously available (Chapter Two), and ample empirical description of current Canadian investment patterns and impacts (Chapters Six through Eight). However, venture related topics are poorly developed in the geographic literature, and this study does not satisfy all of our information requirements. It is, however, a solid base from which future research on the Canadian market can address specific questions and design methodologies that focus on causal relationships rather than exploratory description.

Chapter Four

DATA

I. Data Sources

Four databases were created in order to address the research questions outlined in Chapter One. The first was based on a series of industry directories, and provided information on the location and investment preferences of venture capital firms over the time period 1973-1986. The second enhanced this database with additional detail gained from a survey of venture capital firms. The third database was derived from a survey of firms that received venture capital funds between 1980 and 1987. This survey collected a temporal sequence of financial statements for these firms, providing information on the performance and economic impact of venture capital investment. A final database was created by cross-referencing venture capital portfolio firms with a computerized database of export activity maintained by the federal Department of Regional Industrial Expansion. These databases are described and problems of comparability and aggregation are discussed in the following sections.

II. Directories

The office locations of both Canadian and American venture capital firms were determined for the period 1973-1985 using the following industry directories: McQuillan and Taylor (1973, 1978), Pratt (1977,

1981, 1983), Venture (1985) and The Sources of Funds Index, published quarterly. These directories provided information on the investment preferences of venture capital firms with regard to industrial sector, funding stage, region and capital commitment. Additional information such as capital under management, personnel, affiliations and founding year was available for some firms and time periods. The Sources of Funds Index provided detailed profiles of the operating philosophies of investment firms. The information in these directories was coded to provide a temporal database of Canadian and American venture capital firms, their office locations and investment preferences. This database is used in later chapters to trace changes in the spatial pattern of venture capital firm location over time and to assess spatial variations in industrial sector and funding stage specialization.

The use of directories for this purpose is problematic because it is not known if preferences correspond to actual investment behaviour. Actual investment behaviour is influenced by both the investment philosophy of venture firms and the availability of sound business proposals that have an acceptable risk/return mix. Preference data represents what venture capital firms would do if there were only limited constraints on the investment opportunities available to them. Green and McNaughton (1987) found no significant difference between regional investment preferences and actual disbursements in a matched sample of American venture capital firms. However, data are not available to do similar tests for industrial sector and funding stage characteristics, or to test for regional equivalency in the Canadian context. McNaughton and

Green (1988) have argued that preference data are important even if these relationships cannot be established. By controlling for constraints imposed by the external operating environment of firms, preference data yield patterns that closely reflect the aggregate decision-making behaviour of firms, and not simply responses to external forces.

III. Survey of Venture Capital Firms

In order to obtain more detailed information on the venture capitalists operating in Canada, a questionnaire (Appendix I) was mailed to 149 firms listed on the Association of Canadian Venture Capital Companies' (ACVCC) mailing list of members and associates. This questionnaire requested information on: (1) office location criteria, (2) branch offices, (3) geographic origin of investment proposals and destination of disbursements, (4) investment selection criteria and (5) several distinguishing characteristics such as capital under management and founding year. All questions pertained to the year ending December 31, 1986.

In total, 124 (65%) of the questionnaires were returned. However, only 43 of these were useable, yielding a response rate of 29 percent. The rest either indicated that they were not venture capital firms, had moved or closed, or were unwilling to complete the questionnaire for reasons of confidentiality. Those respondents that turned out not to be venture capital firms were associate members of the ACVCC with related interests such as acquisition and holding companies. About 12 percent of the questionnaires were returned as undeliverable and could not be traced

by reference to local telephone books. The number of useable responses compared favourably with 55 Canadian listings in Venture (1985), or 66 full members of the ACVCC. Table 4.1 shows the distribution of questionnaires mailed and returned by urban centre. The nonasymptotic chi-square statistic shows no significant difference between the two distributions. Thus, the resulting sample is geographically representative of the population of venture capital firms. The nonasymptotic chi-square statistic was used because of the number of small (<5) expected frequencies that occur in the table. An algorithm for the calculation of this statistic is provided by Berry and Mielke (1986).

Table 4.1 Population and Sample Distributions of Venture Capital Firms

City ¹	# Responses	% Responses	# Mailed	% Mailed
Toronto	18	41.9	64	43.0
Calgary	5	11.6	8	5.4
Montreal	5	11.6	16	10.7
Edmonton	2	4.7	8	5.4
Halifax	2	4.7	2	1.3
Vancouver	2	4.7	5	3.4
Other	9	20.9	46	30.9
Total	43 ²	100.0	149	100.0

¹ Cities with more than one response.

² The overall response rate is 29%.

$$\chi^2 = 2.4 \quad df = 6$$

IV. Survey of Portfolio Firms

In order to gather information on the performance and economic impact of venture capital investments, a survey of firms that received funds from members of the ACVCC between 1980 and 1986 was conducted. A mailing list of 300 portfolio firms was generated from a master database of venture capital investment activity kept by Venture Economics Canada (VEC), a trade publication firm. This database is updated annually through their own survey and reports submitted by ACVCC members.

The survey instrument (Appendix II) was divided into three main sections. The first section simply established the industrial sector of the firm, the age of the firm, whether the firm was closely held and if the firm was publicly traded. This information was used to determine the general characteristics of firms receiving venture capital funds and to aggregate responses. The second section was a modification of the table used by the American Electronics Association (Zschau, 1978) and later by Ernst and Whinney (1981a) to collect data on the performance of venture backed firms. This table requested financial data in three broad areas (revenues and expenditures, financing, and employment) per income statements and tax remittances for the fiscal years ending between 1980 and 1987. This provided a temporal sequence of financial statements for each respondent. The final section requested information relating to the experiences of the firm in obtaining its most recent round of financing.

This survey required additional effort to ensure an adequate response rate because of the sensitive nature of the information requested. An extensive follow-up was conducted that included: (1) a

second mailing under the letterhead of the venture capitalist that provided the most recent round of funding, (2) translation of the survey for francophone respondents and (3) telephone interviews to solicit responses and check information on returned questionnaires. These efforts resulted in 84 useable responses; 28 percent of the number of questionnaires mailed. Table 4.2 shows the distribution of questionnaires mailed and returned by urban centre. The nonasymptotic chi-square statistic shows no significant difference between the two distributions. Thus, the resulting sample is geographically representative of the population of portfolio firms.

Table 4.2 Population and Sample Distribution of Portfolio Firms

City ¹	Responses	% Responses	# Mailed	% Mailed
Calgary	12	14.3	30	10.0
Edmonton	10	11.9	19	6.3
Toronto	7	8.3	34	11.3
Vancouver	7	8.3	22	7.3
Montreal	6	7.1	17	5.7
Ottawa	3	3.6	13	4.3
Burnaby	3	3.6	10	3.3
Markham	3	3.6	7	2.3
Richmond	2	2.4	7	2.3
Other	31	36.9	141	47.0
Total	84 ²	100.0	300	100.0

¹ Cities with more than one response.

² The overall response rate is 28%.

$$\chi^2 = 4.6 \quad df = 9$$

V. Export Data

As an extension of the above survey, data on the export behaviour of portfolio firms were collected through the Business Opportunity Sourcing System, a computerized database maintained by the federal Department of Regional Industrial Expansion. A search of this database found listings for 93 firms that were known to have received venture capital funds between 1980 and 1987. The information included: countries of export, products exported, employment, domestic and export sales, licensing and subsidiaries. This information is used in later chapters to document the range and pattern of export activity by portfolio firms and its impact on the Canadian economy.

VI. The Use of Aggregates

The data collected from these four sources are presented in aggregated form to ensure confidentiality and to provide significant generalizations. As shown in previous chapters, the most frequently used modes of aggregation in venture capital research are by location, industrial sector and funding stage. Several different levels of spatial aggregation are used in later analyses, including urban centres, provinces and regions. The Canadian regionalization used is defined in terms of provincial boundaries (Table 4.3). In the American context, the nine major census regions are used. Use of such large regions is made necessary by the extreme concentration of the industry, small sample size and desire to ensure the confidentiality of respondents.

Table 4.3 Regionalization Used in Databases

Region	
Province	
Atlantic Provinces	British Columbia
New Brunswick	British Columbia
Nova Scotia	
Prince Edward Island	
Newfoundland	
Quebec	Yukon/NWT
Quebec	Yukon
	Northwest Territories
Ontario	United States
Ontario	United States
Prairie Provinces	Foreign
Manitoba	other foreign countries
Saskatchewan	
Alberta	

The aggregation of industrial sectors and funding stages is complicated by different definitions between databases. The industrial sector and funding stage classes used with the directory data correspond to those in Pratt (1977, 1981, 1983), and the classes used in the survey of portfolio firms correspond with those used in the annual reports of the ADVCC. Tables 4.4 and 4.5 show the equivalency of these classes.

The small number of cases in the portfolio firm survey database often resulted in small expected frequencies, requiring even coarser aggregations to allow the use of certain statistical techniques. The industrial sectors were further aggregated into three categories based on research by Bygrave, Timmons and Fast (1984) and Timmons and Bygrave

Table 4.4 Industrial Sector Categories Used in Databases

Survey of Portfolio Firms	Directories	Aggregate Sectors
Computer Related Electronics Communications	High-technology	High-technology
Medical/Biotech	Medical	
Industrial Services and products	Manufacturing Distribution	Standardized Technology
Consumer Services and products	Services Retail	
Natural Resources	Natural Resources	Traditional Sectors
Development/Leasing Transportation	Real Estate	

(1986) that found two salient groups of portfolio firms: (1) high innovative technological ventures and (2) low innovative technological ventures. These were labelled high technology sectors and standardized technology sectors. A third category - traditional sectors - was added for those firms that did not easily fit into the other two categories (Table 4.4). The aggregation of funding stages was much easier as these categories are temporally related. The earliest stages were combined (beginning firms), then those in the middle (expanding firms) and finally the later stages were combined (restructuring) (Table 4.5).

While aggregation solved the problem of small expected frequencies, it generated another. Aggregation lessens the variation inherent in a

Table 4.5 Funding Stage Categories Used in Databases

Survey of Portfolio Firms	Directories	Aggregate Stages
Seed	Seed	Beginning
Startup	Startup	
Expansion	Stage 1 Stage 2	Growing
Bridge/Mezzanine	Stage 3 Stage 4	
Acquisition Leveraged Buyout	Acquisition	Restructuring
End Receivership Refinance	Secondary	

distribution and as a result may change the relationship between variables. Thus, it is necessary to test that the relationships between region, industrial sector and funding stage were not significantly affected by aggregation. To do this test, the symmetric uncertainty coefficient and the likelihood ratio (G^2) were calculated for the cross-tabulations of industrial sector with region, funding stage with region, and industrial sector with funding stage before and after aggregation (Table 4.6).

The symmetric uncertainty coefficient is a measure of proportional reduction in error (PRE) and is similar to the more common measure lambda proposed by Goodman and Kruskal (1954). The uncertainty coefficient can be thought of as a measure of the entropy contained within an $r \times c$ table.

Table 4.6 Uncertainty Coefficients for Effect of Aggregation

Cross-tabulation	% cells < 5	Symmetric Uncertainty Coefficient	G ² Likelihood Ratio	DF
Categories in Survey of Portfolio Firms				
Industry*Region	92.5	.175	51.474	27
Stage*Region	87.5	.144	28.488	21
Industry*Stage	97.5	.230	74.928	63
Aggregate Categories				
Industry*Region	16.7	.130	25.016	6
Stage*Region	25.0	.046	9.298	6
Industry*Stage	11.1	.029	4.952	4
Change Due to Aggregation				
Industry*Region	-75.8 ¹	.045	26.458	21
Stage*Region	-62.5	.068	19.190	15
Industry*Stage	-86.4	.201	69.976	59

^{||} Indicates significance at p=0.01.

¹ Percentage decrease in number of cells with frequencies less than 5.

The measure is relatively large if there is little entropy (that is, the values of the cells within the table tend to be dissimilar) and relatively small if entropy is high (the values of the cells within the table are similar). The likelihood ratio statistic (G²) is used to determine if a significant amount of entropy exists within the table (indicating that a relationship exists between r and c). G² has (r-1)(c-1) degrees of freedom and follows an approximate chi-square distribution. It is also perfectly

Table 4.7 Summary of Databases

Characteristic	Venture Capital Directories	Survey of Investors	Survey of Portfolio Firms	Portfolio Firm Exports
Time Period Covered	1973-1985	1986	1980-1986	1987
Markets Covered	United States Canada	Canada	Canada	Canada
Number of Cases Coded	U.S.: 4973 CDN.: 275	43	84	93
Number of Variables Coded	U.S.: 40 CDN.: 46	49	175	20
Primary Information	-Name -Location(s) -Type -Size -Investment Preferences -Compensation	-Name -Location -Type -Size -Age -Investment Criteria -Rationale -Anecdotal Comments	-Location -Industry -Funding Stage -Age -Sources of Funding -Balance Sheet(s) 1980-1986 -Employment 1980-1986 -Anecdotal Comments	-Name -Location -Sales -Employment -Licensing -Products Exported -Countries of Export
Sources	-McQuillan and Taylor; 1973, 1978 -Pratt; 1977, 1981, 1983 -Venture; 1985	Survey by Author Appendix I	Survey by Author and VEC Appendix II	Business Opportunity Sourcing System

additive, and can be easily partitioned to test the significance of a change in the uncertainty coefficient. The uncertainty coefficient is discussed by Theil (1972), and Goodman and Kruskal (1972). The likelihood ratio is discussed by Fienberg (1977).

The uncertainty coefficient analysis found a significant relationship between industrial sector and region that is preserved with aggregation. As the likelihood ratio was not significant for any of the measures of change associated with aggregation, it was concluded that the aggregation chosen was appropriate and had no significant effect on the relationships between these three primary variables.

VII. Summary

Four databases were created in order to gain insight into the investment behaviour of Canadian venture capital firms and to estimate the economic impact of their investments. The characteristics of these databases are summarized in Table 4.7. The definition of industrial sectors and funding stages varies between the databases; Tables 4.3-4.5 provide a key to their comparison. The small number of cases in the database derived from a survey of portfolio firms required further aggregation of industrial sector and funding stage categories to avoid problems with small expected frequency counts. The validity of aggregating industrial sectors and funding stages into three categories each was confirmed by tests for significant changes in the uncertainty coefficient between levels of aggregation.

Chapter Five

SOURCES OF VENTURE CAPITAL

I. History of Venture Capital

The beginnings of the venture capital industry can be traced to the Middle Ages when merchants, noblemen and clergy joined in partnerships to underwrite trading voyages. These partnerships became institutionalized in a precursor to the modern banking system. However, the amount of capital that could be raised through these partnerships was found to be insufficient to fund increasingly expensive attempts to exploit resources in the New World.

During the 1500s, the joint stock company became the common device for pooling capital resources, but by 1720 fell into disrepute as a result of the collapse of the speculative episode known as the South Sea Company Bubble (La Force, 1963). The South Sea Company, an English mercantilist company with a monopoly on trade in Spanish America, underwrote the English national debt at 5 percent. This sparked a frenzy of stock speculation that increased the value of shares ten fold. When the government attempted to halt the speculation, there was a dramatic fall in the value of the shares. The resulting distrust of joint stock companies meant that "the entrepreneurs who created the industrial revolution, for the most part, had to provide their own capital or seek help from their suppliers or customers (Wilson, 1985, 15)."

The modern idea of investment banking was spawned in Europe during the late 1800s. Private banks were especially important in Germany, where the Rothschilds, Bleichroeders and Oppenheims played an important role in backing railroads, mining ventures and manufacturing. In the U.S., domestic and European investors were responsible for the development of several new industries including railroads, steel, petroleum and glass (Rind, 1981).

Previous to the Second World War, the norm of corporate success was represented by a coincidental matching of entrepreneurial talent with established capital. Entrepreneurs of the early 1900s depended on friends, relatives, local merchants and other sources of what is now called informal venture capital. Characteristic of the time was the lack of a formal and disciplined process for matching innovators with the needed capital and management resources. Successes were rare and seemingly unpredictable.

After the Second World War, independent pioneering efforts in the United States resulted in organizations that provided the conceptual framework for today's institutional venture capital industry. One of the first venture organizations, J.H. Whitney and Company, founded in 1946, started with an initial capitalization of \$10 million. The Rockefeller family also began their venture activities in the late 1940s by setting up the American Research and Development Corporation (ARDC). ARDC represented a landmark as the first venture organization open to public investment, and remained as the only publicly held venture company in operation until 1960.

In Canada, the institutional venture capital industry formally started with the opening of the English subsidiary Charterhouse Canada Limited in 1952. Charterhouse remained the only firm explicitly involved in venture capital until 1962 when it was joined by Canadian Enterprise Development (CED), which was modelled after the success of General Doriot's Associated Research and Development (ARD) in Boston. By the end of the 1960s, several firms were operating in the Canadian market, including TD Capital Group, Roymark, Cavendish, Ventures West and Helix.

The Canadian market is much younger and smaller, but in many ways it emulates the American market. The beginning sections of this chapter provide an historical background for the development of the sources of institutional venture capital. The history of the venture capital industry is not well recorded in comparison with other financial institutions, such as commercial banks and insurance companies. In part, this is because of the prevalence of limited partnerships with specified life-times. Long corporate histories are simply not developed. The history of the industry is very much that of the efforts of individuals rather than corporations. Two popular books are worthwhile in this regard: Wilson (1985) gives a journalistic account of the major players in the American market, and Ross (1975) provides an account of the activities of Canadian venturers. This chapter relies heavily on the historical account provided by Fells (1988). The entry and exit of firms from the market are traced from the directories discussed in Chapter Four. The chapter ends with a discussion of the relative importance of different

sources of venture capital, and the growth and diffusion of venture capital office locations over time.

II. Sources of Venture Capital

Venture Capital is available from a variety of sources, the most important being private venture capital firms, corporate subsidiaries and government programs. Private venture firms are often related to family fortunes. Typically, they are interested in more glamorous ventures that will translate into a significant contribution to industry, technology or society. Corporate venture activities allow major financial and industrial corporations to invest in related but non-competing fields. They often act as an information gathering organ for the parent company, cultivating potential merger candidates, suppliers and customers (Liles, 1974). Both independent firms and subsidiaries are highly sophisticated, preferring well researched proposals and higher investment amounts.

Together, private firms and corporate subsidiaries account for the majority of private sector venture capital in both Canada and the United States. Considerable differences exist, however, between the sources of public sector venture capital between the two countries. Approximately one-third of the American venture capital market is made up of federally licensed Small Business Investment Companies (SBICs) that leverage their founding capital with the Small Business Administration (SBA). The investment patterns of these firms are considerably different from those of their private counterparts. SBICs have smaller capital bases, make smaller investments, invest in lower technology traditional business

sectors, rely on debt-like financing structures and are more parochial in their choice of investment location (Green, 1988).

In Canada, federal funds are made available through two crown corporations, the Federal Business Development Bank (FBDB) and the Canadian Development Corporation (CDC). In contrast to the American approach, these corporations have very large capital bases and closely mimic the operation of private firms. Several provincial governments have also established venture capital programs, some based on the SBIC model, and others modelled after the FBDB. As yet, comparatively little capital is available from these sources.

Private Sector Firms. The development of the private venture capital sector in Canada can be described in three distinct periods: (1) early growth, (2) shakeout and (3) relative maturity. The first period began with the establishment of U.K. based Charterhouse's Canadian subsidiary in 1952. The next entrance into the market was a decade later when CED opened. CED followed the American model, designing its operations after the successful ARD of Boston, famous for its sponsorship of Digital Equipment. In the late 1960s and early 1970s, several more firms entered the market including: TD capital Group, Roymark, Cavendish, Ventures West and Helix.

These early venture capital firms performed very well, following essentially similar investment philosophies: (1) minority equity investment, (2) long time horizons, (3) little emphasis on liquidity and (4) passive portfolio management. However, several factors combined in the early 1970s to cause a shakeout in the industry that caused some firms

to leave the market, and the remaining firms to change their investment policies. In the early 1970s, liquidity became a major concern of venture capitalists. First, the drastic downturn in the stock market made it difficult to liquidate portfolio firms through initial public offerings (IPOs), and the Foreign Investment Review Act (FIRA) made a common route to liquidity (selling to a foreign interest) more difficult. The result was that venture capital firms became concerned with their own capital flows, switching to subordinate debt instead of equity investment. This lessened the pressure for liquidation as venture capital firms had an incoming capital flow to meet overhead and recycle into new investments.

The liquidity problems of venture capital firms, and a generally stagnant economy, discouraged new firms from entering the field from 1973 to 1978. The only major firms established during this period were SB Capital and Inco Ventures. Several firms stopped making new investments during this period and eventually liquidated their portfolios. This is particularly true of the subsidiaries of industrial corporations that sought to redirect their investment into more profitable areas. In particular, historically high interest rates near the end of this period provided comparable returns with significantly reduced levels of risk. Two corporate venturers, Northern Telecom and MacMillan Bloedel, left the market during this period, as did several private firms, including Varitech, Guardian Ventures, International Capital, Glentech and Venturetek.

The firms that did stay in the market gradually changed their investment philosophies, learning how to make portfolios yield adequate

returns under adverse conditions. The most important change was from passive involvement to active management of portfolio firms. The new emphasis became management ability; turning around potential failures before it was too late. This caused three additional changes: (1) demand by venture capitalists for increasingly large ownership shares of portfolio firms, (2) investment projects that were actually initiated and brought together by venture capitalists and (3) increasing technological specialization among the staff of venture capital firms.

By the late 1970s the venture capital industry had reached a level of relative maturity, and improved market conditions caused a resurgence of interest and renewed growth in the industry. Several new venture funds were established in the early 1980s based on the American model of limited partnerships. The adoption of the limited partnership over incorporation as the preferred form of corporate organization offered distinct advantages that attracted more capital to the market. Limited partnerships allow the mingling of taxpaying investors with non-taxpayers (for example, some pension funds). They also have a specified life-time, usually ten years, which makes it easy to assess the performance of the fund over time. The ability to assess performance is critical to attract commitments of capital from large institutional sources, such as pension funds and insurance companies. The general partner (the venture management team of the partnership) is also motivated to increase performance as rewards are usually linked to net gains.

Some of the major venture capital funds established during the early 1980s included a joint venture between SB Capital and Inco Ventures to

found North American Ventures Management Limited, general partner of North American Ventures Fund (NAVF I) capitalized with \$22.5 million, and NAVF II capitalized with \$36 million. Others include Helix Investments (\$17.5 million), Ventures West Technologies (\$24 million) and VenGrowth Funds (\$34 million). During the same period several industrial corporations reentered the market, including Northern Telecom, and Alberta Gas and Trunk.

Public Sector Firms. The involvement of government in the provision of venture capital is motivated by the desire to fill gaps in existing capital markets. Equity gaps occur when (1) the marginal return on capital invested exceeds the marginal cost of capital, or (2) the cost of capital for small firms is higher than the cost of capital for firms in general (Dominguez, 1976). Studies showing that such gaps exist in the American market were first conducted in the late 1930s by the Committee for Economic Development, U.S. Department of Commerce. Subsequent studies (Kaplan and Banner, 1958; Kieschnick and Daniels, 1976; Cohen, 1979) confirm the continued existence of the problem. Similar studies in the Canadian context include Thorne Ridell (1981), and Small Business Financing Review Team (1982).

The U.S. government became interested in the venture capital market during the 1950s, creating the Small Business Investment Company (SBIC) program to aid in the stimulation and growth of small firms. The program was designed to provide more capital than was available from the few existing corporations, and to interest business professionals in the investment and supervision of high-risk capital.

SBICs are licensed by the Small Business Administration (SBA) under the Small Business Investment Act of 1958, and are eligible for long-term loans or SBA purchased debentures with which to finance small business. SBICs may borrow at a ratio of 3 to 1 up to a maximum of \$75 million. These investment companies are constrained by the requirements that not over 20 percent of their capital may be invested in any single concern, and no more than one-third of their investments may be in the real estate sector (Waldmann and Cohn, 1980).

In 1969, the program was expanded to create a new type of SBIC specializing in funding minority enterprise. The Minority Enterprise Small Business Investment Company (MESBIC) program was modeled after Arcata Co. (California) which established a venture capital firm to invest 2 percent of their after tax profits in minority owned businesses. MESBICs are restricted to investment in minority controlled ventures, and must be backed by a strong corporate or community sponsor. Additional historical information on the SBIC and MESBIC programs is available in Noone (1968), Rubel (1970), Noone and Rubel (1970), Dominguez (1974,1976) and Wilson (1985). Critical discussions of both these programs can be found in Chambers (1962), Clarke (1967), Rosenbloom and Shank (1970), Allen (1971), Karuna-Karan and Smith (1972), Osborn (1973) and Gupta (1983).

The Canadian federal government has been active in the venture capital market since 1971 when the Canadian Development Corporation was launched through a special act of parliament. The CDC invests through its wholly owned subsidiary CDC Ventures Inc. which has an interest in several

private venture capital companies: Venturetek, Innocan, Ventures West and Alberta Ventures. In addition, the federal government provides equity capital to small firms through the Federal Business Development Bank (another crown corporation), that maintains close to one hundred branch offices nationwide. The FBDB replaced the Industrial Development Bank (established in 1944) in 1975. The idea of a national program designed after the SBIC act, called the Venture Enterprise Investment Company (VEIC) program received much attention in 1978, but was never operationalized.

The provincial governments have been much more active in trying to stimulate the formation of private venture funds, while committing public funds to the market. The provinces have pursued two strategies: (1) large crown-type corporations or (2) smaller SBIC type firms that combine private and public funds. Crown-type corporations include: Saskatchewan Economic Development Corporation (Saskatchewan), Societe de Developpement Industriel (Quebec), Provincial Holdings Limited (New Brunswick), Industrial Enterprises Incorporated (P.E.I.), Industrial Estate Limited (Nova Scotia) and Idea Corporation (Ontario). Programs of the second type include: Societes de Developpement de L'Entreprise (SODEQ;Quebec;1979), Small Business Development Corporations (SBDC;Ontario;1979), Nova Scotia Venture Corporations (NSVC;Nova Scotia;1982), P.E.I. Venture Corporations (PEIVC;P.E.I.;1983) and Manitoba Venture Capital Companies (MVCC;Manitoba;1983).

While each of these programs has its own regulations, the general intent is to provide eligible venture corporations or their shareholders

incentives (usually through the tax system) to channel their savings or investments into developing small businesses. The Ontario SBDC program, for example, makes an additional amount available equal to 30 percent of the investor's startup equity. This is done through either a grant to individuals, or through corporate tax credits. This amount is recaptured by the Provincial government when an SBDC either deregisters or dissolves. The longest running and most successful of these programs have been Ontario's SBDC and Quebec's SODEQ. The SBDC program replaced the unsuccessful Venture Investment Corporation (VIC) Registration Act (1977) in 1979 (Playfair, 1976; Colley, 1979). It had 364 participants and had raised more than \$200 million by the end of 1984, while \$25 million had been raised by 13 SODEQs (Gadbois and Knight, 1985). Both of these programs are small, however, when compared with more than 450 active SBICs, which had approximately \$1.5 billion in combined assets in 1984 (Gadbois and Knight, 1985).

III. Market Shares

The current market share (in terms of the number of firms) of private venture capital sources is about 84 percent in Canada and 51 percent in the United States (Table 5.1). However, market shares measured by total capital provide a different picture (Figure 5.1). In the United States about 90 percent of the venture capital is controlled by private firms, while in Canada this proportion is 72 percent. This difference occurs because SBICs and MESBICs are numerous but have small capital bases (Table 5.2). In Canada and the United States private sector firms are the

Table 5.1 Sources of Venture Capital

Type of VC Firm	% of Firms in Canada	% of Firms in United States
Independent Private	38%	31%
Subsidiary	25	7
Intermediary	18	7
Crown Corporation or related Provincial Program	11 5	- -
SBIC	-	37
MESBIC	-	12
Other	3	6
Number of Firms	55	995

Calculated from Venture (1985). Author's database of venture directories.

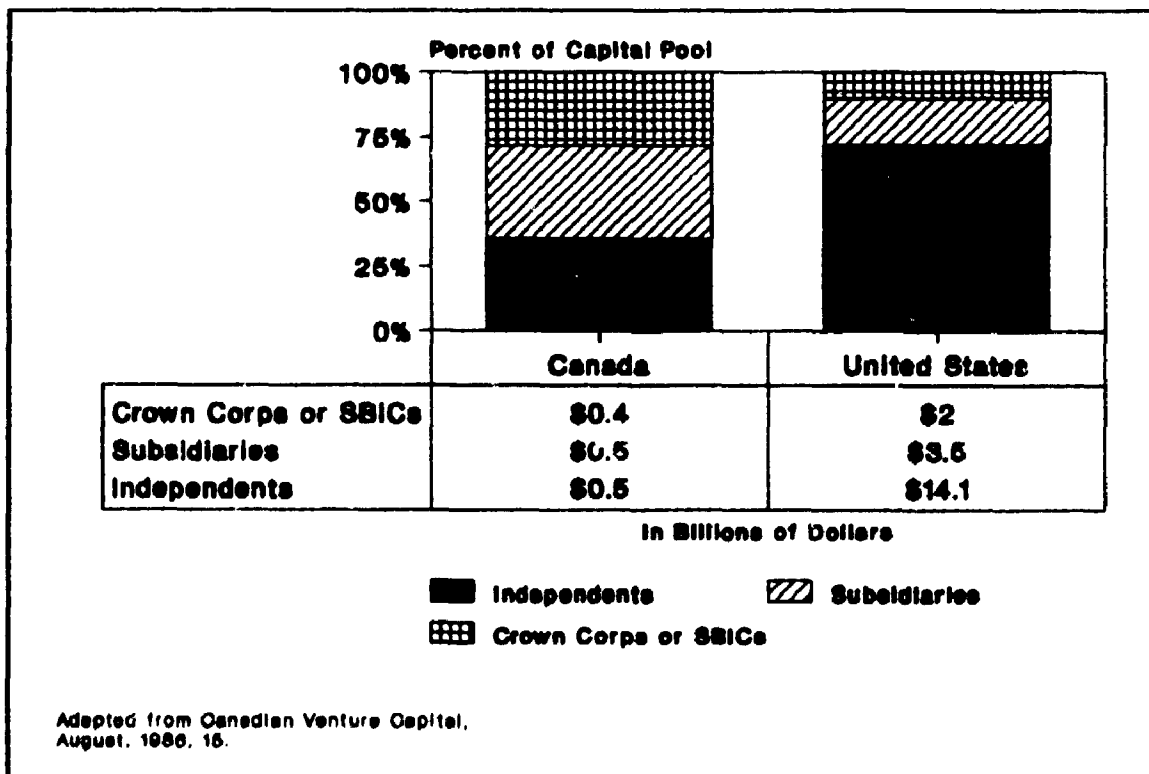


Figure 5.1 Market Shares in Canada and the United States

most important market component, both in terms of their capital commitment, and because they are largely responsible for determining industry trends.

The source of venture capital funds is slowly evolving away from reliance on the contributions of wealthy individuals toward corporate sources and pension funds (Table 5.3). This is particularly evident in

Table 5.2 Average Size of Venture Capital Firms

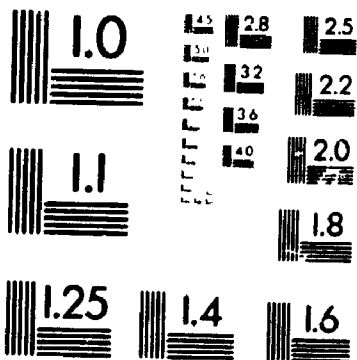
Type of VC Firm	Mean Capital per Firm	Median Capital per Firm
Independent Private		
Canada ¹	\$21.4	\$19.2
United States ²	51.7	25.0
Subsidiaries of Fin. Corps.		
Canada	59.5	-
United States	49.1	20.5
Subsidiaries of Ind. Corps.		
Canada	20.0	15.0
United States	27.6	15.0
Crown Corporations/SBICs		
Canada	91.8	52.5
United States	5.0	2.5
Total All Types		
Canada	30.2	20.0
United States	36.8	15.0

Adapted from Canadian Venture Capital, Venture Economics Canada, August 1986, 15.

¹ In millions of Canadian dollars.

² In millions of American dollars.

2



the U.S. market, where venture capital was originally synonymous with family names such as Rockefeller, Phipps, Doriot and Whitney. The involvement of wealthy families in the Canadian market has never been as overt, though Koerner (Canadian Overseas Development Corporation) and Webster (Helix) were in the market early, and were later joined by the likes of Eaton, Campeau, and Nihon.

IV. Office Location

The historic growth and development of venture capital firms in Canada has favoured some regions over others in the choice of office location (Figure 5.2). As discussed earlier, few firms were established

Table 5.3 Sources of Venture Capital Funds

Source of VC Capital	% of Capital Added in 1985	% of Capital Added in 1986	Total VC Pool
Pension Funds	37%	67%	49%
Corporations	20	21	15
Individuals and Families	13	3	20
Insurance Companies	11	9	10
Government	19	0	2
Foreign Investors	0	0	5
Endorsements and Foundations	0	0	0
Total Capital ¹	\$53	\$161	\$627

Adapted from Canadian Venture Capital, Venture Economics Canada, May, 1987, 18.

¹ In millions of Canadian dollars.

before 1972 and relatively slow growth was experienced up until the beginning of 1978. Historical inertia has afforded Ontario more than half (54 percent) of existing venture capital firms. Quebec and the Prairie Provinces have a similar number of firms, and both have had a slightly higher rate of firm formation than Ontario since 1982. Both British Columbia and the Atlantic Provinces have few venture capital firms.

Regional analysis hides the spatial concentration of the industry. More than 40 percent of venture capital firms are headquartered in Toronto, with another 4 percent in the satellite communities of Rexdale,

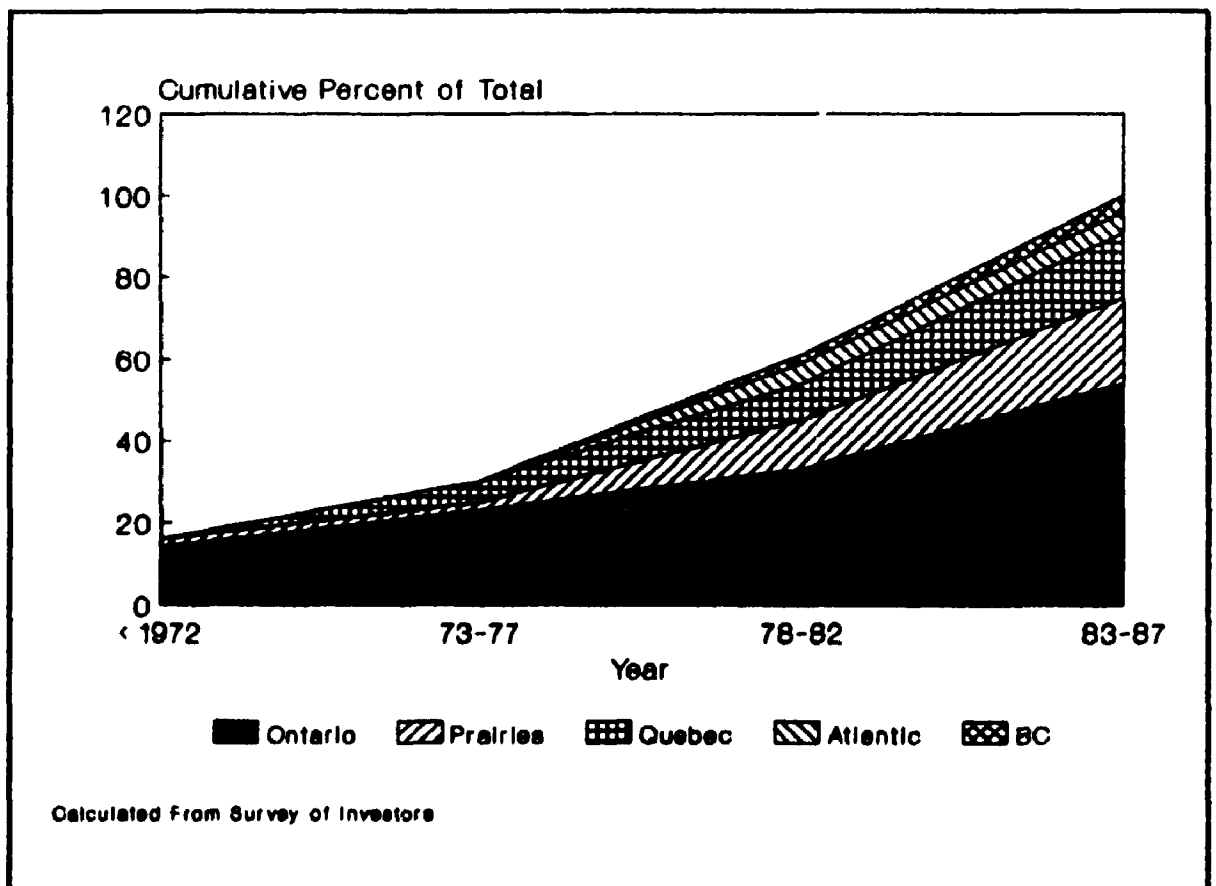


Figure 5.2 Regional Growth in Venture Capital Office Locations

Weston and Grimsby (Figure 5.3). Indeed, 16 percent of the firms share the same postal code in the downtown Toronto financial district. Toronto is also home to half of Canada's ten largest venture capital firms (Table 5.4). A further 15 percent of firms are headquartered in Montreal and Calgary.

The mobility of venture capital firms is quite high; 44 percent of the firms responding to the investor's survey had moved their primary office location since opening. Of these moves, 84 percent were intraurban and the rest were interurban. All of the interurban moves were from

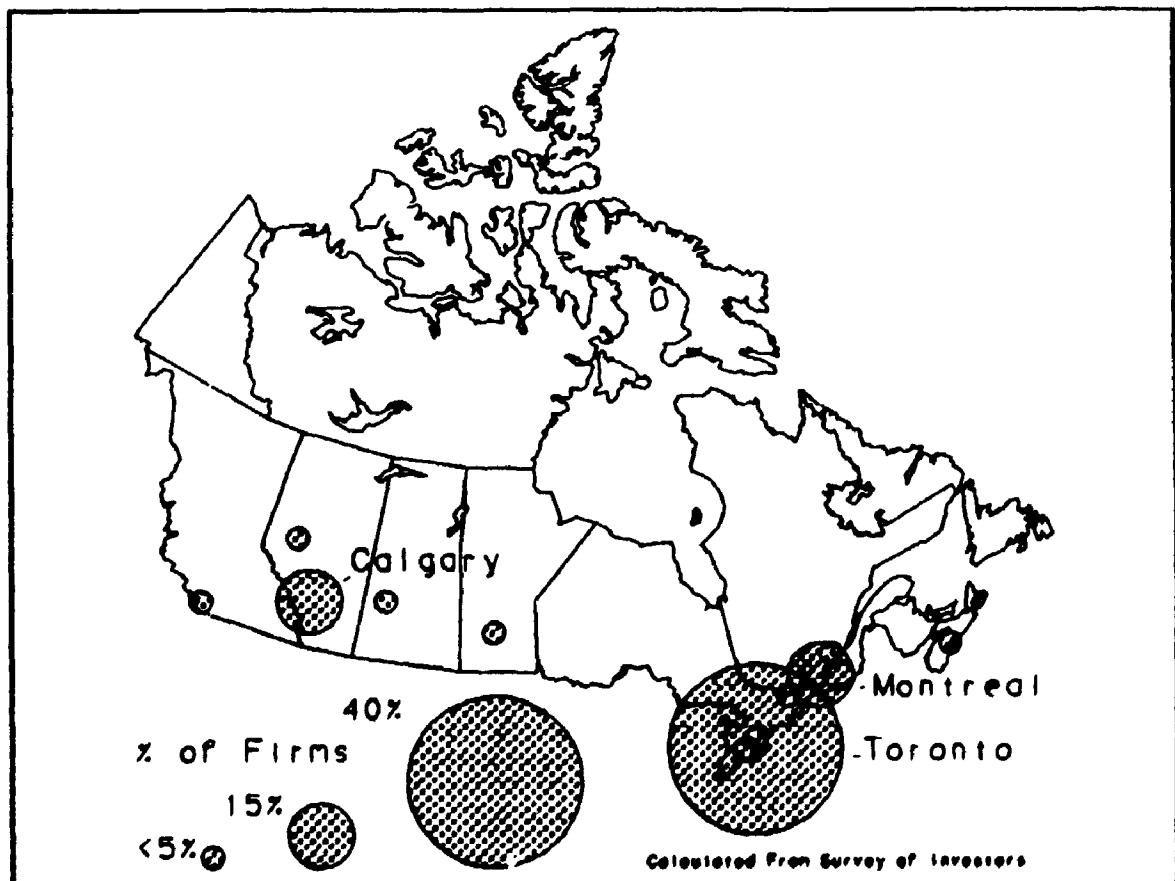


Figure 5.3 Office Locations of Venture Capital Firms

Table 5.4 Largest Canadian Venture Capital Firms

VC Firm	Capital Under Management 1987 ¹	Headquarters Location
Vencap Equities Alberta Ltd	\$244	Edmonton
Canadian Corporate Funding Ltd	142	Toronto
TD Capital Group Ltd	122	Toronto
Ventures West Management Ltd	85	Vancouver
Grayrock Shared Ventures Ltd	85	Rexdale
Societe D'Investissement Desjardins	82	Montreal
Schroders Canadian Buyout Fund	60	Toronto
Vengrowth Capital Funds	70	Toronto
Noranda Enterprise Ltd	70	Ottawa
Federal Business Development Bank	70	Montreal

Adapted from The Financial Post, Thursday July 21, 1988, 16.

¹ In millions of Canadian dollars.

Calgary to Toronto, and probably reflect the recent decline in both the availability and profitability of resource related investment opportunities available in the Prairie Provinces.

The respondents to the investor's survey provided several rationales for their choice of office location (Table 5.5). The most frequently cited rationale was the desire to be near business associates. This includes other venture capital firms, and business services such as accountants, attorneys and the corporate units of commercial banks. To quote one respondent: "Proximity to an industrial base, sources of financing (banks) and legal assistance are critical factors in determining a (successful) venture capital company's location." Such proximity is desirable, not only because venture capital firms are large consumers of such services, but because they act as initial filters in the selection

Table 5.5 Rationales for Office Location

Rationale	Percent
Near Business Associates	21%
Characteristics of Office	19
Centre of Promotional Area	12
Transportation Access	12
Head Office of Parent	9
Home of Owner	9
Office of Affiliate	7
No Rationale Given	12
Total	43

Calculated from survey of investors.

of investments by providing referrals.

The second most frequently cited rationale concerned the characteristics of the office itself. Microeconomic considerations such as rent, terms of lease, size, prestige and even decor were mentioned. The importance of these considerations is underscored by the number of intraurban moves that were reported. Cost is an important factor given that preferred locations are in the highest rent districts. Different types of firms suggested other considerations. Being near the centre of their promotional area was important for firms whose geographic market area was limited by government sponsorship or indenture mandate. Head office location of the parent company was important to subsidiaries, and some smaller firms were concerned with proximity to the home of the owner, or used the office of an affiliate.

V. Summary

This chapter provided an historical context for the development of the Canadian venture capital industry, and a discussion of the implications for current market shares and office locations. The major empirical observations in this chapter are:

- (1) In Canada and the United States private sector firms are the most important market component because of the size of their capital commitment, and because they are largely responsible for determining industry trends.
- (2) The source of venture capital funds is slowly evolving away from reliance on the contributions of wealthy individuals toward corporate sources and pension funds.
- (3) The number of firms has expanded rapidly in the last decade. This growth has accentuated the concentration of firms in Ontario.
- (4) The office locations of venture capital firms are highly concentrated in Toronto, and in the secondary centres of Calgary and Montreal.
- (5) Proximity to business associates is the primary consideration in determining office location.

The locational choice of a venture capital firm is, as pointed out in Chapter Two, one variable that can be manipulated to maximize access to information. Several factors affect the availability of information. For the venture capital firm, one important factor is the extent of the personal contacts and business acquaintances possessed by the firm's management. Personal referrals are often a major consideration in the investment decision. Because of their reliance on attorneys, accountants and bank officers, both for their services and for referrals, proximity to these business associates is an important consideration in the selection of an office location. As accessibility to both business

services and information on potential investments is greatest in the larger urban centres; it is there that venture capital firms tend to concentrate. The early dominance of Ontario (and specifically of Toronto) has afforded it a more pervasive contact network and better access to informational resources. Thus, firms operating in the Toronto area have a greater number of opportunities available to them, and experience less restrictive spatial bounds.

MARKET SPECIALIZATION

I. Urban Markets

Venture capital firms are financial intermediaries, acting as control points in the flow of both capital and business information. Through extensive contact networks that reach into large corporations, financial institutions, governments and universities, venture capitalists gather information about market conditions and potential investment projects. This information is used to establish a portfolio of high-growth companies. Venture capital investments are equity based: large capital gains are realized if portfolio firms grow into multi-million dollar companies that can be liquidated on the public market.

As a result of the information intensive nature of the venture capital market, investors find that they must specialize to develop sufficient expertise to build profitable portfolios. Venture capitalists usually specialize in certain geographic regions, funding stages or industrial sectors (Silver, 1985; Green, 1988). Firms within a particular urban market often develop similar interests, creating an aggregate pattern of specialization. This pattern emerges because firms in the same urban market have access to similar levels of information and a similar range of prospective projects. Pratt (1983), for example, provides the following characterization of a selection of American urban venture capital markets:

- (1) firms located in New York and Chicago specializing in leveraged buyouts,
- (2) firms located in Minneapolis specializing in medical and computer related ventures,
- (3) firms located in Dallas and Houston specializing in energy related ventures, and
- (4) firms located in San Francisco, Los Angeles and Boston specializing in seed capital and computer related ventures.

In terms of economic development, specialization suggests greater access to equity capital, and a greater ability to support the growth of certain new industries in some markets over others. This chapter provides an empirical investigation of specialization in both Canadian and American urban venture capital markets. The theoretical basis of specialization is presented in Chapter Two.

II. Market Size and Concentration

The Canadian venture capital market is considerably smaller than the American market. The Canadian market consists of approximately 70 firms, having a combined capital pool of \$2.3 billion dollars (Gittins, 1988). The American market has more than 600 firms with a capital pool in excess of \$18 billion. The 25 Canadian firms reporting their capital in Venture (1985) managed \$1.5 billion dollars, while 432 American firms managed over \$15 billion dollars (Table 6.1). These funds are concentrated in a few large urban centres: 34 percent of the Canadian venture capital pool is controlled from Montreal, and 20 percent is controlled from Toronto; 29 percent of the American market is controlled from San Francisco, and an additional 21 percent is controlled from New York. Toronto has more

Table 6.1 Market Size and Concentration

City	Capital Under Management ¹	Mean	Three Firm Concentration Ratio	N ²
CANADIAN MARKETS				
Toronto	\$380	\$42	0.77	9
Montreal	518	104	0.94	5
Calgary	30	10	1.00	3
Vancouver	41	10	0.99	4
Canada	1540	52	0.55 (0.70) ³	25
AMERICAN MARKETS				
New York	\$3103	\$33	0.31	89
San Francisco	4392	54	0.30	82
Boston	2479	56	0.42	42
Los Angeles	934	27	0.45	34
Dallas	532	29	0.67	18
Chicago	245	18	0.84	14
Philadelphia	171	14	0.76	12
Washington DC	91	8	0.98	9
Denver	273	39	0.99	7
Atlanta	67	11	0.99	6
Cleveland	101	20	0.99	5
Detroit	80	16	0.99	5
Houston	30	6	0.99	5
Miami	531	106	0.99	5
Milwaukee	81	27	1.00	3
All U.S.	15084	35	0.09 (0.15) ³	432

¹ Capital under management is in millions of Canadian Dollars for Canadian Markets, and in millions of U.S. dollars for American markets.

² N is the number of firms in each market that reported their capital under management in *Venture* (1985). For Canadian markets all firms that reported this data were included, for American markets government licensed SBICs and MESBICs were excluded because of their orientation toward debt financing (Green, 1988). All cities with more than three firms are included.

³ Five firm concentration ratios.

venture capital firms than does Montreal, and New York has more firms than does San Francisco. However, the mean firm size is larger in Montreal and San Francisco, contributing to larger capital pools. The mean firm size in Montreal is upwardly biased by the large capital base of the Federal Business Development Bank, a crown corporation.

The concentration of control over the capital pool in each urban market is closely associated with the size of the market ($r=-.87$) and with the number of firms participating in the market ($r=-1.0$). Larger markets have more participants, each with smaller relative market shares, resulting in lower concentration ratios. Three and five firm concentration ratios are used in this analysis instead of the more common four and eight firm ratios. It is traditional to use smaller ratios in highly concentrated sectors such as banking, insurance and real estate, while larger ratios are used for less concentrated sectors, such as manufacturing. The Canadian market is more concentrated than the American market; the largest three firms control 55 percent of the capital base. The largest three American firms only control 9 percent of the nation's capital pool.

III. Specialization

The degree of regional, funding stage and industrial stage specialization of firms in Canadian urban venture capital markets did not change significantly between 1973 and 1985 (Table 6.2). The changes in the symmetric uncertainty coefficient and G^2 ratio for various years were calculated to provide a statistical measure of changes in specialization.

Table 6.2 Tests for Change in Market Specialization Over Time

Cross-tabulation	Change in Uncertainty Coefficient	Change in G ² Ratio	DF
CITY*REGION			
1973-1977	-0.01	-7.5	15
1977-1981	0.00	0.7	15
1981-1985	0.00	0.5	15
1973-1985	-0.01	-6.3	15
CITY*STAGE			
1973-1977	-0.01	-1.9	21
1977-1981	0.00	-0.6	21
1981-1985	0.00	-0.5	21
1973-1985	0.00	-2.8	21
CITY*SECTOR			
1973-1977	0.00	-2.9	21
1977-1981	-0.01	-2.0	21
1981-1985	0.01	2.3	21
1983-1985	0.00	-2.6	21

In no case is the G² ratio statistically significant.

As no significant difference was found between years, firm preferences were aggregated across the time period. Temporal stability in market specialties is confirmed by Green (1988) who applied multiple preference matrix individual scaling (INDSCAL), and a series of Wilcoxon matched pair ranked sign tests to the same data used here for American urban venture capital markets. Neither test found any systematic variation in market specialization over time.

The degree of specialization varies widely by market (Table 6.3). The specialization index compares the standard deviation of regional, funding stage and industrial sector preferences to the maximum standard deviation that would result if all firms preferred the same region, funding stage, or industrial sector. To facilitate comparisons, the index is expressed as a percentage of its maximum value. The relationship between regional, funding stage and industrial sector specializations for each market is shown graphically by series of multiple sun-ray plots (Figure 6.1). In these plots, regional specialization is on the horizontal axis, industrial sector is the next axis in the clockwise direction and funding stage specialization is on the final axis. Each ray is scaled so that the polygon will intersect it in the middle if the value of a variable is equal to the sample mean. The extreme points on each ray represent the standard deviation of the distributions. Canadian markets are generally less specialized than American ones, and there is little difference between the level of regional, funding stage and industrial sector specialization at the national level. At the urban level, most markets are highly specialized regionally. Toronto, Montreal, New York and Miami are the exception.

Each market has its own unique combination of regional, funding stage and industrial sector specialties as shown by a coded table specialization index (Tables 6.4-6.6). This specialization index classifies values based on their deviation from the median (Tukey, 1977). To prepare a coded table, the data is first ordered and the median value is found. The median between this value and either extreme is calculated.

Table 6.3 Specialization Indices for Urban Venture Capital Markets

City	Regional Specialization Index	Funding Stage Specialization Index	Industry Specialization Index
CANADIAN MARKETS			
Toronto	7.8	10.1	10.5
Montreal	9.3	7.3	13.1
Calgary	20.5	16.5	39.3
Vancouver	19.6	17.8	9.4
Canada	8.2	9.7	6.3
AMERICAN MARKETS			
New York	38.0	19.0	21.4
San Francisco	51.1	17.3	26.7
Boston	40.3	16.6	22.2
Los Angeles	54.9	18.9	23.3
Dallas	31.8	16.4	24.7
Chicago	38.5	17.7	19.9
Philadelphia	27.3	20.4	22.6
Washington DC	27.6	16.8	18.8
Denver	54.3	21.8	19.5
Atlanta	50.1	13.4	31.5
Cleveland	49.7	20.8	20.3
Detroit	42.0	19.2	18.1
Houston	51.0	18.9	29.7
Miami	13.7	19.5	21.8
Milwaukee	44.9	20.4	23.7
United States	18.3	23.4	19.1

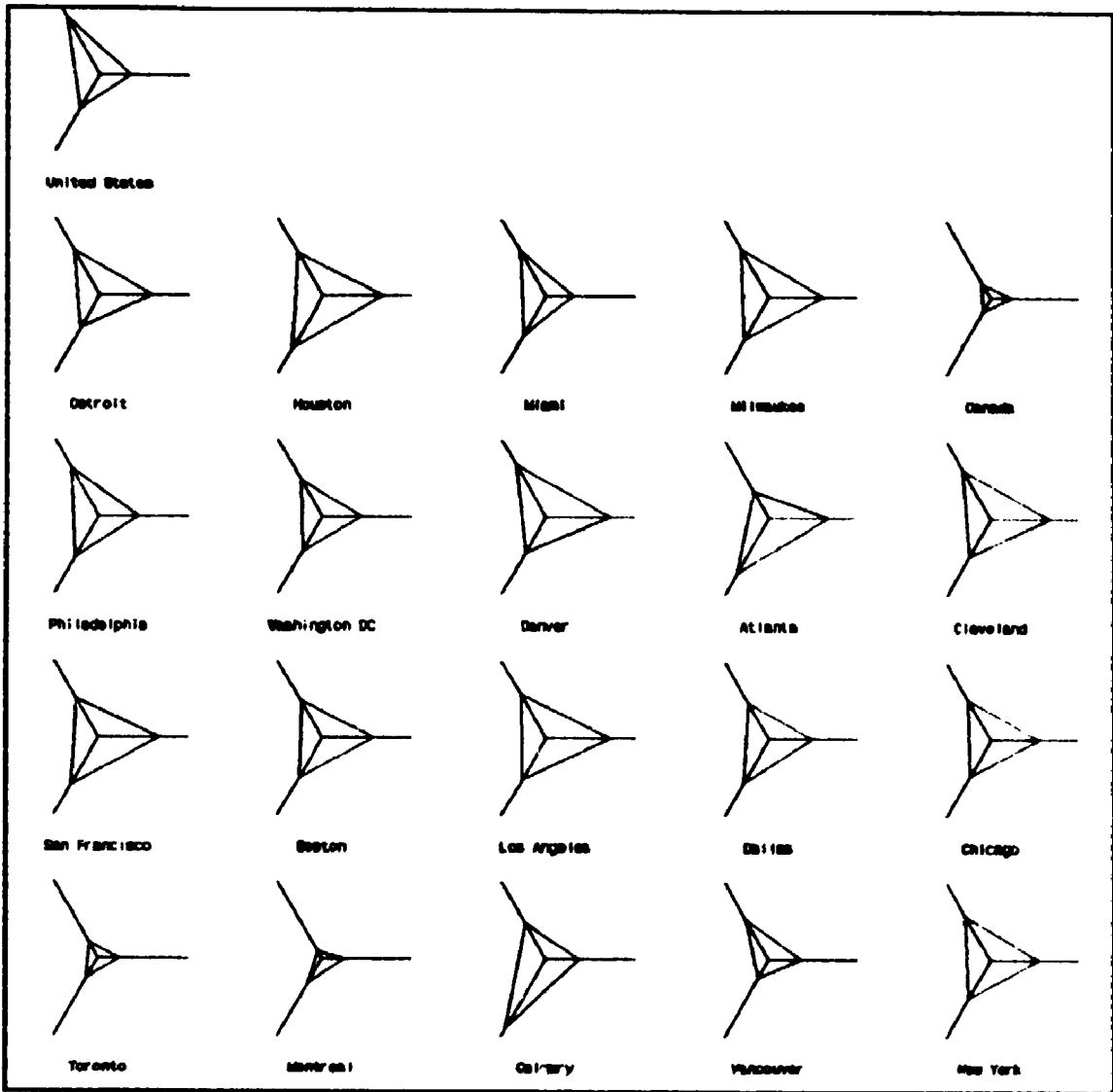
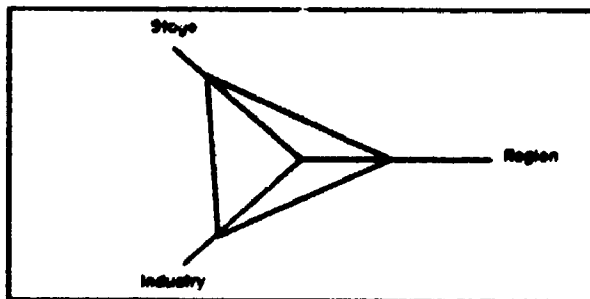


Figure 6.1 Sun-Ray Plots of Regional, Funding Stage and Industrial Sector Specialization



Sun-Ray Plot Key

Table 6.4 Regional Specialization of Urban Capital Markets

City	Atlantic Provinces	Quebec	Ontario	Prairie Provinces	British Columbia	United States
CANADIAN MARKETS						
Toronto	.	.	+	.	.	-
Montreal	.	+	.	.	.	-
Calgary	-	-	.	+	+	-
Vancouver	.	.	.	+	+	-

City	N.E.	M.A.	W.N.C.	Mtn.	Pac.	W.S.C.	E.S.C.	S.A.	E.N.C.
AMERICAN MARKETS									
New York	+	+	.	.	.	-	.	.	.
San Francisco	#
Boston	+	+
Los Angeles	-	-	.	.	+	.	.	.	-
Chicago	-	-	.	.	+
Dallas	.	.	.	+	.	+	.	.	.
Washington DC	+	+	.	.	.	-	.	.	.
Philadelp. a	+	+
Houston	-	-	-	#	-	#	.	.	-
Minneapolis	-	-	#	.	.	-	-	-	+
Cleveland	.	.	.	-	.	-	-	-	.
Detroit	.	.	+	.	-	.	.	.	#
Denver	-	.	-	#	+	.	-	-	-
Atlanta	-	-	-	-	-	-	#	#	.
Miami	+	+	+	+	+
Milwaukee	-	-	+	.	-	-	-	-	+

- Below inner hinge but within inner fence

.

+

Above high inner fence

United States Census Regions

N.E. New England

M.A. Middle Atlantic

W.N.C. West North Central

Mtn. Mountain

Pac. Pacific

W.S.C. West South Central

E.S.C. East South Central

S.A. South Atlantic

E.N.C. East North Central

Table 6.5 Funding Stage Specialization of Urban Venture Capital Markets

City	Seed	Startup	1st	2nd	3rd	4th	Acquis	Secondary
CANADIAN MARKETS								
Toronto	-	.	+
Montreal	-	.	+	+	+	.	.	.
Calgary	=	-	.	-
Vancouver	-	+	+	+	+	-	.	-
AMERICAN MARKETS								
New York	-	.	.	+	.	.	.	-
San Francisco	-	+	+	+	.	.	.	-
Boston	-	+	.	+	.	.	.	-
Los Angeles	-	.	.	+	.	.	.	-
Chicago	-	.	.	+	+	.	.	-
Dallas	-	.	.	+	.	.	+	-
Washington DC	-	.	.	+	.	.	.	-
Philadelphia	-	.	.	+	.	.	.	-
Houston	-	.	.	+	+	.	+	-
Minneapolis	-	.	.	+	.	.	.	-
Cleveland	-	+	.	+	.	.	.	-
Detroit	-	+	.	.	.	-	.	-
Denver	-	+	+	+	.	-	.	-
Atlanta	.	.	.	+	+	+	+	.
Miami	-	.	.	+	.	.	.	-
Milwaukee	+	.	+	.

= Below low inner fence

- Below inner hinge but within inner fence

.

+ Above upper hinge but within inner fence

Funding Stages Defined by Pratt (1983)

Seed	Seed (prove a concept)
Startup	Startup (product development and marketing)
1st	First Stage (initiate commercial manufacturing and sales)
2nd	Second Stage (working capital)
3rd	Third Stage (expansion of company)
4th	Fourth Stage (bridge to public market)
Acquis	Acquisitions and Management Buyouts
Secondary	Secondary (restructure or refinance)

Table 6.6 Industrial Sector Specialization of Urban Venture Capital Markets

City	Dis.	Manf.	Med.	N.R.	R.E.	Ret.	Serv.	Tech.
CANADIAN MARKETS								
Toronto	.	+	.	+	-	.	.	+
Montreal	.	+	+	+
Calgary	-	.	-	+	.	-	.	-
Vancouver	.	.	-	+	.	-	-	.
AMERICAN MARKETS								
New York	.	+	.	.	-	-	.	+
San Francisco	-	+	+	.	-	-	.	+
Boston	.	+	+	.	-	.	.	+
Los Angeles	.	+	+	.	-	.	.	+
Chicago	.	+	.	.	-	-	.	.
Dallas	-	+	.	.	-	-	.	+
Washington DC	-	+	+
Philadelphia	.	+	.	-	-	-	.	+
Houston	-	+	.	.	-	-	-	.
Minneapolis	-	+	.	-	-	-	.	.
Cleveland	.	+	+	.	-	.	.	+
Detroit	.	+	+	.	-	.	.	+
Denver	.	+	.	.	-	.	.	+
Atlanta	.	+	.	.	.	-	.	.
Miami	.	+	+	-	-	.	.	+
Milwaukee	.	.	+	.	-	-	.	.

- Below inner hinge but within inner fence
- .
- Between the hinges
- +
- Above upper hinge but within inner fence

Industrial Sectors Defined by Pratt (1983)

- Dist. Distribution
- Manf. Manufacturing
- Med. Medical
- N.R. Natural Resources
- R.E. Real Estate
- Ret. Retail
- Serv. Services
- Tech. High Technology including Computers

These two values are the "hinges" of the distribution, and the difference between them is the "H-spread". Finer breakdowns of the distribution are then undertaken in "steps" that are 1.5 times the H-spread. Finally, values in the original distribution are assigned symbols that correspond to one of the following categories:

- (1) between the hinges
- (2) within the inner fence - one step outside either upper or lower hinge
- (3) within the outer fence - two steps outside either upper or lower hinge
- (4) far outside - more than two steps outside either upper or lower hinge

The hinge is thus comparable to the quartile, the inner fence the eighths, and the outer fence the sixteenths of the distribution. The median is the preferred measure of central tendency because of its relative insensitivity to a few extreme values. An algorithm for coded tables is provided by Velleman and Hoaglin (1981).

The pattern of regional specialization is one of self-bias: the firms in most markets prefer to invest within their own region and perhaps in a contiguous one as well. All Canadian markets appear conspicuously averse to cross-border investment. The majority of both Canadian and American markets are averse to seed and secondary investment, and prefer investment in manufacturing and high technology.

IV. Concentration and Specialization

The specialization of urban venture capital markets is related to the level of concentration in the market (Figures 6.2-6.4). This

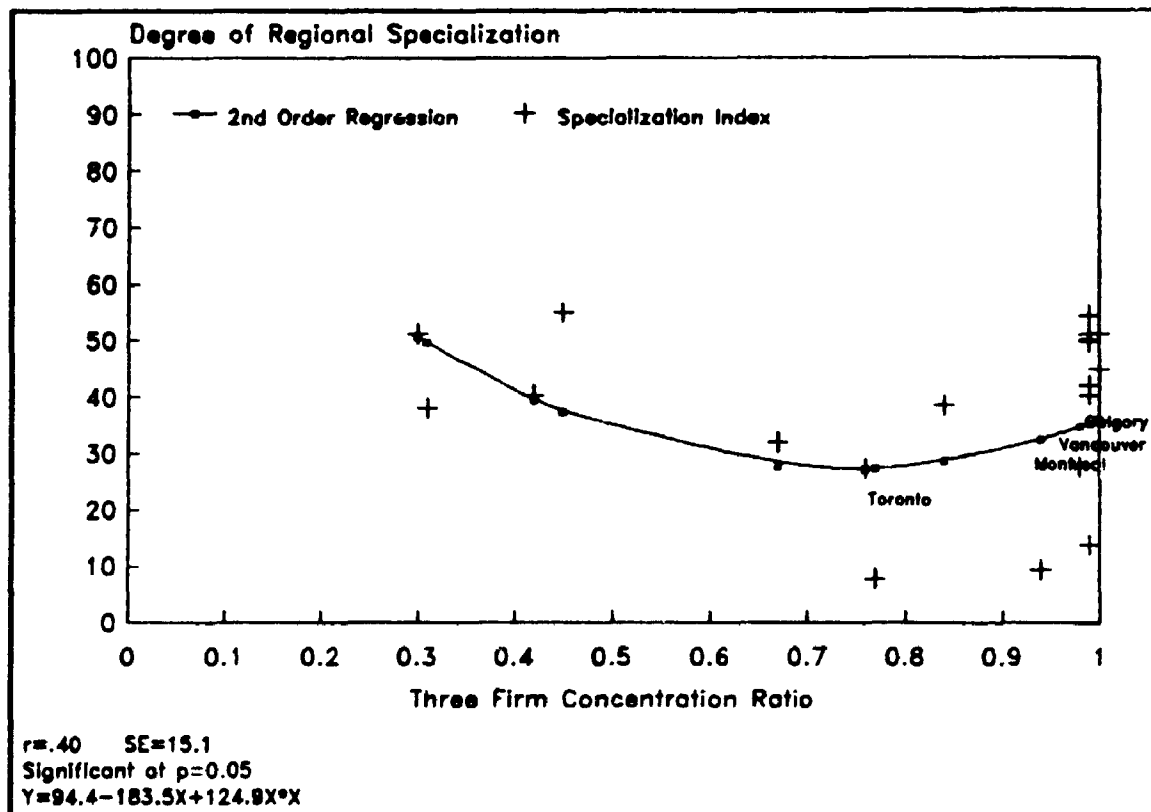


Figure 6.2 Market Concentration and Regional Specialization

relationship is best described by a parabolic second order polynomial function. Market specialization is high at both low and high levels of concentration, and low at intermediate levels of concentration. There is a 5 percent chance that this relationship is due to chance factors for regional specialization, but this increases to 10 percent for funding stage and industrial specialization. The small range in funding stage and industrial sector specialization over a wide range of concentration levels further suggests that this relationship is weak for funding stage and industrial sector specialization. Alternative specifications of the relationship between specialization and concentration such as linear, logarithmic, exponential, power and higher order functions were all

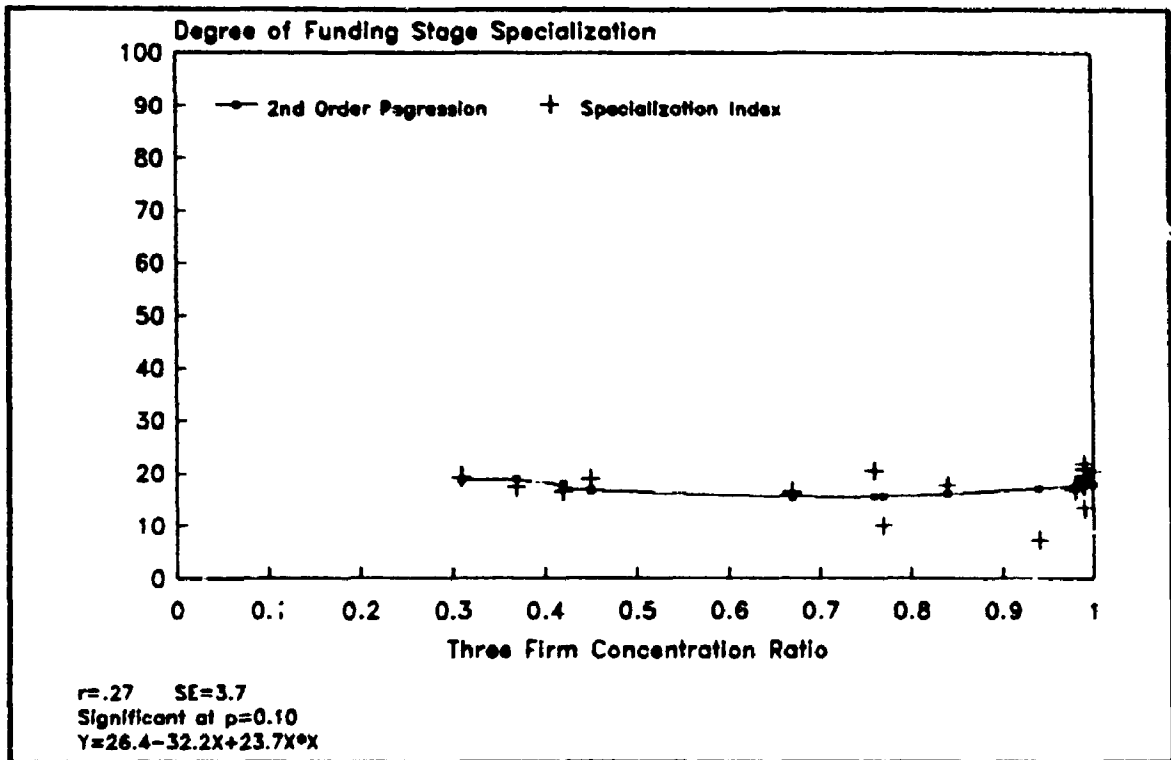


Figure 6.3 Market Concentration and Funding Stage Specialization

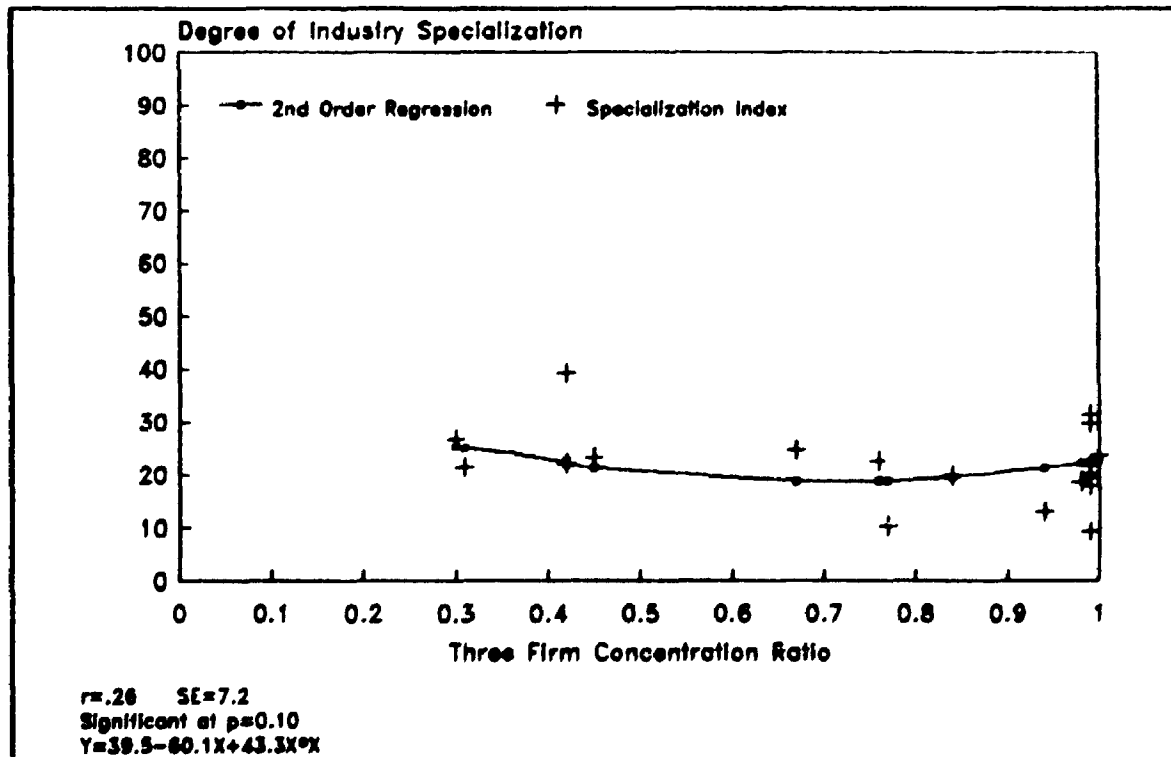


Figure 6.4 Market Concentration and Industrial Sector Specialization

tested, but did not yield superior descriptions of the data.

V. Summary

This chapter provided an empirical investigation of specialization in urban venture capital markets. The analyses revealed the following results:

- (1) Sources of venture capital in both Canada and the United States are concentrated in a few urban markets.
- (2) The concentration of venture capital sources within an urban market is inversely related to the size of the market.
- (3) Market specialization has not changed significantly over the time period 1973 to 1985.
- (4) The degree of specialization varies widely by market. Canadian markets are generally less specialized than American ones. Each market has a unique combination of regional, funding stage and industrial sector specializations.
- (5) The relationship between market concentration and specialization follows a U-shaped curve. Market specialization is high at both low and high levels of concentration, and low at intermediate levels of concentration.

These results generally support the theoretical explanation of market specialization based on the concepts of information impactedness and idiosyncratic capital presented in Chapter Two. Generally, in large markets where transactions are less idiosyncratic, venture capitalists must specialize in order to organize, interpret and use all available information. In small markets where there is little information, and transactions are highly idiosyncratic, venture capitalists must specialize in order to generate enough expertise to make satisficing decisions. In

markets of intermediate size, venture capitalists need not specialize to the same degree in order to use available information.

The implications for small and new firm development are clear. First, access to this form of badly needed equity capital is both hierarchically and spatially biased toward a few large centres. Second, there may be greater support for the development of certain new industries in some markets over others. While entrepreneurial talent may be ubiquitous, it cannot make an economic contribution if the enabling mechanism of capital is not available. In any case, entrepreneurs with the greatest desire to succeed may be drawn to those cities with a financial community willing to undertake the risk of venture capital. If this is the case, economic growth and job creation might concentrate in these centres.

INVESTMENT PATTERNS

I. The Investment Process

The venture capital investment process can be divided into two phases: (1) a preinvestment phase that involves finding, evaluating, selecting and structuring investments, and (2) a postinvestment phase that involves monitoring, valuing the portfolio and eventually exiting the investment (Coutarelli, 1977). One of the main avenues for a venture capital firm to find projects is through the personal contact networks of its management and shareholders. Outside sources, such as lawyers, accountants and business consultants, also act as important referees for investment proposals. Other sources include innovations spawned within large corporations that become operationalized through severed ventures, resignations or employee-buyouts. Many investors have realized that the best investments are those that they create themselves and no longer wait passively for deals to come to them (Knight, 1983). In an increasing number of ventures, the investor is the instigator and driving force, rather than the individual entrepreneur.

Venture capitalists have very sophisticated procedures for investment selection that result in a high rejection rate (Knight, 1983). The quality of the management team and the expected rate of return are often cited as prime considerations in the investment decision (Knight, 1986). Venture capital firms also specialize in the types of investments

they will consider. This specialization may take the form of a particular geographic area, industrial sector, stage in the funding cycle, or a combination of these three (See Chapter Six).

Investments within the same geographic area are usually preferred because of greater market knowledge and ease of monitoring. Haslett (1984), for example, found that it is typical for many American venture capitalists to consider only investments that are within 250-300 miles of their office. An increasing number of investments, however, are made through branch offices, or in syndication with other venture capitalists. Both of these mechanisms can be used to increase the geographic market area of the firm. Canadian venture capital firms most frequently invest in industrial and consumer services and products (standardized technologies), and in computers and other electronics (high-technologies) (Table 7.1). Most firms prefer to invest in the expansion of existing firms rather than in riskier seed and startup situations (Table 7.2). Recently, interest has grown in the corporate debt market because of the demand created by an ever increasing number of acquisitions and leveraged buyouts (LBOs).

The end point of the venture capital investment process occurs when the venture capitalist is presented with an exit opportunity. Exits can be made through several vehicles: repurchase by the portfolio firm, acquisition, initial public offering or writeoff. Repurchases are the most common means of exit and require the longest holding periods, while initial public offerings (IPOs) yield the highest returns and require relatively short holding periods (Table 7.3). Despite careful selection

Table 7.1 Industrial Sector of Portfolio Investments

Industrial Sector	Percent
Industrial Services/Products	20
Consumer Services/Products	19
Computer Related	11
Other Electronics/Instruments	11
Natural Resources	11
Communications	10
Holding/Leasing/Finance	6
Medical/Pharmaceuticals/Biotech	5
Transportation	4
Missing	5
	N= 84

STANDARDIZED TECHNOLOGIES _____ 40%
 (Consumer/Industrial Products & Services)

HIGH-TECH _____ 36%
 (Computer, Electronics, Communications, Medical)

TRADITIONAL SECTORS _____ 20%
 (Natural Resources, Holding, Transportation)

MISSING _____ 4%

Calculated From Survey of Investees.

procedures and monitoring, almost one third of investments end as writeoffs.

This Chapter provides an empirical investigation of the aggregate patterns of preinvestment and postinvestment characteristics. The path of portfolio investments is traced from selection, through monitoring and finally exit.

Table 7.2 Funding Stage of Portfolio Investments

Funding Stage	Percent
Expansion	31
Start-up	27
Seed	17
Leveraged Buyout (LBO)	10
Acquisition	8
Bridge/Mezzanine	4
End Receivership	1
Refinance	1
Missing	1

	N= 84

BEGINNING FIRMS _____ 44%
(Seed and Start-up)

GROWING FIRMS _____ 35%
(Expansion and Bridge)

RESTRUCTURING _____ 20%
(LBO, Acquisition, Refinance)

MISSING _____ 1%

Calculated From Survey of Investees.

II. Investment Selection and Monitoring

Venture capitalists are sophisticated investors, having thorough and routinized procedures for evaluating prospective investments. The general requirements for consideration of a project by members of the Association of Canadian Venture Capital Companies at their annual conference and venture fair are, for example:

- (1) an exceptional market opportunity for products and services must have been identified

Table 7.3 Exits From Venture Capital Investments

Method	Exits		Mean Investment ¹	Mean Holding Period ²	Mean IRR(%) ³
	#	%			
IPD	26	16%	\$999	2.3	197
Acquisition	29	17	700	4.1	21
Repurchase	37	22	453	5.7	44
Writeoff	53	32	613	3.4	-
Other	18	10	421	5.5	-
Unknown	4	2	-	-	-
Total	167	100	647	4.3	23

Adapted from Venture Economics Canada (1986), p. 6.

¹ In thousands of Canadian dollars.

² In years.

³ Internal rate of return in percent.

(2) at least one product must be ready for market

(3) the project must have a potential growth rate significantly above average for the next five to seven years

(4) the project must require at least \$250,000 in equity within the next twelve months

(5) an experienced management team must have been assembled that can execute a formal business plan effectively

On average, only three percent of the proposals submitted to the firms responding to the survey of investors were funded. Further, those firms that received funding from a venture capitalist had already approached a median of twelve (mean of 22) alternative sources including local businessmen, other venture capitalists, relatives and government sources (Table 7.4). The search for funds is a difficult process, and for many firms a venture capitalist is their last chance to find an investor.

Table 7.4 Financing Sources Approached Before Obtaining Venture Capital

Source of Funds	Mean	Median	Std. Dev.	Max.	N=
Local Businessmen	8	4	11	48	44
Other Venture Cap.	6	3	8	38	44
Family and Friends	4	3	4	10	16
Federal Programs	2	1	2	7	30
Provincial Programs	2	1	1	3	23

Calculated From Survey of Investees.

Venture capitalists use a variety of criteria to evaluate proposals and select portfolio investments (Figure 7.1). The business skills, experience and personality of the portfolio firm's management team are of primary concern. Factors such as the location and life-cycle stage of the portfolio firm do not rank highly because proposals are rarely offered from far afield, and relatively few firms approach venture capitalists for seed or startup financing. The reasons given for declining to fund proposals bear little resemblance to rankings of selection criteria (Table 7.5). Most proposals are refused because of their funding stage; few venture capitalists will consider funding firms that have short track records and weak balance sheets, and some do not like to get involved in later-stage acquisitions and LBOs. Unfamiliarity or lack of confidence in the technology of a particular industry is also a common reason for rejecting proposals. Other considerations include general market conditions, a lack of funds to invest, proposals that do not meet the

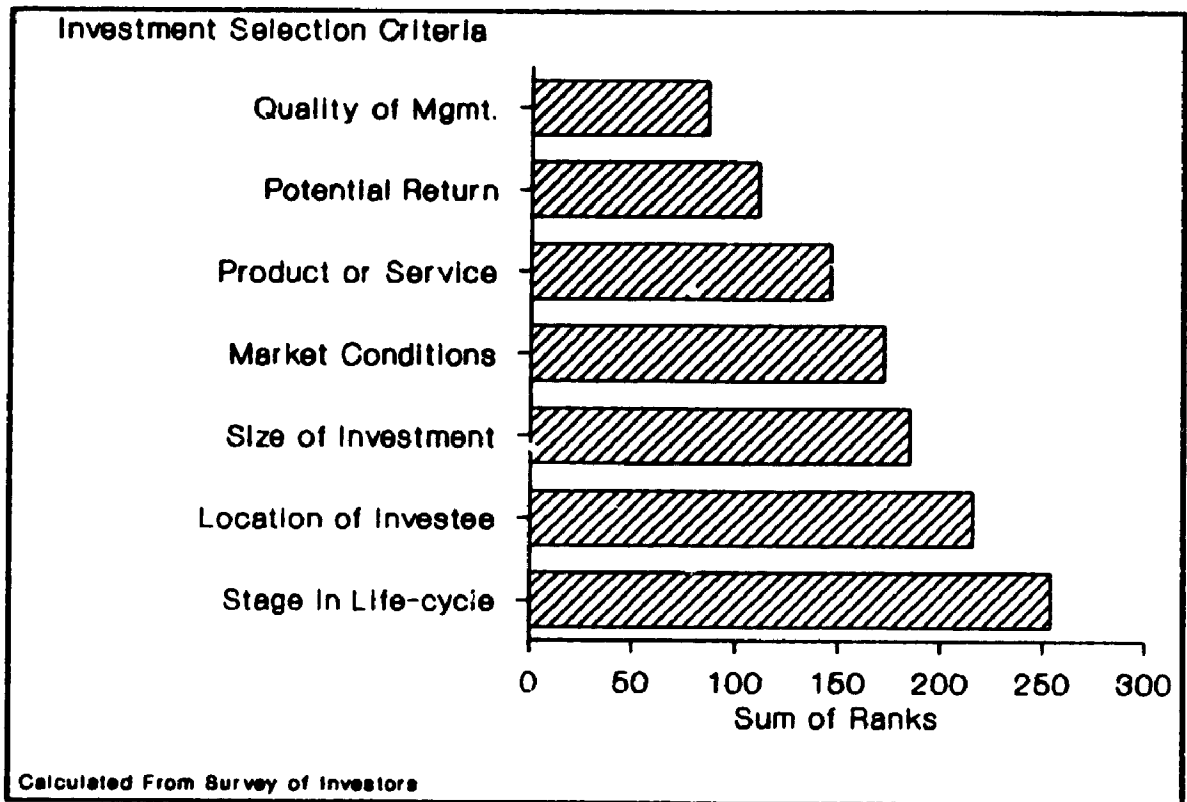


Figure 7.1 Rank of Selection Criteria Considered by Venture Capitalists

criteria of indenture or government mandates and conflicts of interest with firms already in the venture capitalist's portfolio.

On occasion, funding may be offered by a venture capitalist, but the terms are not acceptable to the entrepreneur. Most frequently, the entrepreneur feels that by accepting the offer he/she will have to give up too large an equity share and thus lose control of the company. This is a legitimate concern as the management of few of the portfolio firms surveyed owned more than fifty percent of their firm's shares.

Venture capitalists monitor their investments and provide managerial assistance in an effort to increase the value of their portfolio holdings. This is usually accomplished through one or more seats on the portfolio

Table 7.5 Reasons for Refusal to Provide or Accept Venture Capital Funds

Reasons Given for Turn Down by Investor

Reason	Percent
Funding stage too early	8
Market too risky	5
No experience with industrial sector	5
Funds not available	4
Not in mandate	2
Funding similar company	2
No interest in technology	2
Investment too small	1
Weak balance sheet	1
Already publicly traded	1
Does not supply equity capital	1
No confidence in technology	1
No previous sales	1
Overtrading	1
Missing	65

	N= 84

Reasons Given for Turn Down of Financing Offer

Reason	Percent
Loss of control	10
Not enough capital offered	2
Did not like investor	2
Better deal offered elsewhere	1
Complexity of government program	1
Unethical dealings	1
Cultural impact of English investor	1
Missing	82

	N= 84

Calculated From Survey of Investees.

firm's board of directors, though in some cases an additional fee is charged for managerial consulting. The most frequent form of assistance is securing additional funds from commercial financial institutions and other venture capital investors (Figure 7.2). Venture capitalists are also of help with day-to-day problems in administration, human resources and operations. The technical aspects of product development and production are usually left to the expertise of the entrepreneur. Monitoring and assistance are of a frequent and ongoing nature; the average portfolio firm is contacted by telephone once a week, and is visited by a venture capitalist once a month (Figure 7.3). This varies, of course, with the distance between the investor and investee and with the experience of the portfolio firm's management team.

The paternalistic behaviour of venture capitalists is met by some entrepreneurs with much resentment, but most see their advice as sound and beneficial (Table 7.6). Two-thirds of the respondents to the survey of investees expressed positive feelings about the relationship with their venture capital backer. Most mentioned access to information, skills and cooperation with other firms in the venture capitalist's portfolio as important benefits. Negative comments focused on protracted negotiations, and feelings that the entrepreneur had lost control over the management of his/her own firm.

III. Investment Patterns

Regional Flow of Funds. At the urban level, the locational origin of venture capital investments is similar to the pattern of office

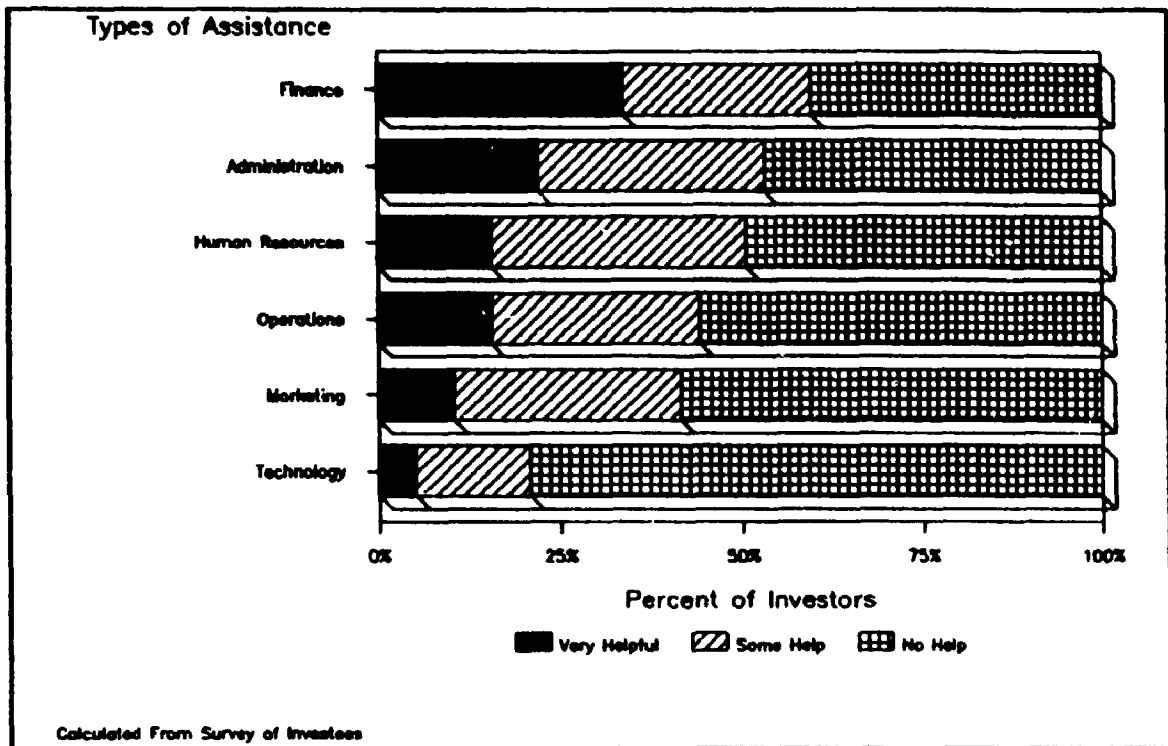


Figure 7.2 Assistance Provided to Portfolio Firms

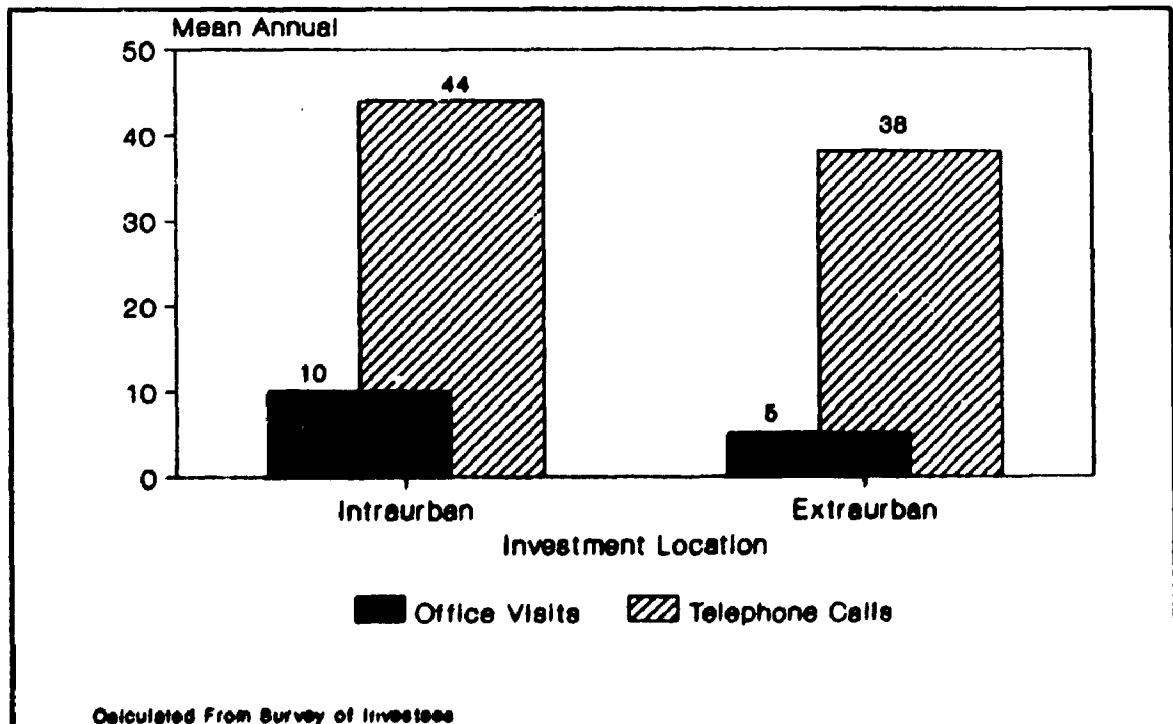


Figure 7.3 Frequency of Monitoring

Table 7.6 Comments Concerning the Role of Monitoring and Assistance

"The venture capitalist on our board takes a direct and genuine interest in the affairs of our company. He continually calls to see what we are doing and to discuss our progress. At the same time, he is very aware of all the new and upcoming techniques that our business touches upon and he is quick to share this information with us, some of which has been quite helpful."

"The venture capitalist presents an objective viewpoint, and a refreshing well honed critique on operations. They also take the most active interest in the company outside of the management shareholders which is vital to the success of any operation."

"...I feel we ended up with a very good deal. First impressions also suggest that both [venture capital] companies will be very helpful. For example, one company has put us in a building they own at a highly subsidized rental rate, giving us a large high quality space we could not sensibly afford on the open market. The other VC looks like they will be very helpful vis-a-vis additional government sources of funding, etc..."

"The venture capital company with which we are involved is committed to helping people build businesses. We regard the company as a partner, giving us support and assistance in management and sharing an appreciation of our visions."

"Dealing with a venture capitalist has opened the eyes and minds of the original principals to the larger corporate world and its possibilities. Their support of management in organization restructuring has been beneficial. Our association with a high profile venture capitalist has also enhanced the credibility of our company with bankers, other businessmen, etc..."

"Venture capitalists tend to make inspiring speeches in the beginning about the 'added value' they provide a startup by virtue of their connections, etc. The reality after the investment proved to be very different. We have concluded therefore that venture capital firms are nothing more than high-risk bankers."

"...there is little 'venture' in most of these organizations and almost all seem to feel they are better suited to control the affairs of their target companies. Giving up control, of course, is absolutely abhorrent to entrepreneurs."

"It is my personal belief that the title 'venture capitalists' is a misnomer in that I have yet to talk to a representative of a company I would deem to be true venture capitalists. In most cases companies do not vary to any great degree from the traditional lending sources."

"Venture capitalists have limited knowledge of entrepreneurs outside their local area and are therefore reluctant to invest."

Comments From the Survey of Investees.

locations discussed in Chapter Five. The destination of venture investments is significantly more diffuse (Table 7.7). At the regional level, Ontario both originates and receives the largest number of investments, followed by Quebec, the Prairie Provinces and British Columbia (Table 7.8). The ratio of investments made to investments received shows Ontario and Quebec to be net exporters of investment, while the Prairie Provinces and British Columbia are net importers. Extreme self-bias is evident in the pattern of regional investments. Venture capital firms in British Columbia make 69 percent of their investments within their own region, firms in the Prairie Provinces 86 percent, firms

Table 7.7 Locational Origin and Destination of Venture Capital Investments

City	Investor		Investee	
	Frequency	Percent	Frequency	Percent
Toronto	28	33%	7	8%
Montreal	20	24	6	7
Edmonton	17	20	10	12
Vancouver	9	11	7	8
Calgary	3	4	12	14
Other	7 ¹	8	42 ²	50
Total	84	100	84	100

Calculated From Survey of Investees.

Chi-square = 52.6 Df = 5 Significant at p=0.01

¹ Investments originated in four other centres.

² Investments were made in thirty-one other centres.

Table 7.8 Regional Flow of Venture Capital Investments

Destination	Location of Investor				N=
	BC	Prairies	Ontario	Quebec	
BC	7%	1	3	2	15
Prairies	1	15	4	1	26
Ontario	1	0	24	1	32
Quebec	0	0	3	21	29
Atlantic	0	0	0	1	1
US	2	2	9	0	15
Foreign	0	0	2	0	2
N=	13	22	54	31	120

Uncertainty Coefficient = .38 $G^2 = 137.4$ Df = 18
 Significant at $p=0.01$

Calculated From Survey of Investors. Values are expressed as a percentage of the overall total.

in Ontario 56 percent, and those in Quebec 84 percent. Firms in Ontario also make a significant number of their investments in the U.S. (20 percent), and were the only ones to make investments in other countries in 1986. The level of investment in Ontario was essentially stable for the period 1979-1986, though the proportion of investment flowing into more peripheral regions, such as British Columbia and the Atlantic Provinces, varied more widely (Figure 7.4). The proportion of investments flowing out of the country significantly decreased in 1986.

Several rationales for the selection of investment locations were suggested by respondents to the survey of investors (Table 7.9). For domestic investments the most frequently cited consideration was ease of

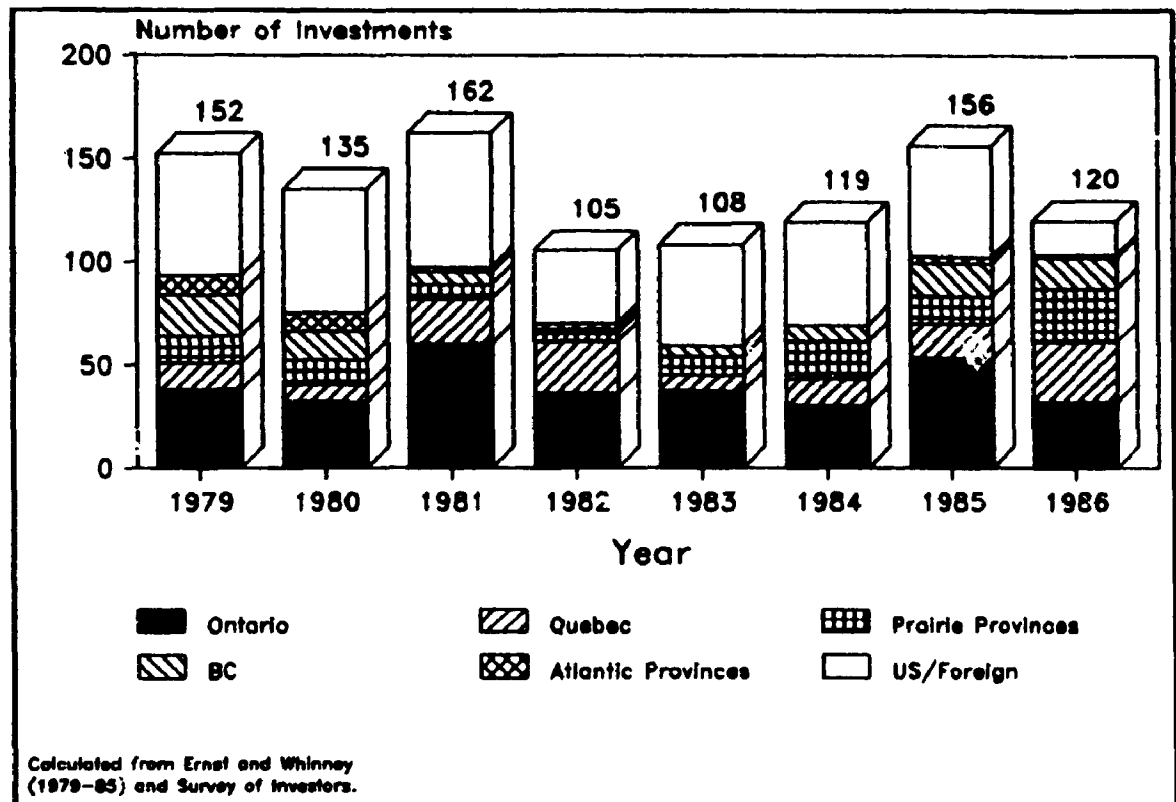


Figure 7.4 Destination of Venture Capital Funds 1979-1986

monitoring, and for investments in the United States profit potential was the most frequently cited reason. Other investors felt that their intimate knowledge of the market allowed them to develop higher returns by investing locally. Still others were attracted by the larger, more diversified and technology intensive market in the United States.

As would be expected in a market with such strong regional self-bias, investment activity decays steeply as the distance between investor and investee increases (Figure 7.5). Most investments are made within 200-300 miles of the venture capitalist's office. This is primarily the result of spatially limited informational linkages. To minimize uncertainty and risk, access to information flows must be maximized. This

Table 7.9 Reasons for Choice of Investment Location**Domestic Investment Locations**

Rationale	Percent
Ease of monitoring	33
Contacts/market knowledge	14
Indenture mandate	14
Government Program	9
Availability of deals	7
Relative competition	7
No rationale provided	16
	N= 43

Investment Locations in the United States

Rationale	Percent
Profit Potential	14
Larger more diversified market	9
Market penetration for firms in portfolio	7
Canadian government interference	5
Better organized deals	5
Access to new technology	2
No rationale provided	2
No experience investing in U.S.	56
	N= 43

Calculated From Survey of Investors.

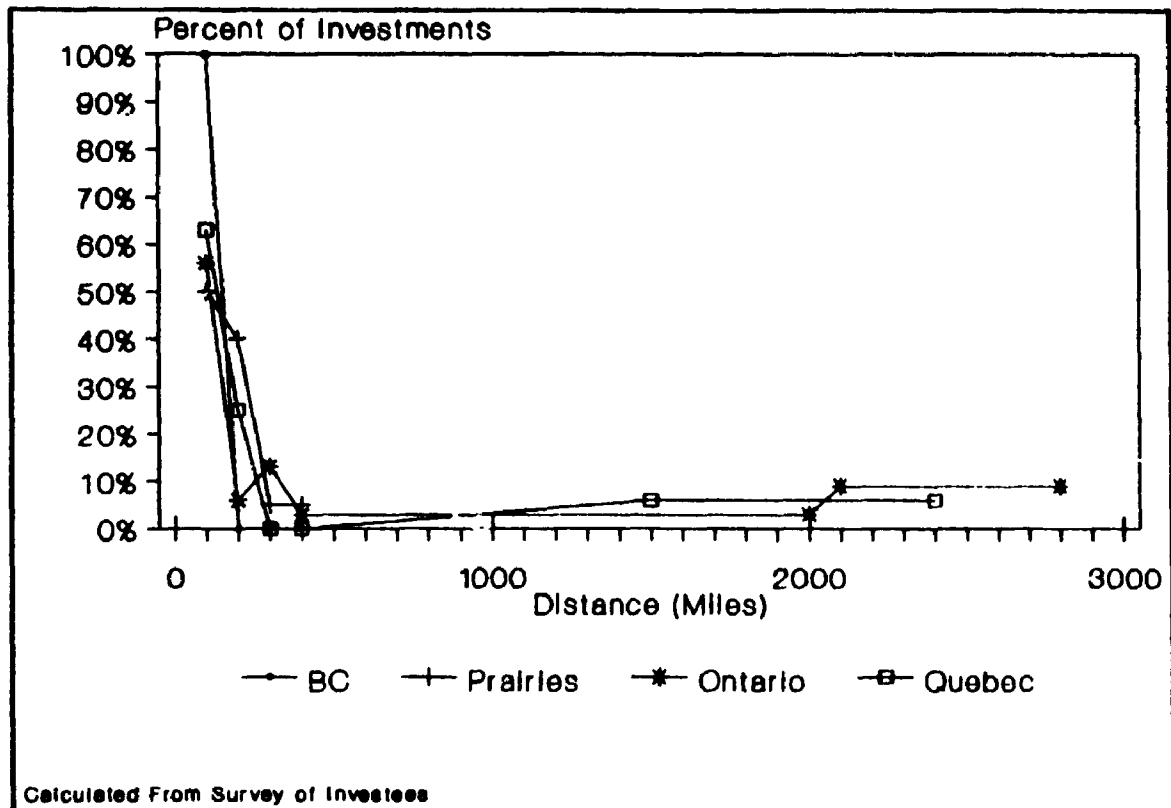


Figure 7.5 Distance-Decay of Investment Activity

constrains the activity space of venture capital firms, and limits the distance over which transactions take place. The transmission of information is affected by several factors. For the venture capital firm, one important factor is the range of personal contacts and business acquaintances possessed by the firm's management team, as personal referrals are often a major consideration in the investment decision. An even more restrictive spatial limit is imposed by what Thorngren (1979) has termed the planning network. Planning networks affect changes to existing linkage structures and are associated with the provision of business assistance by the venture capitalist. Since distance represents

cost in terms of both time and money, investment in local firms both lowers overhead, and helps to ensure the success of a venture.

Two mechanisms are used to extend the distance over which investments can be adequately monitored. The first is the syndication of deals with venture capital firms in other locations. Monitoring is performed by the firm nearest the investment, and the risk is diversified over all firms in the syndication. This approach appears to have greater acceptance in the United States than in Canada. As one venture capitalist explained: "In the U.S. venture capitalists hunt in packs of 3 to 12." "In Canada they are lone rangers in that they feel they can do every thing themselves." There are an average of 1.2 investors per financing in Canada, while in the United States there are an average of 3.7 investors (CVC, 1986).

The second mechanism involves greater cost to the firm; the establishment of regional branch offices. Branch offices appear to be an important part of the Canadian venture capital industry, as 26 percent of the firms responding to the investors' survey had at least one branch office. Firms with branch offices develop much more pervasive contact networks (a function of both their increased size and geographic coverage), and receive more than twice the number of investment proposals considered by their single office location counterparts (Figure 7.6). They also make relatively fewer investments, resulting in a significantly reduced turnover ratio of investment. The turnover ratio is the proportion of proposals received that are eventually funded. This suggests that better access to information about investments allows these

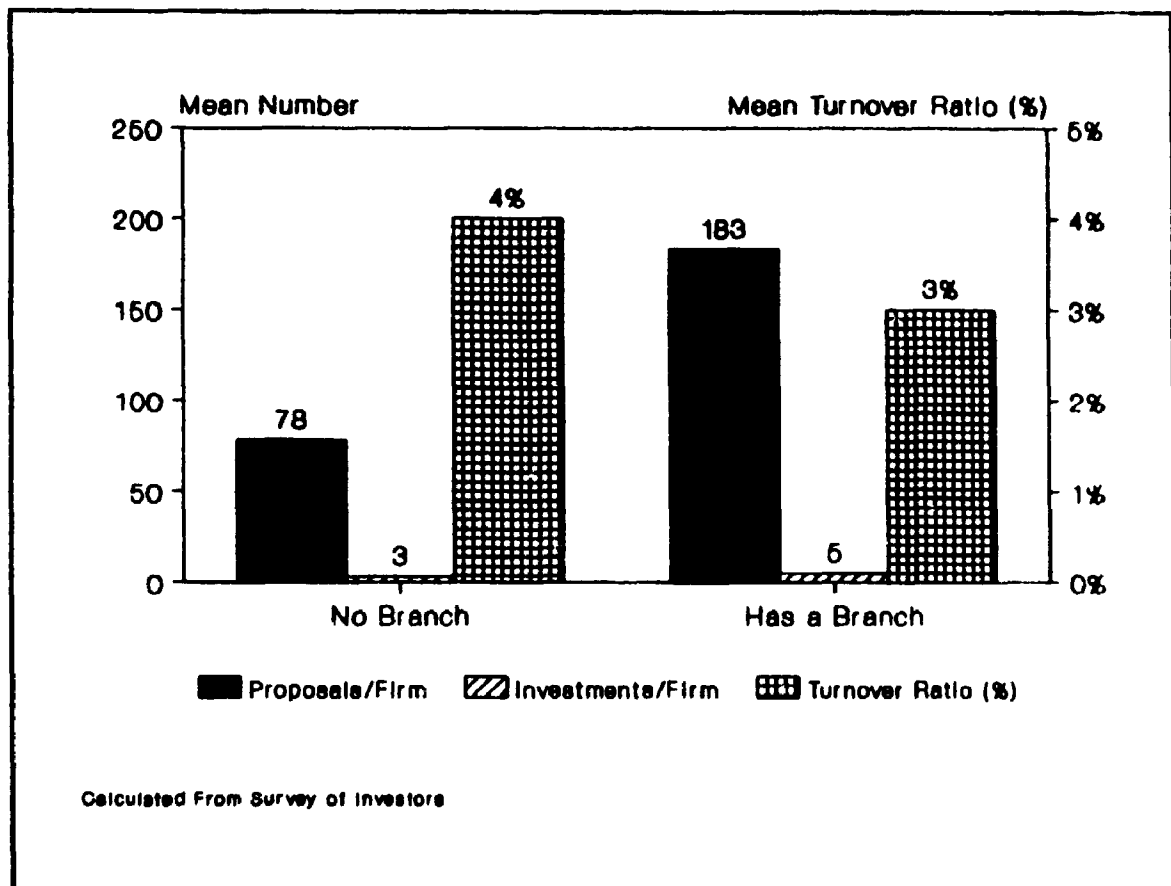


Figure 7.6 Turnover Ratio for Firms With and Without Branch Offices

firms to undertake a more expansive search, and to be more selective by channelling their funds into those few investments that are most likely to be successful and provide large returns.

The regional pattern of investment is also influenced by the receipt of proposals and the turnover ratio. There is considerable regional variation in this ratio (Table 7.10). In particular, the propensity to fund proposals generated in foreign countries and in Quebec is above average, and the propensity to fund those generated in Ontario and the Atlantic Provinces is below average. This pattern is the result of variations in the degree of competition for funds; higher levels of

Table 7.10 Turnover Ratio by Locational Origin of Proposals and Location of Investor

Destination	Location of Investor				
	BC	Prairies	Ontario	Quebec	All
BC	4	25	4	2	4%
Prairies	4	3	8	3	4
Ontario	4	0	3	1	3
Quebec	0	0	2	7	6
Atlantic	0	0	0	11	1
US	8	9	3	0	4
Foreign	0	0	8	0	7
All Regions	4	4	3	4	3

Calculated From Survey of Investors. Values are the proportion of proposals received that were funded for each origin-destination pair.

competition in Ontario are a function of the large number of proposals venture capital firms have to choose from, while in the Atlantic Provinces it is a function of the paucity of capital sources.

The regional pattern shown in Table 7.10 is very different from the pattern of actual investment shown in Table 7.8. There is no evidence of regional self-bias, in fact, proportional funding of other regions is much higher in the cases of British Columbia-United States, Prairie Provinces-British Columbia, Ontario-foreign, and Quebec-Atlantic Provinces. This is the result of regional differences in the quantity of proposals available, and in the level of information that is available upon which to judge their quality. Proposals received from the United States and from other foreign countries, for example, are much more likely to have

been screened by another funding source and referred to the Canadian venture capital firm as part of a syndication. In other cases (particularly in the Atlantic Provinces and to some extent in British Columbia), the paucity of local venture capital may force enterprises to seek funds in a contiguous region (Quebec and the Prairie Provinces respectively).

Industrial Sector and Funding Stage Patterns. There is a significant difference in the frequency of portfolio firm industrial sectors by region; there is no significant difference in the frequency of funding stages by region or by industrial sector (Table 7.11). Investments in British Columbia and the Prairie Provinces are evenly distributed between standardized, high-technology and traditional sectors. Investments in Ontario are more frequently of a high-technology nature; those in Quebec frequently involve standardized technologies. Investments in British Columbia, the Prairie Provinces and Ontario are more frequently in the beginning or growing stages of corporate development, while those in Quebec are conspicuous for their emphasis on restructuring.

In order to test for a three-way association between region, industrial sector and funding stage, all possible log-linear models were calculated for these data tables (Table 7.12). Log-linear models focus on the structural analysis of tables and are increasingly used for the analysis and estimation of spatial patterns. Current expositions of the log-linear model are the result of work by Bishop, Fienberg and Holland (1975), and Fienberg (1981). Reviews of the model with applications to the social sciences are provided by Knoke and Burke (1980), Gilbert

Table 7.11 Sectoral and Funding Stage Patterns of Investment

Location of Investee					
	BC	Prairies	Ontario	Quebec	N
Industrial Sector of Investee					
Standardized Tech	8%	13	9	13	33
High-Tech	6	11	20	0	30
Traditional	5	10	1	5	17
N	15	27	24	14	80 ¹
Uncertainty Coefficient =	.11	$G^2 = 21.6^{**}$		Df = 6	
Funding Stage of Investee					
Early Stage	10%	16	16	4	37
Growing Firms	5	15	10	6	29
Restructuring	4	5	4	8	17
N	15	29	24	15	83 ²
Uncertainty Coefficient =	.05	$G^2 = 9.2$		Df = 6	
Funding Stage of Investee					
	Early	Beginning	Restructuring	N	
Industrial Sector of Investee					
Standardized Tech	17%	13	13	33	
High-Tech	20	13	4	29	
Traditional	8	9	5	17	
N	35	27	17	79 ³	
Uncertainty Coefficient =	.03	$G^2 = 4.8$		Df = 4	

Calculated From Survey of Investees.

^{**} Indicates significance at $p=0.01$.

¹ Four firms did not provide their industrial sector.

² One firm did not provide funding stage information.

³ See notes 1 and 2 above.

Table 7.12 All Possible Log-Linear Models of INDUSTRY, SECTOR and REGION

Model	Likelihood Ratio	Probability	DF
I*S*R	0.0	1.000	0
I*R S	31.0	0.096	22
I S*R	43.9	0.004	22
I*P R	50.0	0.001	24
I*S	56.1	0.001	27
I*R	37.4	0.040	24
S*R	49.5	0.002	24
I S R	54.8	0.002	28
I P	60.8	0.001	31
I R	60.8	0.001	31
S R	60.4	0.001	30
I	67.2	0.000	33
S	66.4	0.000	33
R	66.8	0.000	32

Calculated From Survey of Investees.

I = Industrial Sector of Portfolio Firm

S = Funding Stage of Portfolio Firm

R = Regional Location of Portfolio Firm

* = Indicates an interaction effect, a blank indicates independence

(1981), and Fischer and Nijkamp (1985).

Log-linear models are generated using an iterative proportional scaling algorithm. The algorithm generates maximum likelihood estimates for the cell counts of an observed contingency table using effect parameters. The estimates are constrained by the requirement that the marginal totals of the derived contingency table must equal certain specified marginal totals of the observed contingency table. The

constraining specified marginal totals are the effects included in the model. The cell counts of the derived contingency table are then compared with those of the observed contingency table. If no significant difference is found, the effects are accepted as those that describe the observed table.

Beginning with a saturated model in which all effects are included, terms are successively deleted until a statistically significant model is found. Without an a priori determinant of the model, the simplest model generating no significant differences between the observed and derived contingency tables is chosen as the parsimonious description of the relationships contained in the observed table. This technique is thought to be superior to that of successively adding terms to an initial effect (Benedetti and Brown, 1978).

The log-linear model allows for an examination of the interrelationships between variables. By controlling for the effects of such interrelationships, the model provides for a more sophisticated analysis than is possible by comparing raw frequencies. Log-linear modelling may be viewed as analogous to testing for independence between variables. If no interaction term is necessary to recreate the observed contingency table, the variables can be considered to be independent in their effects upon cell counts.

In this case, the model INDUSTRY*REGION STAGE is parsimonious, generating no significant difference between observed and predicted frequencies at the 95 percent confidence level. Selection of this model is confirmed by tests that three-way effects are zero, by tests of partial

association and by G^2 statistics. This model suggests that there is an interaction between industrial sector and location (there are significant regional variations in the industrial sector characteristics of portfolio firms), and that funding stage characteristics are independent of either industrial sector or location. The log-linear model generates only one statistically significant residual, underpredicting the occurrence of portfolio firms located in Quebec that are using standardized technologies and are undergoing restructuring.

The lambda parameters of the log-linear model INDUSTRY*REGION STAGE are provided in Table 7.13. These values are the mean log of the frequencies in a particular category minus the grand mean of the three-way frequency table. Positive values of lambda indicate that the mean number of observations in a particular category is larger than the overall mean; negative values indicate the opposite. The significance of these values can be tested by dividing them by their standard error to yield a Z-value that is approximately normally distributed. The significant parameters show:

- (1) a larger than average number of firms in high-technology sectors located in Ontario,
- (2) a larger than average number of firms in standardized sectors located in Quebec,
- (3) a smaller than average number of firms in traditional sectors located in Ontario, and
- (4) a smaller than average number of firms in high-technology sectors located in Quebec.

This regional variation in industrial sector characteristics may be explained by differing technical relationships between the factors of

Table 7.13 Lambda Parameters of Model INDUSTRY*REGION STAGE

INDUSTRY*REGION

Region	Standardized Tech	High-Tech	Traditional
BC	-.21	-.01	.22
Prairies	-.20	.09	.11
Ontario	-.19	.92 [‡]	-.73 [‡]
Quebec	.60 [‡]	-1.02 [‡]	.40

STAGE

Beginning Firms	.25
Growing Firms	.00
Restructuring	-.25

INDUSTRY

Standardized Tech	.24
High-Tech	-.04
Traditional	-.20

REGION

BC	-.11
Prairies	.48 [‡]
Ontario	-.06
Quebec	-.31

[‡] Indicates statistical significance at $p=0.05$.

production. Each Canadian region is not simply operating at different points along the same production function, but rather has its own production function (Lande, 1978). This causes regional differences in what is seen to be innovative, and results in a bias toward those sectors where there is a competitive advantage.

IV. Exits

Exiting profitably is the ultimate goal of a venture capital investment. Exits can be made through several vehicles: repurchase by the portfolio firm, acquisition, initial public offering or writeoff. Initial public offerings, the preferred method of exit, were used to exit from 12 percent of Canadian investments, compared with 32 percent of investments in the United States (Table 7.14). Two explanations are possible: (1) the investments made in the United States are in larger firms with proven track records, or (2) the public markets in the United States are more receptive to venture-backed companies. The first is probably untrue as mean investment size is the same in Canada as in the United States (Table 7.15). Within Canada IPOs are most common in British Columbia and Quebec, both of which have developed significant over-the-

Table 7.14 Exit Vehicles by Region

	BC	Prairie Provinces	Ontario	Quebec	Atlantic Provinces	All Canada	USA
IPO	29%	6	8	25	0	12	32
Acquisition	0	11	23	14	29	18	14
Repurchase	43	28	22	25	14	25	11
Writeoff	14	11	37	29	43	30	32
Other	14	45	11	7	14	15	11
N=	7	18	65	28	7	125	28

Adapted from Venture Economics Canada (1986), p. 10. Values are expressed as a percent of the column totals.

counter markets for the trading of smaller firms. Repurchases by the entrepreneur are twice as common in Canada as in the United States, reflecting the greater concern of Canadian entrepreneurs for regaining control of their company. Writeoffs account for a similar proportion of exits in both countries, suggesting that similar levels of risk are undertaken in both markets.

The notion that similar levels of risk exist in both markets is also borne out by the mean internal rate of return on investments (IRR) which is equivalent in both countries (Table 7.15). When disaggregated by industrial sector, the mean IRR is highest in the communications, computers and electronics sectors. It is surprisingly low (by comparison) in the biotechnology and medical related fields. The growth of interest in leveraged buyouts is easily explained by a large mean IRR, and short mean holding period. Further, as LBO investments are usually in the form of debt rather than equity, and a track record is established, the level of risk is significantly reduced. As they are frequently very large, leveraged buyout investments contribute to the positive relationship frequently observed between investment size and mean IRR (Table 7.16). This relationship may also be indicative that investors do not provide sufficient capital to support growth, or it may simply reflect the fact that follow-on financing is not provided to investments that provide inferior returns. Finally, one of the most salient observations about portfolio returns is that a small number of investments provide superior rates of return contributing to an adequate overall mean IRR (Table 7.17). Only 15 percent of exits generate returns greater than 50 percent, and

Table 7.15 Internal Rates of Return by Region, Industrial Sector and Funding Stage

	Exits		Mean Investment ¹	Mean Holding Period ²	Mean IRR(%) ³
	Number	Percent			
Location					
Quebec	28	17%	855	4.6	28
Canada less Quebec	100	60	588	3.9	23
Canada	128	77	684	4.0	24
United States	28	17	654	3.5	23
Industrial Sector					
Communications	17	10			28
Computer Related	20	12			29
Other Electronic	8	5			29
Biotechnology	2	1			12
Medical/Health	8	5			12
Energy	16	10			17
Consumer Related	26	16			23
Industrial Prod.	25	15			26
Other	38	23			19
Unknown	7	4			-
Funding Stage					
Seed/Startup	60	36	545	4.5	16
Expansion	45	27	707	3.8	22
Leveraged Buyout	14	8	1098	2.4	55
Turnaround	11	7	879	4.0	23
Other	1	1	-	-	-
Unknown	36	22	324	4.9	15
Total	167	100	647	4.3	23

Adapted from Venture Economics Canada (1986), pp. 12,13,15.

¹ In thousands of Canadian dollars. Not available by industrial sector.

² In years. Not available by industrial sector.

³ Internal rate of return in percent.

Table 7.16 Internal Rate of Return by Investment Size

Amount Invested	Mean Holding Period	Mean IRR(%)
<\$200,000	4.9	16.7
200,000-499,000	4.2	22.7
500,000-999,000	3.1	21.2
>1 million	4.0	36.3
Total	4.3	23.1

Adapted from Venture Economics Canada (1986), p.18.

these are almost exclusively IPOs. These IPOs play a significant role in producing the 23 percent mean IRR for all investments.

V. Summary

The surveys of both venture capital investors and their portfolio investments yielded much information regarding the pre and postinvestment patterns of Canadian venture capital investment. Specific findings include:

- (1) The search for funds is a difficult process, and for many firms the venture capitalist is a last chance investor.
- (2) Venture capitalists monitor their investments and provide managerial assistance in an effort to increase the value of their portfolio holdings.
- (3) At the regional level, Ontario both originates and receives the largest number of investments, followed by Quebec, the Prairie Provinces and British Columbia.
- (4) In terms of the number of investments made, Ontario and Quebec are net exporters and the Prairies and B.C. are net importers.

Table 7.17 Distribution of IRR by Exit Vehicle

IRR range	IPD	Repurchase	Acquisition
>200%	8%	0	0
126-200	8	0	0
76-125	15	3	0
51-76	4	0	14
26-50	8	16	7
16-25	15	16	7
0-15	12	30	35
<0	0	8	7
Missing	30	27	30
N=	26	37	29

Adapted from Venture Economics Canada (1986), p. 17.

(5) There is extreme self-bias in the selection of regional investment location. Investments are characterized by steeply sloped distance decay curves.

(6) The proportion of proposals received that are funded is very small. Regional variations in the proportion of proposals funded are not related to self-bias.

(7) There are significant regional variations in the industrial sector characteristics of portfolio firms.

(8) Writeoffs account for a similar proportion of exits in both Canada and the United States, suggesting that similar levels of risk are undertaken in both markets.

(9) A small number of investments provide superior rates of return contributing to an adequate overall return on the portfolio.

The selection of venture capital investments is an important process because it screens potential high growth firms and provides them with the needed capital and human resources. Despite careful and sophisticated procedures for selection, almost one third of these select firms must be

written off through closure or bankruptcy. In an effort to prevent this, and to increase the value of their holdings, venture capitalists closely monitor the day-to-day activities of their investments and contribute managerial expertise.

One of the results of this monitoring is a strong bias toward local investments as distance represents a cost both in terms of time and travel. The level of knowledge about potential projects also constrains the activities of venture capitalists. As the amount of information available is greatest in the largest urban centres, venture capitalists locate their offices there. The number of proposals submitted from local firms, and the increased availability of information with which to judge these proposals translates into a bias in the absolute number of investments made within the indigenous region. However, the turnover ratio for investments is often higher for investment projects further afield. This occurs because venture capitalists seek to minimize their risk/return ratios. These investments offer above average returns, and the risk is significantly reduced through referral, syndication or reconnaissance provided by a branch office.

Within their local market, venture capitalists specialize in the funding of particular industrial sectors. The choice of this specialization is constrained by the production function of the indigenous region, and more specifically by the economic base of the centre within which the venture capitalist is located. This pattern of regional bias in both investment location and industrial sector implies that there may be a greater ability to support the growth and development of these high

growth firms in some regions over others. Thus the economic benefits that accrue from these firms are also likely to be biased. This proposition is explored in the following chapter.

Chapter Eight

ECONOMIC IMPACT

I. Impact of Small Firms

The small business sector has assumed a prominent role in discussions pertaining to economic growth and development. There is considerable evidence reported in the business literature, however, that suggests only a small proportion of new and small firms achieve rapid growth and make a significant contribution to job generation and economic growth. This minority of firms is the prime target of the venture capital investment selection process.

Venture capitalists provide capital to companies that have the potential to achieve a superior rate of growth and hence a superior rate of return. To maximize their potential for success, and the profitability of their investments, venture capitalists must develop the ability to select good companies before they have an established track record. They must also back up their investments with the managerial support required to help the company realize its potential. This is particularly true of early stage investments in high-technology sectors.

Those venture backed companies that succeed, and become sufficiently strong and profitable to provide large returns for their investors, also create new economic activity as a result of their success. They generate revenues, they employ people, they pay taxes, they invest in research and development (R&D), they export their goods and services, and they generate

surplus capital that can be reinvested. Clearly the more successful these companies are, the greater their combined economic impact.

This chapter provides an empirical description of the financial characteristics and growth of venture capital portfolio firms, and an estimate of their economic impact. Because of the relatively few cases available, these analyses are based on the concept of a typical firm in each industrial sector, funding stage and regional location. The median (the middle value in a ranked distribution) is used throughout this chapter as the preferred measure of central tendency. The distributions of these financial characteristics are often highly skewed. The mean can be sensitive to a few extreme values; the median is more robust to the influence of such outliers. A final section describes the relationship between the financial performance of portfolio firms and their economic impacts.

II. Sources of Equity Capital

Venture capital investment activity has increased considerably in the past few years. In 1980, for example, Canadian venture capitalists had approximately \$26 million invested in 76 companies. By the end of 1986 they had over \$348 million invested in some 300 companies. This growth in the market is mirrored by an increase in the combined equity of the portfolio firms that responded to the survey of investees (Figure 1). In 1980, nineteen firms had a combined equity worth of \$30.7 million (\$2.1 million from venture capitalists); in 1986 seventy firms had a combined equity worth of \$261.7 million (\$65.1 million from venture capitalists).

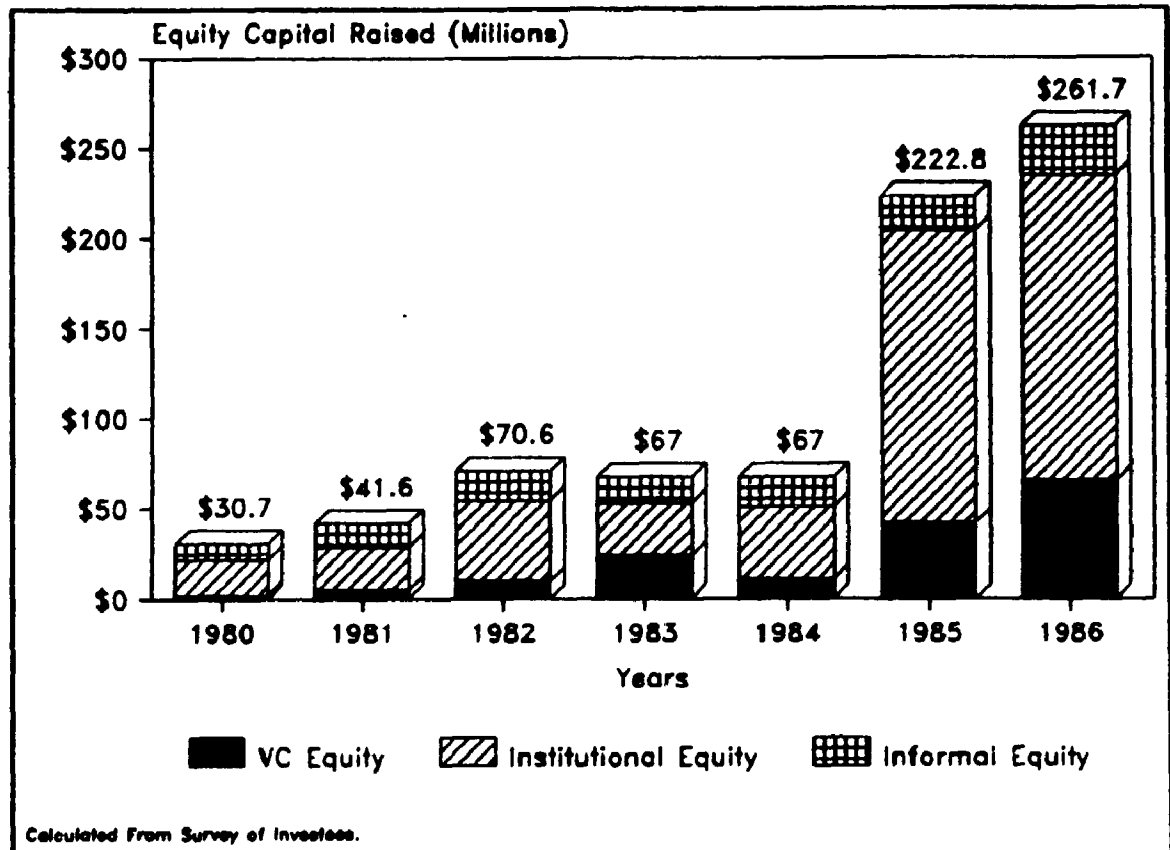


Figure B.1 Combined Equity of Portfolio Firms 1980-1986

The sample of responding portfolio firms accounts for about one-quarter of the venture capital investment activity over the period 1980-1986.

One result of increased venture capital investment is that a greater proportion of the total equity demand can be met from this source. The proportion of total equity coming from venture capital sources increased from seven to twenty-five percent between 1980 and 1986. The proportion coming from other institutional sources remained at sixty-four percent during the period, and the contribution from informal sources declined. The mix of venture capital, institutional and informal equity sources varies considerably by the sector, stage and locational characteristics of firms (Table B.1). Firms in high-technology sectors, those undergoing

expansion and those located in the Prairie Provinces are particularly reliant upon venture capital sources. Those firms that depend most heavily on other institutional sources are in traditional sectors, are undergoing restructuring or are located in Quebec.

This differential mix of equity sources is the result of several factors. First, of course, is the amount of equity that is required. In general, more capital is available from institutional sources than from venture capital sources, and more is available from venture capital sources than from informal sources. Second, there is a regional bias in both the availability and propensity to utilize different sources of funds. It is not surprising, for example, that firms in Quebec rely heavily on institutional sources of equity as this province is the traditional locus of such capital sources. Further, the majority of firms in Quebec are in standardized sectors and are undergoing restructuring (See Chapter Seven). These firms are larger, have proven track records and have shares of tangible value that can be sold in return for liquid funds from sources such as merchant banks and holding companies. The final reason for mixes of equity is the differential risk involved in investing in each sector and stage. Beginning firms have the greatest levels of risk and usually approach informal sources first. Older and larger firms have established track records that can easily be evaluated by more sophisticated investors.

The source from which equity capital is obtained has considerable significance because equity is representative of ownership and hence control. Generally, informal investors act as silent partners maximizing

Table B.1 Equity Mix by Industrial Sector, Funding Stage and Region 1986

	(Percent of Total Equity)		
	VC Equity ¹	Institutional Equity ²	Informal Equity ³
Industrial Sector			
Standardized Tech.	53.7%	16.8	28.7
High-Tech.	78.7	6.4	14.9
Traditional Sectors	34.9	42.1	23.0
Funding Stage			
Beginning Firms	65.8%	8.6	25.6
Expanding Firms	71.4	6.6	22.0
Restructuring	11.9	68.3	19.8
Region			
BC	60.2%	0.0	39.8
Prairies	78.8	12.2	9.0
Ontario	49.8	5.9	44.2
Quebec	28.3	54.0	17.7

Calculated From Survey of Investees.

¹ Includes direct equity and unsecured debt or subordinate loans from institutional venture capital sources.

² Includes direct equity and unsecured debt or subordinate loans from merchant banks, holding companies, underwriters, et cetera.

³ Includes direct equity and unsecured debt or subordinate loans from relatives, friends, and local businesses.

the managerial autonomy of the entrepreneur. Venture capital investors usually require some involvement in the firm, either through a seat on the board of directors, or through active management participation. Rarely, however, does a venture capitalist obtain controlling interest in an investment. Institutional investors have different operating philosophies that range from non-involvement in management through complete turnover

of management personnel. Institutional investors frequently try to obtain a controlling interest in their investments.

III. Financial Characteristics

The firms responding to the survey of investees collectively had revenues of \$2.1 billion, assets of \$2.9 billion, a debt load of \$0.6 billion, \$0.7 billion worth of equity and \$0.3 billion of retained earnings in 1986. This translates into median values for the typical firm of: \$5.3 million (revenues), \$4.6 million (assets), \$2.2 million (debt), \$1.5 million (equity) and \$0.1 million (retained earnings). By comparison, the Globe and Mail top 1000 companies had combined revenues of \$406.5 billion (a mean of \$4.1 million per firm), and \$1043.7 billion of assets (a mean of \$10.4 million per firm) in 1986 (Report on Business, 1988).

The median value of these financial characteristics varies significantly by funding stage and by regional location (Table 8.2). There is no significant difference by industrial sector. As these characteristics are general measures of firm size, and size increases as firms mature and progress through the funding cycle, these results are not surprising. Regional differences are primarily the result of the unusual number of large firms in standardized sectors undergoing restructuring that are located in Quebec (See Chapter Seven).

The median debt/equity ratio does not vary significantly by either industrial sector, funding stage or regional location. The ratio ranges between 0.5 and 1.1. The comparatively large coefficients of variation

Table 8.2 Financial Characteristics of Portfolio Firms 1986

	(In Millions of Canadian Dollars)									
	Industrial Sectors			Funding Stages			Regions			
	Std.	Tech.	Trad.	Beg.	Exp.	Rest.	BC	Pra.	Ont.	Que.
Total Rev										
Mean	\$34.3	11.7	58.9	2.0	23.0	92.4	13.6	21.2	15.8	78.4
Median	10.0	3.0	5.3	0.4 ^{§§}	13.1	22.9	1.7 [§]	8.3	3.1	16.5
Coefficient of Var. ¹	2.5	1.7	1.8	1.9	1.4	1.4	1.8	1.8	1.8	1.8
Valid Cases ²	27	26	14	26	28	15	12	24	20	14
Total Assets										
Mean	\$19.0	8.9	54.9	2.9	15.4	67.9	25.5	11.1	15.1	47.1
Median	6.6	3.7	7.8	1.7 ^{§§}	9.9	16.2	0.8 [§]	4.9	3.5	16.0
Coefficient of Var.	2.0	1.7	1.7	1.6	1.0	0.2	2.8	1.3	1.9	1.7
Valid Cases	27	28	15	29	28	16	14	26	20	14
Total Debt										
Mean	\$6.9	3.2	26.0	1.3	5.8	25.0	1.4	6.4	6.3	22.1
Median	2.5	0.8	2.9	0.3 ^{§§}	2.9	4.0	0.4	2.3	1.5	4.8
Coefficient of Var.	1.6	1.5	1.8	2.7	1.0	1.6	1.8	1.7	1.8	1.9
Valid Cases	27	22	11	22	26	15	11	23	17	13
Total Equity										
Mean	\$6.1	4.2	24.1	1.2	6.7	27.1	13.6	3.6	5.1	18.9
Median	1.2	1.3	4.2	0.6 ^{§§}	4.4	3.3	0.4 [§]	2.5	1.2	4.3
Coefficient of Var.	2.6	1.9	2.0	1.1	1.2	1.8	3.1	1.2	1.9	2.0
Valid Cases	29	28	15	31	28	16	14	27	21	14
Debt/Equity Ratio										
Mean	0.4	0.2	0.5	0.0	0.2	2.3	0.0	1.7	0.0	1.6
Median	0.9	0.7	0.7	0.7	0.9	1.1	0.6	1.0	0.5	0.8
Coefficient of Var.	16.3	18.0	11.8	6.8	23.5	1.7	9.4	1.4	5.9	2.0
Valid Case	27	22	11	22	26	15	11	23	17	13
Retained Earnings										
Mean	\$8.1	0.4	5.9	-0.7	2.5	17.1	14.5	0.8	-0.6	8.8
Median	0.0	0.0	1.2	-0.1 ^{§§}	1.4	0.7	0.2	0.2	-0.3	0.4
Coefficient of Var.	3.9	8.0	2.2	3.0	1.7	2.5	3.0	2.9	6.5	2.4
Valid Cases	27	22	13	24	26	15	12	22	18	14

Calculated from Survey of Investees.

[§] Indicates a significant difference between medians for sectors, stages or regions at p=0.05.

^{§§} Indicates a significant difference between medians for sectors, stages or regions at p=0.01.

¹ Coefficient of variation.

² Firms reporting financial information.

indicate that a wide variety of strategies are undertaken by firms in regards to their debt/equity mix. The typical firm is not highly leveraged, presumably a result of recent injections of equity capital by venture capitalists. This allows for the flexibility to substantially increase operating debt in times of financial need. Not all firms enjoy this position; two of the respondents had ratios in excess of 11.0. One of these had sought venture capital funds to end voluntary receivership. For comparison, the mean debt/equity ratio of the Globe and Mail top 100 firms is 0.7. High ratios are not necessarily indicative of poor performance and are often the result of recent acquisitions or leveraged buyouts. For example, Campeau's \$6.6 billion takeover of Federated Department Stores contributed to its 1988 ratio of 24.9 (Report on Business, 1988).

The change in these financial variables between 1985 and 1986 is presented in Tables B.3. The typical firm in all sectors, stages and locations is highly growth oriented. The median increase in revenues ranges from 8.5 percent (standardized industries) to 43 percent (firms in Ontario). The range for individual firms, however, is from a decrease of 59 percent to an increase of almost 900 percent. This compares with the Globe and Mail's ten firms with the largest increases in sales whose range is from 5 to 417 percent, with a median of 22 percent (Report on Business, 1988). Changes in assets and in total equity have similar patterns. One firm in the standardized sector increased its assets by 20,300 percent and its debt load by almost 5,000 percent through an unusually large acquisition.

Table B.3 Change in Financial Characteristics of Portfolio Firms 1985-1986

	(Percent Change From 1985 Base)									
	Industrial Sectors			Funding Stages			Regions			
	Std.	Tech.	Trad.	Beg.	Exp.	Rest.	BC	Pra.	Ont.	Que.
Total Revenue										
Mean	65.82	38.9	60.8	104.8	32.4	40.7	51.7	22.2	116.7	21.7
Median	8.5	25.8	26.2	25.4	16.6	36.3	27.2	9.8	43.0	19.5
Coefficient of Var. ¹	3.0	1.6	2.1	2.1	2.8	0.9	1.6	2.0	2.1	1.3
Valid Cases ²	21	20	13	16	27	12	9	19	16	12
Total Assets										
Mean	993.52	28.1	186.1	39.1	99.3	1589.0	2042.7	129.6	41.2	21.6
Median	6.4	21.5	29.3	23.5	13.3	29.3	25.4	21.0	23.8	6.9
Coefficient of Var.	4.5	1.3	3.3	1.8	4.4	3.5	3.1	3.8	1.6	2.1
Valid Cases	21	21	13	18	26	13	10	20	16	12
Total Debt										
Mean	288.22	11.3	10.0	94.6	7.3	402.3	81.7	18.5	15.0	447.5
Median	-9.3	7.5	19.1	10.7	-1.8	-5.6	-20.1	0.5	11.2	-7.9
Coefficient of Var.	3.9	4.9	7.0	3.0	7.2	3.6	4.1	3.2	3.7	3.3
Valid Cases	20	15	10	10	25	12	8	17	12	11
Total Equity										
Mean	-52.52	17.0	134.3	13.1	47.0	-12.0	1.0	68.5	-26.9	20.4
Median	9.6	25.9	16.0	25.9	13.6	14.7	45.4	14.0	26.7	13.8
Coefficient of Var.	5.7	11.6	2.5	25.7	6.2	10.5	15.7	4.8	13.3	2.8
Valid Cases	22	21	13	19	26	13	10	21	16	12
Retained Earnings										
Mean	-24.02	199.0	26.0	47.5	12.4	157.7	153.4	44.3	52.4	28.3
Median	16.6 [§]	81.9	49.0	49.1	25.6	35.3	106.3 [§]	19.9	63.8	20.6
Coefficient of Var.	7.4	2.4	11.9	4.1	22.9	3.3	2.1	11.2	4.4	3.8
Valid Cases	22	17	12	16	24	13	10	18	14	12

Calculated From Survey of Investees.

[§] Indicates a significant difference between medians for sectors, stages or regions at p=0.05.¹ Coefficient of variation.² Firms providing financial information.

There is a significant difference in the median value of retained earnings by both industrial sector and regional location. Retained earnings are an additional source of capital with which future growth can be financed. It is a particularly important source because the firm does not have to compete in the open market. This has several benefits including no cost (other than opportunity cost), no loss of control and assured supply. The large median increase in retained earnings in British Columbia may indicate that firms in that province adapt to the limited number of alternative funding sources through retained earnings. The relatively small coefficient of variation indicates a similarity of firms in pursuing this strategy.

IV. Economic Impact

Research and Development. Total research and development (R&D) expenditures by firms responding to the survey of investees were \$47.8 million in 1986. The median expenditure on R&D by portfolio companies in 1986 was \$500,000, or about 6 percent of revenues (Table 8.4). There are no significant differences between median R&D expenditures by industrial sector, funding stage or regional location. However, there are significant differences in the median expenditures on R&D expressed as a proportion of revenues. In particular, expenditure/revenue is greatest for high-technology firms (14.1 percent), beginning firms (41.8 percent) and firms located in Ontario (14.8 percent). This level of commitment to R&D can be compared with an estimate by Statistics Canada that the mean proportion of revenues allocated to R&D by all industrial firms active in

Table B.4 R&D Expenditures of Portfolio Firms by Industrial Sector, Funding Stage and Region 1986

(In Millions of Canadian Dollars)					
	Mean	Median	C.V. ¹	Cases ²	Total ³
TOTAL					
Expenditures	\$1.0	0.5	1.9	47	47.8
R&D/Revenue	656.1%	5.7	4.9	43	
INDUSTRIAL SECTOR					
Standardized Tech.					
Expenditures	\$0.5	0.1	1.4	14	6.4
R&D/Revenue [†]	93.4%	1.8	3.4	14	
High-Tech.					
Expenditures	\$1.5	0.5	1.7	24	36.1
R&D/Revenue	1221.0%	14.1	3.6	22	
Traditional					
Expenditures	\$0.7	0.7	0.9	6	4.2
R&D/Revenue	7.4%	3.6	1.5	5	
FUNDING STAGE					
Beginning Firms					
Expenditures	\$0.7	0.5	1.3	21	14.4
R&D/Revenue ^{††}	1653.1%	41.8	3.0	17	
Expanding Firms					
Expenditures	\$1.1	0.5	2.0	18	20.5
R&D/Revenue	4.5%	3.8	0.9	18	
Restructuring					
Expenditures	\$1.8	0.1	1.8	7	12.5
R&D/Revenue	2.8%	0.7	1.8	7	
REGION					
BC					
Expenditures	\$0.6	0.2	1.3	10	5.9
R&D/Revenue ^{††}	2409.4%	6.4	2.8	9	
Prairies					
Expenditures	\$0.7	0.4	1.4	15	10.4
R&D/Revenue	491.5%	5.0	3.0	12	
Ontario					
Expenditures	\$1.8	0.5	1.8	14	25.5
R&D/Revenue	44.0%	14.8	1.6	14	
Quebec					
Expenditures	\$0.8	0.3	1.1	8	6.1
R&D/Revenue	1.8%	1.3	0.8	8	

Calculated From Survey of Investees.

[†] Indicates a significant difference between medians at $p=0.05$.

^{††} Indicates a significant difference between medians at $p=0.01$.

¹ Coefficient of Variation.

² Firms that provided financial information.

³ Totals are not exact due to rounding.

R&D is less than 2 percent (Statistics Canada, 1988). The mean expenditure on R&D by the Globe and Mail's top 20 technology firms is 6 percent of revenues, with a range from 1 to 13 percent (Report on Business, 1988).

Exports. The firms responding to the survey of investees had combined foreign revenues in excess of \$0.4 billion in 1986, a median of \$2.6 million per firm. The typical firm received 43 percent of its revenues from foreign sales; this value varies significantly by industrial sector and by funding stage (Table 8.5). The typical high-technology and beginning firm show a greater orientation toward export markets than does the typical firm in other sectors or stages. This is contrary to traditional logic that dictates a firm will first develop a domestic market niche before expanding to foreign markets. This apparent anomaly is explained by the fact that many of these beginning stage firms are also in high-technology sectors. These firms market highly specialized products and services for which there is only limited demand in Canada. The rapid expansion demanded by venture capital investors requires that these firms penetrate foreign markets at an early stage.

The countries that venture backed firms export to are mapped in multi-dimensional scaling space (MDS) in Figure 8.2. The object of MDS is to develop a map or configuration that locates objects according to a measure of similarity that has been computed for all pairs of objects (in this case, the number of firms that export to each country). This is accomplished by locating the coordinates of all objects in a graphical configuration so that the distances between the objects on the

Table 8.5 Foreign Sales of Portfolio Firms 1986

	(In Millions of Canadian Dollars)			
	Mean	Median	C.V. ¹	Cases ²
TOTAL				
Foreign Sales ³	\$12.5	2.6	1.8	36
Foreign Sales/Revenue ⁴	43.0%	43.0	0.8	36
INDUSTRIAL SECTOR				
Standardized Tech.				
Foreign Sales	\$3.4	1.9	1.1	15
Foreign Sales/Revenue ⁴	28.6%	12.7	1.1	15
High-Tech.				
Foreign Sales	14.2	3.6	1.4	14
Foreign Sales/Revenue	58.3	64.6	0.5	14
Traditional				
Foreign Sales	37.8	35.5	1.2	5
Foreign Sales/Revenue	43.8	48.9	0.6	5
FUNDING STAGE				
Beginning Firms				
Foreign Sales	\$4.8	1.6	1.3	7
Foreign Sales/Revenue ⁴	65.0%	77.6	0.5	7
Expanding Firms				
Foreign Sales	11.0	2.7	1.6	18
Foreign Sales/Revenue	35.5	23.6	0.9	18
Restructuring				
Foreign Sales	21.6	3.7	1.6	10
Foreign Sales/Revenue	40.0	44.1	0.7	10
REGION				
BC				
Foreign Sales	\$20.8	15.6	1.1	5
Foreign Sales/Revenue	64.1%	77.6	0.5	5
Prairies				
Foreign Sales	2.7	1.7	1.0	11
Foreign Sales/Revenue	26.8	21.5	0.9	11
Ontario				
Foreign Sales	13.0	3.0	0.8	11
Foreign Sales/Revenue	58.5	58.3	0.5	11
Quebec				
Foreign Sales	19.1	4.5	1.9	9
Foreign Sales/Revenue	32.3	18.2	1.0	9

Calculated From Survey of Investees.

¹ Indicates a significant difference between medians at $p=0.05$.

¹ Coefficient of variation.

² Firms providing financial information.

³ In millions of Canadian dollars.

⁴ Foreign sales as a percent of revenues.

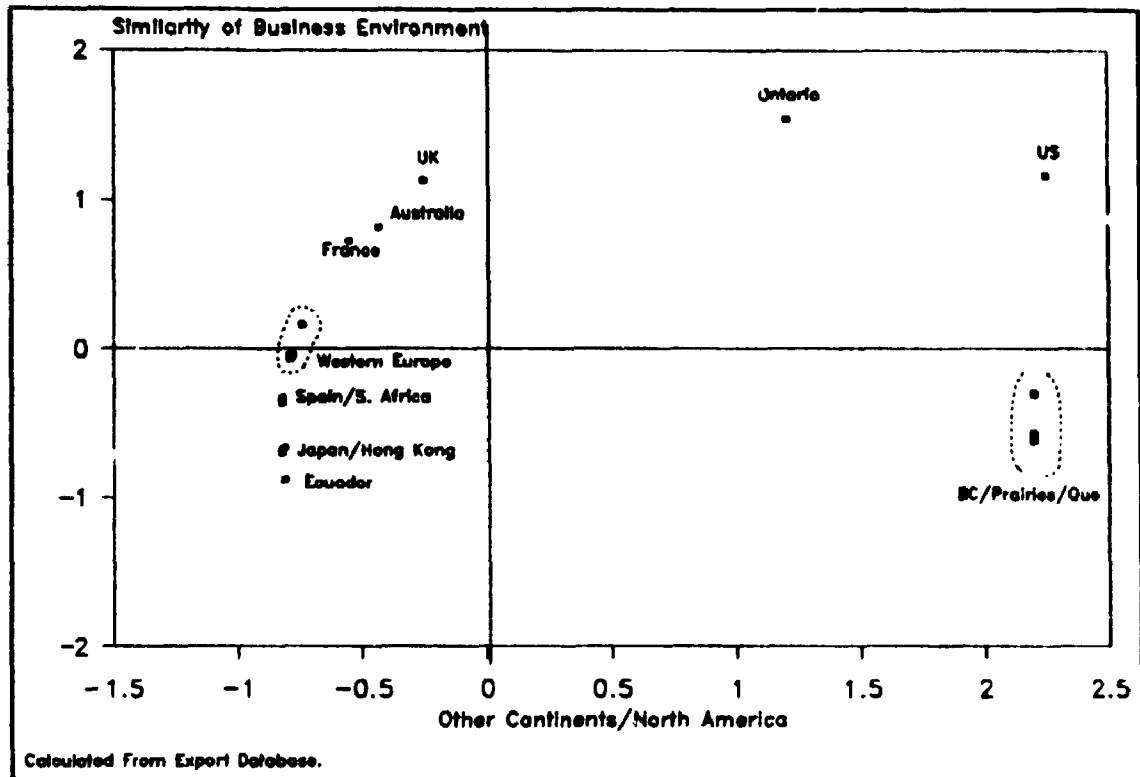


Figure 8.2 Multi-Dimensional Scaling Map of Export Space for Venture Backed Firms by Canadian Regions

configuration have a direct relationship to the actual distances in the original data. The algorithm used to scale these distances maximizes the goodness of fit of the distances on the configuration with the actual distances. The MDS map presented here is based on a classical nonmetric analysis (Shepard, 1962; Kruskal, 1964). It was solved using the alternating least-squares approach proposed by Takane, Young and deLeeuw (1977), and Young, Takane and Lewyckyj (1978). Standard texts on MDS analysis include Kruskal and Wish (1978), Schiffman, Reynolds and Young (1981), and Davison (1983).

The MDS map provides an excellent fit to the cross-tabulation of firm location and destination of exports (all countries to which more than

1 percent of firms export), having a Kruskals stress value of 0.06 and an R^2 of 1.0. The first dimension (on the horizontal axis) can be thought of as measuring proximity in the binary terms of North America and other continents. The second dimension (on the vertical axis) measures the ease of exporting goods and services; a product of the similarity of cultures, languages, legal systems and corporate operating environments.

The United States is the most popular export target for firms in all regions, followed by the United Kingdom, Australia and France for firms located in Ontario. Firms located in other Canadian regions are closer in relative export space to Western Europe, Spain, South Africa, Japan, Hong Kong and Ecuador. Table 8.6 lists the proportion of venture backed firms that export to each of these countries and provides a comparison with the behaviour of exporting Canadian firms in general. The overall ranking of countries of export is similar between venture backed firms and exporting firms in general. The difference is that a much larger proportion of venture backed firms export to each country.

Taxes. The typical portfolio firm responding to the survey of investees paid \$200,000 in corporate taxes, less than \$50,000 in local taxes and withheld \$300,000 in employee income taxes in 1986 (Table 8.7). This resulted in a total addition to government revenues of \$113.2 million, contributed by only 46 firms.

Job Creation. The firms responding to the survey of investees collectively had 16,646 employees and paid-out \$292.1 million in wages in 1986; a median of 54 employees per firm, and a median payroll of \$1.1 million (Table 8.8). The 47 firms that reported both 1985 and 1986

Table B.6 Countries Receiving Exports from Venture Backed Firms

	Venture Backed Firms	All Canadian Firms
United States	70%	34%
United Kingdom	25	5
Australia	20	7
France	18	5
West Germany	15	5
Italy	11	3
South Africa	11	2
Sweden	11	3
Hong Kong	10	3
Japan	10	5
Netherlands	9	3
Belgium	6	2
Spain	6	2
Switzerland	6	2
Ecuador	5	1
Others ¹	2	1
Firms ²	93	22873

Calculated From Export Database.

¹ Venture backed firms exported to 99 other countries, and all Canadian firms exported to 205 other countries.

² Number of firms in the Business Opportunity Sourcing System database. Values are the proportion of these firms that export to each country.

employment information together created 783 new jobs in 1986. There is a significant difference in employment creation by industrial sector. The typical firm in the high-technology sector experienced an increase in employment of 22.3 percent, or 14 employees. Firms in the traditional sector typically experienced no change in employment; however, the total number of new jobs created lagged only slightly behind that of the other two sectors, the result of significant growth in a few firms.

Table 8.7 Taxes Paid by Portfolio Firms 1986

	(In Millions of Canadian Dollars)						Total
	Mean	Median	C.V. ¹	Min. ²	Max.	Cases	
Corporate Taxes	\$0.8	0.2	2.3	-1.3	10.7	43	\$36.1
Local Taxes	0.1	0.0	0.4	0.0	2.1	34	\$4.3
Employee Income Taxes Withheld	1.6	0.3	5.1	0.0	34.5	46	\$72.8
Total Taxes Paid or Withheld							\$113.2

Calculated From Survey of Investees.

¹ Coefficient of variation.

² A negative value indicates that a firm experienced a net refund for the 1985 tax year. Zero values are the result of rounding and represent values of less than \$50,000.

Paradoxically, the typical firm in the traditional sector experienced a payroll increase of 31.8 percent. This is the result of employment growth in a few firms, and the preponderance of management level employees in this sector.

The increase in assets necessary to create each additional job ranges from a median of approximately \$50,000 in the standardized and high-technology sectors to a median of approximately \$200,000 in the traditional sector. This higher "cost" of job creation in the traditional sector may partly explain lower rates of employment growth. As well, significant payroll increases suggest that increases in job intensity are substituted for additional employees.

Table B.8 Employment in Portfolio Firms 1986

	Industrial Sectors			Funding Stages			Regions				Canada
	Std.	Tech.	Trad.	Beg.	Exp.	Rest.	BC	Pra.	Ont.	Que.	
Total Employees (1986)											
Mean	360	148	335	35	221	753	140	155	154	679	264
Median	126	51	46	21 ⁸⁸	186	276	20	52	79	250	54
Coefficient of Var.	3	2	2	1	1	2	2	2	1	2	3
Valid Cases	24	22	13	25	23	14	10	22	18	13	63

Total Employees	8635	3252	4355	876	5088	10547	1395	3410	2778	9063	16646
Percent Change in Number of Employees 1985-86¹											
Mean	18.32	29.5	3.3	21.4	11.7	25.9	11.5	10.8	28.3	14.8	17.5
Median	10.8 ⁸	22.3	0.0	16.2	4.8	25.6	12.9	2.0	22.3	1.2	12.5
Coefficient of Var.	1.7	1.1	6.7	1.7	2.1	1.3	2.3	2.8	1.1	2.2	1.8
Valid Cases	18	15	11	14	21	11	8	13	15	11	47
Change in Number of Employees 1985-86²											
Mean	15	20	21	8	15	33	31	35	20	-20	17
Median	12 ⁸	14	0	2	5	12	2	2	14	3	5
Coefficient of Var.	4	3	8	2	3	5	2	3	3	5	5
Valid Cases	18	15	11	14	21	11	8	13	15	11	47

Total New Employees	278	298	225	118	323	357	245	458	298	-218	783
Total Payroll (1986) (In Millions of Canadian Dollars)											
Mean	\$7.4	2.7	3.1	0.8	5.2	12.7	3.3	3.4	2.1	11.8	4.5
Median	2.2	1.0	0.6	0.4 ⁸⁸	3.4	3.4	0.2	1.8	1.1	1.6	1.1
Coefficient of Var.	2.7	1.8	1.5	1.3	1.0	2.3	2.0	1.1	1.5	2.5	2.8
Valid Cases	24	25	12	29	25	11	13	24	17	11	65

Total Payroll	\$177.3	\$68.1	\$37.4	22.4	130.4	139.3	43.2	82.4	36.0	130.5	\$292.1
Percent Change in Payroll 1985-86³											
Mean	24.42	42.7	45.6	44.3	26.7	38.0	31.1	43.3	38.6	18.4	35.0
Median	11.8 ⁸	24.3	31.8	20.2	15.1	28.3	17.1	22.3	23.3	9.0	18.7
Coefficient of Var.	1.8	1.2	1.3	1.4	1.6	0.8	1.4	1.3	1.3	1.7	1.4
Valid Cases	18	17	10	17	22	8	9	17	12	9	47
Assets/Employee (1986) (In Thousands of Canadian Dollars)											
Mean	\$80.5	65.6	249.6	114.9	104.0	133.5	159.4	135.3	94.4	70.9	113.8
Median	50.2 ⁸	52.0	195.3	53.7	69.0	51.4	64.9	59.8	66.7	52.0	56.3
Coefficient of Var.	1.1	0.7	0.9	1.3	1.2	1.2	1.3	1.2	1.1	1.1	1.2
Valid Cases	23	22	13	24	23	14	10	21	18	13	62

Calculated from Survey of Investees.

⁸ Indicates a significant difference between medians for sectors, stages or regions at p=0.05.⁸⁸ Indicates a significant difference between medians for sectors, stages or regions at p=0.01.¹ Change in employment 1985-1986 as a percent of total employment in 1985.² Net increase or decrease in number of employees between 1985 and 1986.³ Change in payroll 1985-1986 as a percent of the total payroll in 1985.

At the end of 1986, 64 percent of the total employment reported by responding firms was in companies that had secured venture capital to finance a restructuring, while 31 percent was in expanding firms and 5 percent in beginning firms. However, firms undergoing restructuring only created 45 percent of the new jobs, while expanding firms created 41 percent and beginning firms 15 percent. Firms that were financed to undertake restructuring accounted for the largest absolute increase in employment, but their share of the increase was lower than their share of total employment. This indicates that restructuring investments are often based on the potential for operating or financial efficiencies rather than incremental growth.

More than half of the jobs in the responding portfolio companies were located in Quebec, though when one disproportionately large firm is excluded, this share drops to 34 percent. Prairie-based firms accounted for 20 percent of the employees, Ontario firms for 17 percent and British Columbia firms 8 percent. The large proportion of jobs in Quebec is again explained by the number of large firms in Quebec that obtained venture capital for restructuring (See Chapter Seven). The effects of restructuring are evidenced by a rationalization in employment that resulted in a net decrease of 218 employees between 1985 and 1986.

V. Size, Growth, Monitoring and Economic Impact

Many of the financial and economic variables collected by the survey of investees are redundant in the sense that they are measures of the same ideal or latent concept. For example, revenues, assets and number of

employees are all commonly used to measure firm size, and are frequently found to be correlated. By using principal components analysis to estimate the relationship between measurable variables and abstract concepts (eg. size), one or more new composite variables can be created that are weighted linear combinations of the original variables.

Principal components analysis is used to account for the total variation among a set of observations in p -dimensional space by forming a new set of orthogonal and uncorrelated composite variables (f). Each of the new variables is a linear combination of the original set of measurements. The linear combinations are generated in such a manner that each successive composite variable accounts for a smaller portion of the total variation. In general, the number of new composite variables that will be needed to account adequately for the total variation is less than p . These components can then be used in subsequent analyses in place of the original (larger) number of variables. Principal component analysis can also be viewed as an attempt to uncover approximate linear dependencies among variables.

Principal components analysis differs from common factor analysis in two important respects. First, in principal components analysis all p components are needed to recover the initial correlations between variables exactly. In contrast, the common factor analysis model posits the existence of a number of factors ($f < p$) which will reproduce the correlations exactly, but may not account for as much variance as do the equivalent number of principal components. Thus, principal components analysis is a variance oriented technique, while common factor analysis

is a co-variance oriented technique. Second, in principal components analysis the composite variables are a linear combination of all observed variables; in common factor analysis the factors are linear combinations of only the common parts of variables. As a result, composite variables are orthogonal, factors are not. Standard texts include Kshirsagar (1972), Mulaik (1972), and Kardia, Kent and Bibby (1979).

Principal components analyses were performed in an attempt to create component variables that measure the size of portfolio firms, the active monitoring of venture capitalists, portfolio firm growth and economic impact. The variables that were used to measure each of these concepts and their weights for the first two principal components are provided in Table 8.9. Component weights are the correlation coefficients between the measured variable and the latent concept or component, and determine the degree of the relationship between the measured variable and the new composite one. Thus, the first component variable generated from the size measures is primarily related to revenues and employees, while the second component is primarily an inverse measure of assets. A biplot of these size measures against the first two principal components confirms that revenues are highly correlated with the number of employees, and that both are only slightly related to assets (Figure 8.3). However, the first component (revenues and employees) accounts for 83 percent of the variance in the three measured variables and is accepted as an appropriate measure of the latent concept size (Table 8.10).

Biplots are approximate graphical representations of a data matrix (observations by variables) obtained by plotting on the same display

Table 8.9 Component Weights for Variables in Principal Components Analyses

Principal Component Analyses	Component 1	Component 2
(1) Size		
Revenues (1986)	.61	.28
Assets (1986)	.52	-.85
Employees (1986)	.60	.45
(2) Monitoring		
Directorships held by VC	.33	.42
Yearly visits by VC	.64	-.03
Yearly telephone calls from VC	.63	.22
Distance between investor and investee	-.29	.88
(3) Growth		
Change in revenues	.53	-.04
Change in assets	.61	-.12
Change in total equity	.32	.51
Change in retained earnings	.04	.82
Change in employment ¹	.50	-.20
(4) Impact		
New employees (1985-86)	.42	-.07
R&D expenditures (1986)	-.44	.02
Corporate and local taxes (1986)	-.46	.03
Income taxes withheld (1986)	-.46	-.03
Foreign sales (1986)	.02	1.0
Payroll (1986)	.46	-.03

Calculated From Survey of Investees.

¹ Change between 1985 and 1986 expressed as a percent of 1985 base.
All variables were standardized.

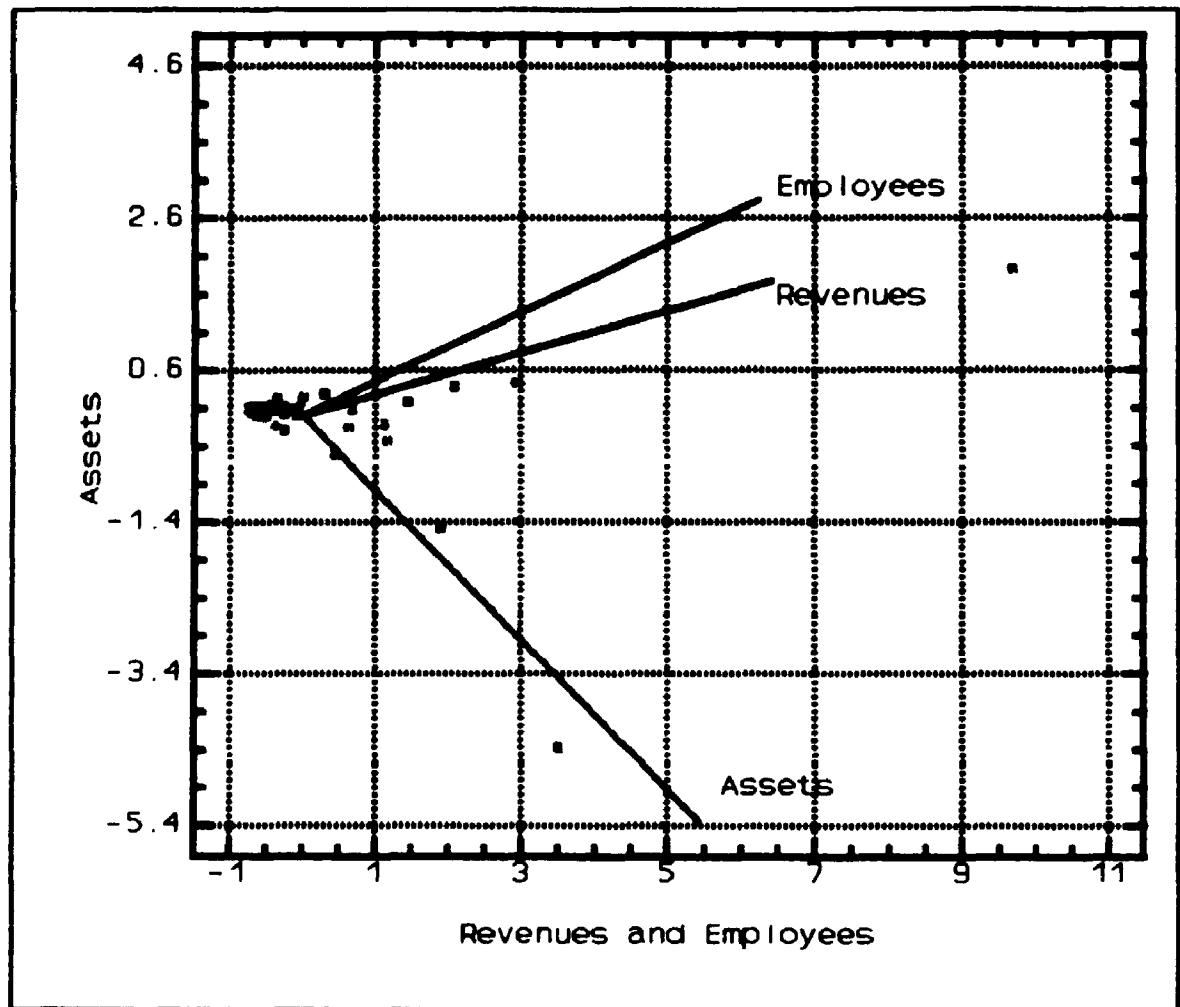


Figure 8.3 Biplot of Variables Measuring Firm "Size"

markers that represent both rows and columns. These display markers are obtained by means of the singular value decomposition of the matrix, which provides the least squares lower rank approximation. The biplots presented here are referred to as G+biplots and have several special properties:

(1) G+biplots preserve the Euclidean column-metric of the data matrix. Thus, the length of each column marker (shown as a vector) approximates the standard deviation of the variable it represents.

(2) The cosine of the angle between two column markers approximates the correlation between the two variables.

Table 8.10 Variance Accounted for by Principal Components

	(Percent of Variance Accounted for) Components					
	1	2	3	4	5	6
Size	83.0%	15.2	1.8			
Monitoring	44.4%	23.7	22.5	9.3		
Growth	47.1%	22.2	15.4	11.9	3.4	
Impact	78.4%	16.7	3.6	1.1	0.2	0.0

Calculated From Survey of Investees.

(3) The distance between row markers (shown as points) approximates the Mahalanobis distance between rows.

(4) The horizontal axis of the plot corresponds to the first principal component of the variables, and the vertical axis corresponds to the second principal component of the variables.

Important references on biplot analysis are Gabriel (1971), Bradu and Gabriel (1978), Gabriel (1981), Cox and Gabriel (1982), and Chambers *et al.* (1983).

The active monitoring performed by venture capitalists is not adequately measured by the first or even the second component variables. The first component is primarily yearly visits and telephone calls (day-to-day contact), while the second is primarily a measure of the distance between the investor and investee. Together they only account for 68.1 percent of the variance in the four measured variables, suggesting that a third and possibly a fourth component should be added. Monitoring is clearly a multi-faceted concept. The most salient and visible form of

monitoring is the day-to-day contact provided by telephone calls and visits to the investee's office. These two measures are also highly correlated ($r=.86$) (Figure 8.4). Thus, it was decided that monitoring would best be represented as a measured variable: the sum of yearly telephone calls and visits.

The concept of growth is also poorly measured by only one component. Two groupings of the measurement variables are clear: (1) changes in retained earnings and total equity representing capital accumulation, and

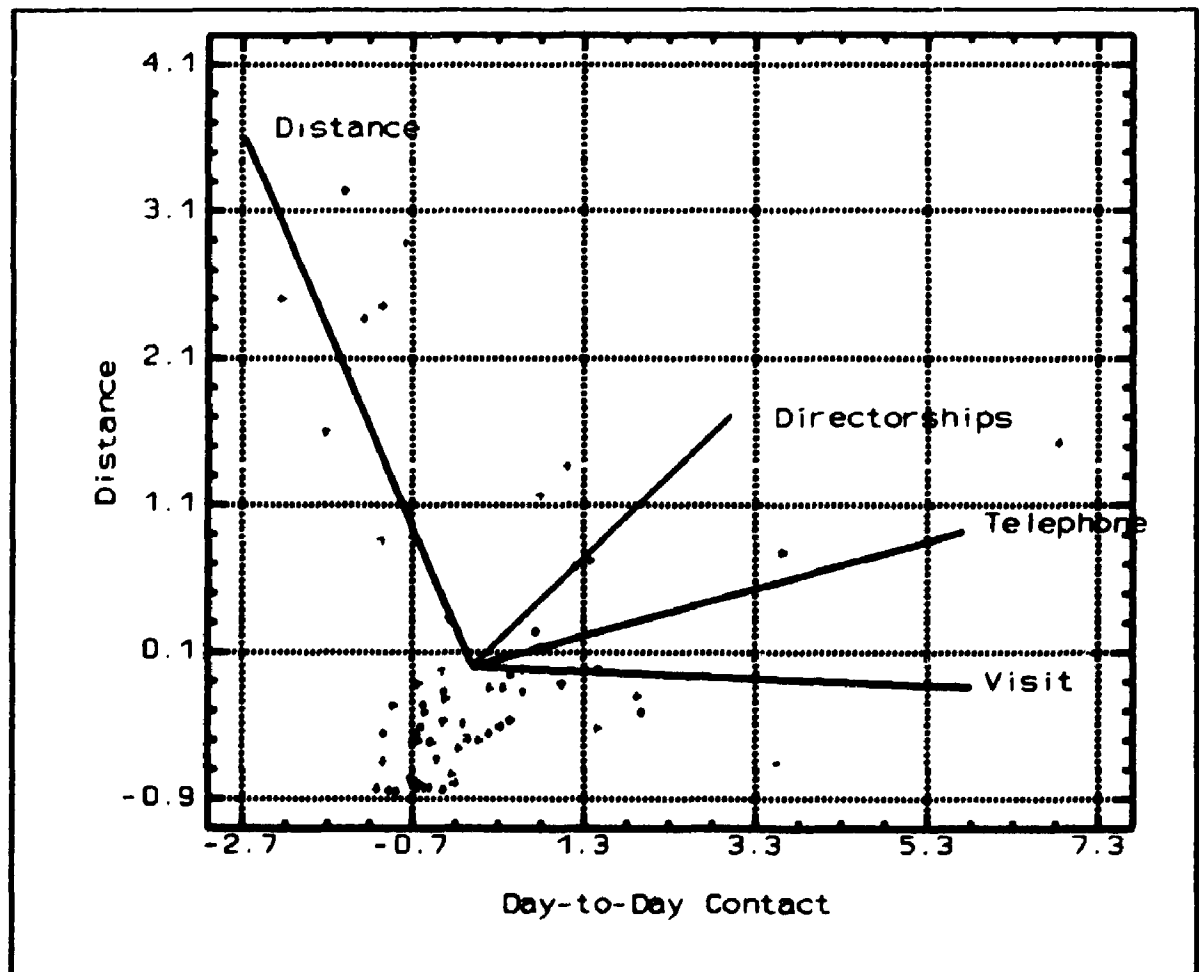


Figure 8.4 Biplot of Variables Measuring "Monitoring" by Venture Capitalists

(2) changes in revenues, assets and employment representing increasing size or the rate of growth per se (Figure 8.5). Economic impact is represented reasonably well by the first component; an inverse measure of the level of expenditures on R&D, taxes and wages and a direct measure of job creation. The fact that foreign sales correlates neither with expenditures or with job creation (Figure 8.6) and forms the second principal component (Table 8.9) suggests that it should be considered separately as a measured variable.

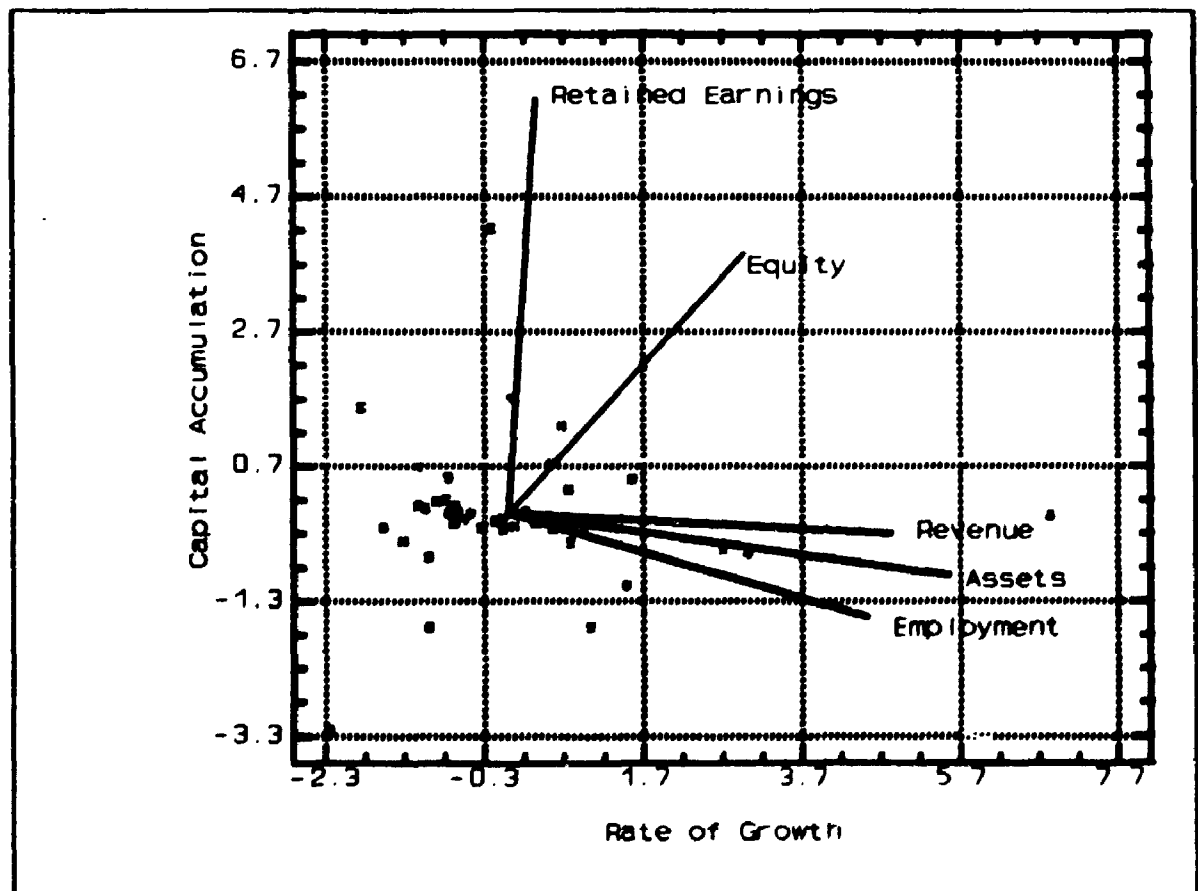


Figure 8.5 Biplot of Variables Measuring Firm "Growth"

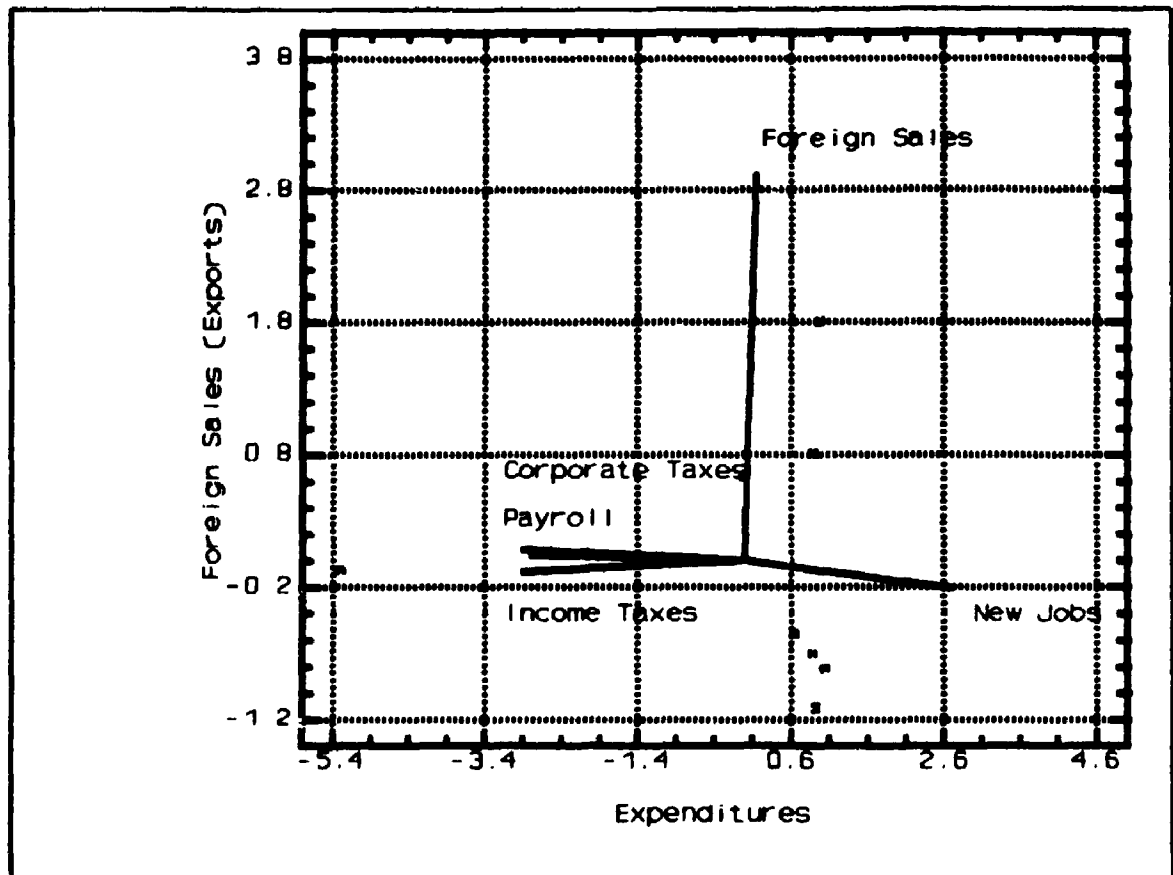


Figure 8.6 Biplot of Variables Measuring "Economic Impact" of Venture Backed Firms

The relationships between size, growth, capital accumulation, monitoring, economic impact and foreign sales are represented in Figure 8.7 which shows the partial correlation coefficients between these variables. Partial correlation coefficients measure the relationship between pairs of variables while controlling for the possible effects of other variables. These effects are controlled by removing the linear relationship with the other variables before calculating the correlation coefficients between the two variables of interest. These coefficients suggest the following:

- (1) Larger firms have higher rates of capital accumulation than do smaller firms.

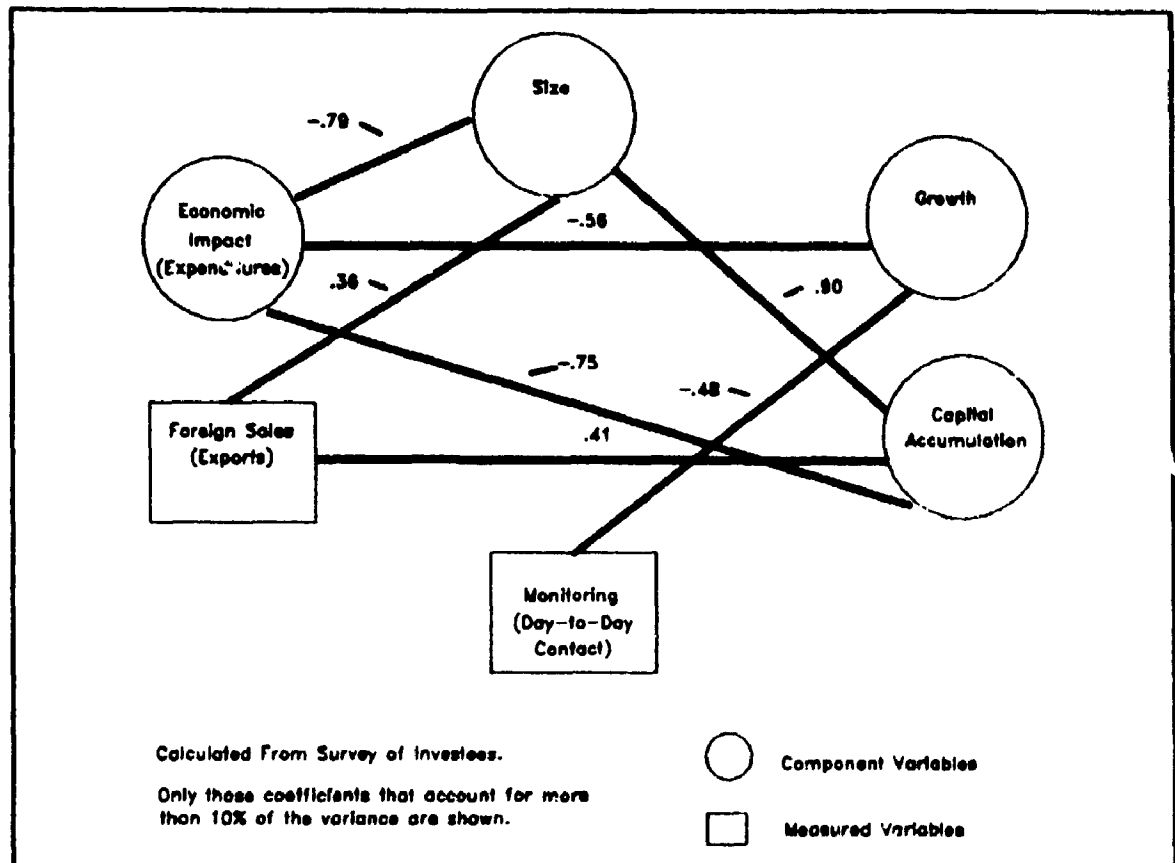


Figure 8.7 Partial Correlation Coefficients Between Measures of "Size", "Growth", "Monitoring" and "Economic Impact"

(2) Larger firms have a greater absolute economic impact than do smaller firms both in terms of expenditures and foreign sales. Smaller firms have a greater absolute economic impact in terms of job creation (the component variable economic impact is an inverse measure of expenditures, and a direct measure of job creation).

(3) Higher rates of growth and capital accumulation are associated with greater economic impact in terms of expenditures. However, the reverse is true of job creation.

(4) Higher rates of capital accumulation are associated with increased levels of foreign sales.

(5) The amount of monitoring provided by venture capitalists is negatively related to the rate of firm growth. This indicates that venture capitalists concentrate their efforts on those firms in their portfolios that are not growing as quickly in an effort to increase their returns.

Because of the small sample size, and the unique characteristics of venture-backed firms, extreme care should be taken in extending these results beyond the immediate sample.

VI. Summary

The survey of firms that received venture funds between 1980 and 1986 provided much information about the financial characteristics and economic impacts of growth oriented firms. Specific findings include:

- (1) Levels of venture capital investment have increased. One result is that a greater proportion of the total equity demand is met from this source.
- (2) Firms in high-technology sectors, those undergoing expansion, and those located in the Prairie Provinces are particularly reliant upon venture capital sources.
- (3) Venture capital investments are usually in small to medium sized companies.
- (4) The typical portfolio firm is not highly leveraged, presumably a result of recent injections of equity capital by venture capitalists. This allows for the flexibility to substantially increase operating debt in times of financial need.
- (5) Venture backed firms seek to be highly innovative, committing large amounts of capital to the process of research and development.
- (6) The typical portfolio firm is highly export oriented.
- (7) Venture backed firms are job generators.

It is clear that venture capital is an increasingly important source of equity for small and medium sized firms. As the result of careful selection procedures and managerial input, these firms are highly growth oriented, and make an important contribution to the economy. This result

is consistent with the expectations outlined in Chapter Two. As the Canadian venture capital industry continues to develop, the number of companies being financed will likely increase. This increased investment activity will in turn increase the aggregate economic impact of venture backed companies. Further, as the venture capital industry itself matures and becomes more experienced, its professionals will be able to add even more value to their portfolio firms, enhancing the prospects for success and the potential economic benefits.

CONCLUSIONS AND RESEARCH PROSPECTS

I. Conclusions

The institutional venture capital industry specializes in organizing the process of finding, evaluating and funding promising ideas. It capitalizes on the opportunities offered by accelerating changes in technology, and supports the development of new high-technology products and processes (Wilson, 1985; Bowen, 1979). Venture capitalists provide financial and managerial assistance to small firms during the difficult early stages of growth and expansion. By helping to ensure the survival of these firms, venture capitalists indirectly increase the rate of innovation in the economy, and contribute to the creation of new job opportunities.

The research reported in this dissertation investigated both the supply and demand components of venture capital investment activity in Canada. Four specific questions were addressed:

- (1) Where are venture capital firms and their investments located?
- (2) To what degree does location affect the types of investments that venture capitalists consider?
- (3) What is the spatial pattern of portfolio firm industrial sector and funding stage characteristics?
- (4) What is the economic impact of portfolio investments, and are there significant differences in that impact by location, industrial sector or funding stage?

Data to support these investigations were gathered from industrial directories, surveys of both venture capitalists and their investments, and an online database of export oriented firms.

The spatial pattern of venture capital activity was shown to be characterized by two forces: (1) concentration-agglomeration and (2) regional self-bias. The locational choice of a venture capital firm is one variable that can be manipulated in an attempt to maximize access to information, thereby minimizing uncertainty and reducing risk. Because of their reliance on attorneys, accountants and bank officers, both for their services and for referrals, proximity to these business associates is an important consideration in the selection of an office location. As accessibility to both business services and information on potential investments is greatest in the larger urban centres, it is there that venture capital firms concentrate. The early dominance of Toronto afforded firms located there more pervasive contact networks and hence better access to informational resources. Firms operating in the Toronto area have a greater number of opportunities available to them, and experience less restrictive spatial bounds.

In an effort to prevent failure, and increase the value of their holdings, venture capitalists closely monitor the day-to-day activities of their investments and contribute managerial expertise. One of the results of this monitoring process is a strong bias toward local investment as distance represents a cost in terms of time and travel. The level of knowledge about projects also constrains the activities of venture capitalists. The number of proposals submitted from local firms

and the increased availability of information with which to judge these proposals translates into a bias in the absolute number of investments made within the indigenous region. However, the turnover ratio for investments is often higher for investment projects further afield. This occurs because venture capitalists seek to minimize their risk/return ratios. These investments often offer superior returns, and the risk is lowered through referral, syndication or reconnaissance provided by a branch office.

As a result of the information intensive nature of the market, investors find that they must specialize in order to develop the expertise needed to build profitable portfolios. Venture capitalists usually specialize in certain geographic regions, funding stages, industrial sectors or a combination of the three. Firms within a particular urban market often develop similar interests, creating an aggregate pattern of specialization. This pattern emerges because firms in the same urban market have access to similar levels of information and a similar range of prospective projects.

This dissertation provided both a theoretical explanation and an empirical investigation of specialization in urban venture capital markets. The empirical analyses revealed a wide variation in the degree of specialization by urban market. Canadian markets are generally less specialized than American ones, and each market has a unique combination of regional, funding stage and industrial sector specializations. The relationship between market concentration and specialization was found to follow a U-shaped curve. Market specialization is high at both low and

high levels of concentration, and low at intermediate levels of concentration. These results generally support a theoretical explanation of market specialization based on the concepts of information impactedness and idiosyncratic capital. Generally, in large markets where transactions are less idiosyncratic, venture capitalists must specialize in order to organize, interpret and use all available information. In small markets where there is little information, and transactions are highly idiosyncratic, venture capitalists must specialize in order to generate enough expertise to make satisficing decisions. In markets of intermediate size, venture capitalists need not specialize to the same degree in order to use available information.

An investigation of the performance and economic impacts of venture backed firms showed that venture capitalists usually invest in the elite of small and medium sized companies. These firms have above average rates of revenue growth, and strong financial positions. They commit large amounts of capital to research and development activity, and are highly export oriented. As a result of their rapid growth, they generate many new employment opportunities.

Venture capital is an increasingly important source of equity for small firms. As the result of careful selection procedures and managerial input, these firms are highly growth oriented and make significant contributions to the economy. As the Canadian venture capital industry continues to develop, the number of companies being financed will likely increase. This increased investment activity will in turn increase the aggregate economic impact of venture backed companies.

The spatial patterns of concentration, regional self-bias and investment specialization have strong implications for the regional distribution of these impacts. First, access to this form of equity capital is both hierarchically and spatially biased toward a few large centres. Second, there is greater support for the development of certain new industries in some markets over others. Entrepreneurs with the greatest desire to succeed may be drawn to those cities with a financial community willing to undertake the risk of venture capital. If this is the case, economic growth and job creation might concentrate in these centres.

Local economic development is in part dependent upon a recognition that venture capital and its attendant managerial assistance is a major component in the development of small high-capacity firms. While the organized venture capital industry is not the only, or even the major form of small firm financing, it shows the attitudes regarding, and the availability of, other sources of equity capital.

II. Research Prospects

The research reported in this dissertation is a clear addition to the existing literature given the recent interest of economic geographers, the paucity of research in the Canadian context, and the lack of comprehensive studies that trace the investment process from its source through to its output to the economy. It provides a more complete conceptualization of the venture capital investment process than previously available, and adds a substantial empirical description of

current Canadian investment patterns and impacts. This research does not, however, satisfy all of our informational requirements. Our understanding of venture capital markets needs to be expanded in at least three areas: (1) the comparative operation of venture capital markets in different national contexts, (2) the micro-economic impacts of venture capital investment and (3) the effect of government policy on the flow of venture funds.

Despite differences in absolute size and the degree and type of government involvement in the market, the Canadian and American venture capital markets operate in a similar manner. This is not necessarily true, however, of the industry in national settings that have distinctly different cultural and economic systems. Of particular interest would be the process of venture investment in Western European countries, and in Japan.

Clark (1987) has made a step in this direction by comparing the adoption of the American venture capital model in the United Kingdom and in Japan. Not surprisingly, he found that the market operates in a similar fashion in the U.K., but in a radically different fashion in Japan. Two factors work against the adoption of the American investment model in Japan: (1) technological innovations are traditionally commercialized within the existing large corporate structure leaving little room for small new firms, and (2) cultural considerations such as lifetime employment, aversion to contractual dealings with strangers and the life-time commitment of equity ownership do not readily foster entrepreneurialism.

Despite these impediments, a venture capital system has emerged. This system is funded in part by government sources, but primarily from subsidiaries of the large sogo shosha (trading houses). As small firms tend to grow slowly and IPOs are uncommon, emphasis is placed on the subordinate debt financing of older firms that need additional funds for expansion. This system seems to foster innovation spawned within existing large corporate structures and operationalized by associated firms, subsidiaries, served and joint ventures. In the United States this approach is referred to as intrapreneurial as opposed to entrepreneurial behaviour. Continued research along these lines could be very helpful in clarifying the relationships between the socio-economic setting, cultural values and the enabling mechanism of capital in fostering and generating economic benefits from innovation.

A second area that needs additional attention is the micro-economic impacts of venture capital investment. While this dissertation demonstrated that venture backed firms generally have above average rates of growth, innovation and employment generation and it is assumed that this has a beneficial impact on local economies, substantiation of this link will require additional research at finer geographic and economic scales. Future research should ascertain if venture backed firms contribute to local development through the enhancement of multiplier effects, local ownership, local reinvestment of profits, local control over investment and location of physical capital, enhancement of employee welfare, and employment skill and pay levels, to name a few examples.

This type of research will need to be conducted from a case study perspective.

Finally, economic geographers should become involved in evaluating the effects of government policies on the availability and distribution of venture capital funds. Research into the availability of venture capital generally points to the importance of tax incentives and of general economic conditions. However, other types of government policies need to be considered as well; in particular, those that affect the liquidity of investments. This includes the development of secondary and over-the-counter markets, and the legal requirements of both domestic and foreign mergers and acquisitions.

Perhaps the most profound set of policies that need immediate attention are those contained in the proposed Free Trade Agreement (FTA) between Canada and the United States. The influence of the agreement on venture capital investment patterns may come in three forms. First the liberalization and increased thresholds for the review of foreign acquisitions proposed in Chapter Sixteen may have the effect of increasing the liquidity of some investments as sale to a foreign interest becomes easier. This is especially true since review requirements act as a perceptual barrier that is greater than the actual legal impediment. Second, as tariff barriers are lowered and it becomes more evident in which sectors Canada has a comparative advantage, there may be a shift in the industrial sectors that are favoured for venture investment. Finally, the changes to the financial services sector proposed in Chapter Seventeen of the FTA may lead to a greater integration of financial services between

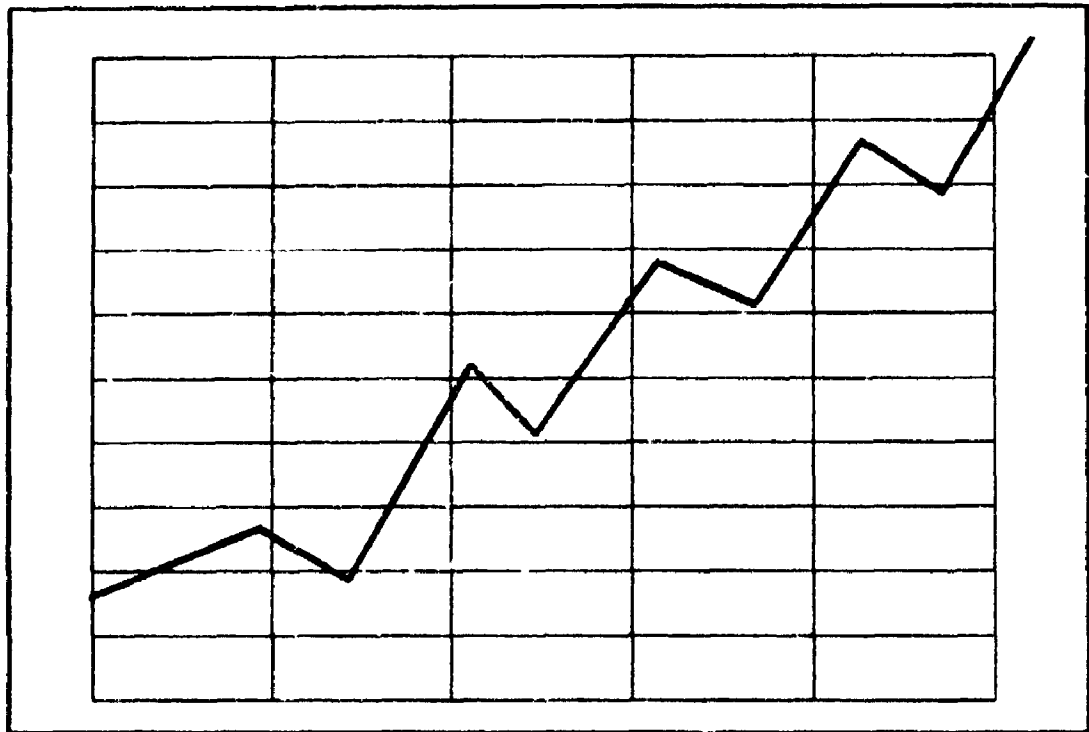
the two countries, as well as the diversification of commercial banking institutions into an increasing number of financial functions. The result may be increased cross-border capital flows, and the consideration of higher risk loans by commercial institutions because of increased competition.

In terms of the spatial distribution of venture capital funds, future policy research should address methods of improving information flows between venture capitalists and potential entrepreneurs located outside of existing agglomerations. The industry is making an internal effort through branch offices and deal syndication. Other mechanisms may include the establishment of regional venture capital associations, and the hosting of venture capital fairs. It is also true, however, that the specialized investment opportunities favoured by venture capitalists are not ubiquitous in space. Thus, future research will also have to move beyond classical partial equilibrium models of firm location (which assume capital to be both freely available and perfectly mobile) and take into account the sources and types of funds available to different types of enterprises. In any case, it is hoped that the challenge of meeting these demands for more research, and the importance of gaining information on the role of capital availability and small firm growth, offers an exceptional motivation for continued geographic research into venture capital markets.

Appendix I

SURVEY OF INVESTORS

Venture Capital Investment Survey



This survey will help us to better understand the geographic investment patterns and characteristics of the Canadian venture capital industry. Please answer all of the questions. If you wish to comment on any questions or qualify your answers, please feel free to use the space in the margins. Your comments will be taken into account. Your answers will be held in strictest confidence, and will be only be reported in aggregated form.

THANK YOU FOR YOUR HELP!

PART ONE

The following questions concern the location of your firm's office(s), and the general nature of your investment activity. The locational information will help us to understand the geographic pattern of venture capital firms, and allow us to compare that pattern with other financial services. Information on your investment characteristics will be used to aggregate responses.

1. We have classified venture capital firms into the following types. Your firm most closely resembles which of the following? (Please circle one).

1. Private venture capital firm
2. Investment banking firm
3. Merchant banking firm
4. Subsidiary - What is your affiliation?

5. Government economic development agency
6. Small business development corporation
7. Brokerage house or financial consultant
8. Other: Please specify _____

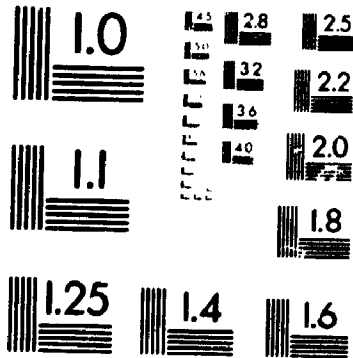
2. In what year was your firm established? _____

3. How long has your firm been located at its present address?

If your firm has relocated since its establishment please state its former address: _____

4. What criteria were considered in the location of your current office?

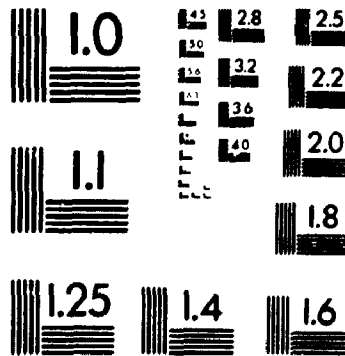
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of/de

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5. Does your firm have a branch office location?

1. No: Please go to question 6
2. Yes

What is the address of your branch office? _____

When was your branch office opened? _____

Why did you establish a branch office? _____

6. How much capital does your firm currently have under management?
\$ _____

7. What percentage of your capital is currently invested in ventures?
_____ %

8. How many investments did you make in the last year (Calendar year 1986)? _____

In the last five years? _____

9. How many of those made over the last year were new investments?

PART TWO

The following questions will help us to better understand the geographic investment preferences of Canadian venture capital firms. We are particularly interested in what factors make some regions more attractive than others to investment.

1. Toward which geographic level is your firm's investment activity oriented? (Please circle one.)

- 1. International
- 2. Binational (Canada and the U.S.)
- 3. National (anywhere in Canada)
- 4. Regional (within one or two provinces or states)
- 5. Local (within one or two nearby cities)

2. Please rank the following criteria according to the importance you would place on each when evaluating an investment proposal (1 = most important):

- Potential return _____
- Quality of Management Team _____
- Location _____
- Product or Service _____
- Age of Firm _____
- Market conditions _____
- Amount of funds required _____

3. If you were asked to state your firm's geographic investment preferences for inclusion in a directory of venture capital firms, what would that preference be? _____

Why do you prefer these locations? _____

4. Does your firm have any experience investing in the United States?

No: Please go to question 5
 Yes

How many investments have you made in the U.S. in the last five years?

What factors led you to invest in the United States? _____

5. In the last calendar year (1986), how many proposals did you receive from each of the following regions, and how many of these did you actually invest in?

	Received	Invested
British Columbia	_____	_____
Prairies	_____	_____
Ontario	_____	_____
Quebec	_____	_____
Atlantic Provinces (NS, NB, NFDL, PEI)	_____	_____
Yukon/NWT	_____	_____
United States	_____	_____
Other Foreign Countries	_____	_____

6. Are you willing to be personally interviewed regarding your firm's investment activity?

- 1. No
- 2. Yes

Contact Person: _____

Position: _____

Is there anything else that you would like to tell us about the venture capital industry, your investments, problems with being a venture capitalist, regulation, or opportunities? If so, please use this space for that purpose.

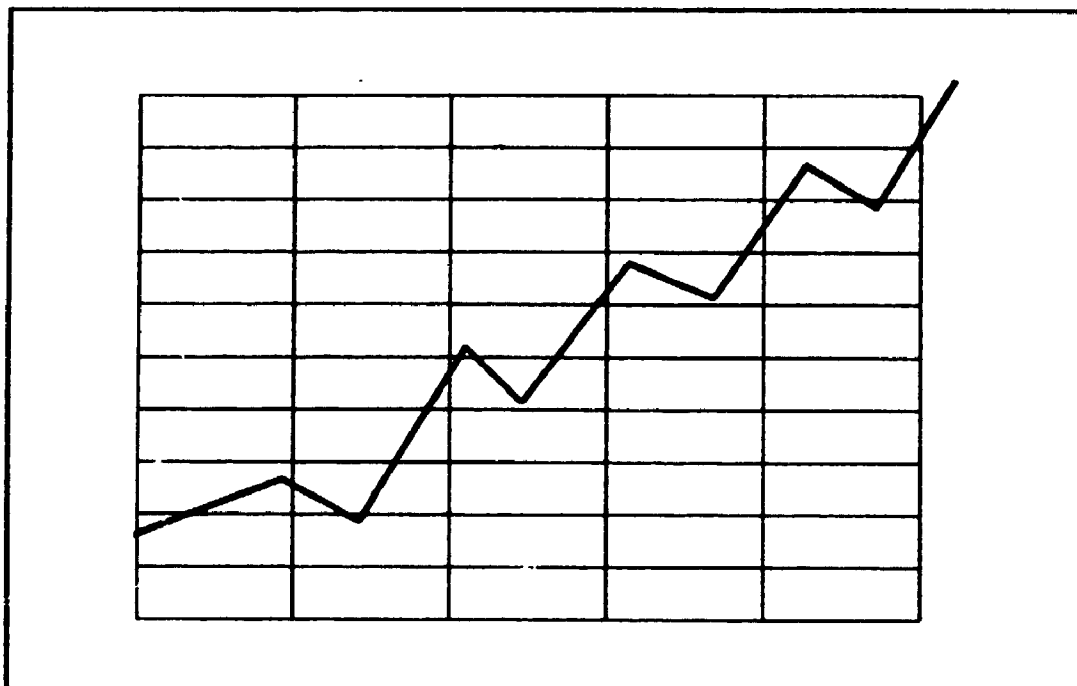
We would like to thank you for completing the questionnaire. Your contribution is sincerely appreciated. If you would like a copy of a summary of the results from this survey, please print your name and address on the back of the return envelope.

ONCE AGAIN, THANK YOU FOR YOUR HELP!

Appendix II

SURVEY OF INVESTEES

Capital and Job Generation Survey



The Association of Canadian Venture Capital Companies (ACVCC) has retained our firm to survey all of the companies that received venture capital from ACVCC members between 1980 and 1986. The results of this survey will be used to demonstrate, in aggregate form, the contribution of smaller firms to job generation and capital formation. Please answer all of the questions. If you wish to comment on any questions or qualify your answers, please feel free to use the space in the margins. Your comments will be taken into account. Please also be assured that your answers will be held in the strictest confidence and will only be reported in industry aggregates.

Thank you for your help!

About Your Firm:

Please answer the following questions regarding the nature of your firm. Your answers will help as to determine the general characteristics of firms utilizing venture capital. They will also be used to aggregate responses in order to ensure confidentiality.

1. What is your firm's primary product or service?

2. In what year was your firm established?

3. What percentage of your firm's shares are held by management?

4. Is your firm publicly traded?

- No.
- Yes. In what year was your firm first publicly traded?

Job Generation and Capital Formation:

Please complete the table on the following page. The information required to complete this section of the questionnaire should be readily available from your business records, financial statements and tax returns. If you have any queries about finding it, please feel free to call us or your accountant. Again, please be assured that all information will be held in the strictest confidence and used only in aggregated form.

(As at your fiscal year end in
thousands of Canadian dollars)

	1980	1981	1982	1983	1984	1985	1986
REVENUES							
Total Revenues ¹							
Revenues from Foreign Sales							
Expenditures on R&D							
Corporate Income Taxes ²							
Property and Local Taxes							
Total Assets ³							
Retained Earnings							
	1980	1981	1982	1983	1984	1985	1986
FINANCING							
Total Equity ⁴							
Equity Capital Raised:							
From Venture Capital Sources ⁵							
From Other Institutional Sources ⁶							
From Informal Sources ⁷							
Total Debt ⁸							
Debt Capital Raised ⁹							

	1980	1981	1982	1983	1984	1985	1986
EMPLOYMENT							
Number of Management Employees							
Number of Non-Management Employees							
Total Payroll							
Employee Income Taxes Withheld ¹⁰							

Notes:

¹ Total gross revenue per your financial statement.

² Per financial statements, which includes current provision for deferred taxes.

³ Per balance sheet based on generally accepted accounting principles for your industry.

⁴ Includes retained earnings.

⁵ Includes direct equity and unsecured debt or subordinate loans from institutional venture capital sources.

⁶ Includes capital (see note 5) contributed by merchant and investment banks, holding companies, underwriters, etc...

⁷ Includes capital (see note 5) contributed by personal savings, relatives, friends, and local businessmen.

⁸ Includes short and long term debt.

⁹ Includes debt capital borrowed from commercial banks and near-banks as well as informal sources (see note 7).

¹⁰ From monthly tax remittances to the federal government, plus Quebec where relative.

NB: This table was originally reproduced on one page in landscape orientation.

Obtaining Funds:

Please complete the following questions concerning your firm's experience obtaining funds. This information will help us to better understand the difficulties firms experience in their search for equity and debt capital.

1. In what year did your firm first secure venture capital financing?

F. Management Buyout Financing. Funds provided to enable an operating management group to acquire a product line or business.

2. What was the purpose of this first round of venture financing obtained (Please check one).

A. Seed Financing. Funds used to prove a concept through product development and market research.

B. Startup Financing. Funds used to initiate the commercial sale of a new product or service through the startup of a firm.

C. Expansion Financing. Funds used to expand the production of an existing firm.

D. Bridge/Mezzanine Financing. Funds provided to a firm expected to go public within 12 to 24 months.

E. Acquisition Financing. Funds provided to a firm to finance its acquisition of another company.

3. How many rounds of venture capital financing has your firm obtained since this first round?

4. Was there more than one venture capitalist involved in the first round of financing?

Yes

No

In subsequent rounds?

Yes

No

5. How many seats do your venture capital backers have on your board of directors?

How many members does your board of directors have in total?

7. How often does the venture capitalist you are currently dealing with:

A. Visit your office?

_____ times per year

B. Telephone?

_____ times per month

6. Have your venture capital investors been helpful to your company in other ways? Please rank each of the following from 0 (no help at all) to 6 (extremely helpful).

- [] securing outside financing
- [] finding human resources
- [] marketing assistance
- [] technical assistance
- [] operational assistance
- [] administrative assistance

8. How important were the following characteristics of the venture capital firm that invested in your company to your decision to approach them for financing?

Venture Capitalist Characteristics	Very Important	Somewhat Important	Not Very Important	Not at All Important
Industry Focus	[]	[]	[]	[]
Stage of Development Focus	[]	[]	[]	[]
Geographic Focus	[]	[]	[]	[]
Personalities of the Venture Capitalist(s)	[]	[]	[]	[]

9. Before obtaining your most recent round of venture capital financing, how many times did you approach each of the following sources of capital, what was the result, and how important was this source to you (Please rank them from 1=not important to 10=very important)?

Source of Capital	Number Approached	Received Financing?		Importance Rank
Individual Investors	_____	Yes	No	_____
Family or Friends	_____	Yes	No	_____
Other Venture Capital Investors	_____	Yes	No	_____
Federal Government Programs Which One(s)?	_____	Yes	No	_____

Provincial Government Programs Which One(s)?	_____	Yes	No	_____

10. If any of these sources declined to provide you with funding, what reasons did they give?

1. _____
2. _____
3. _____
4. _____
5. _____

11. If you decline to accept funding offered by any of these sources, what were the reasons for your refusal?

1. _____
2. _____
3. _____
4. _____
5. _____

Your Comments:

Is there anything else you would like to tell us about your experience dealing with venture capitalists? If so, please use this space for that purpose. Any comments you include here or in a separate letter will be taken into account are greatly appreciated.

This completes the questionnaire. Your contribution is sincerely appreciated. If you would like a copy of a summary of the results of this survey, please indicate below and we will see that you get it.

[] I would like a copy of the results of this survey.

ONCE AGAIN, THANK YOU!

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