

Venture Capital Investment Patterns:
Implications for Regional Economic Development

by
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ABSTRACT

This thesis investigates the role of venture capital in regional economic development and presents results from a national survey of venture capital firms concerning the existence of capital gaps in the venture capital markets. In order to explore these issues, the author lays out the theoretical underpinnings of venture capital-oriented indigenous growth strategies and assesses the relationship of such strategies to small-firm employment arguments. The author provides further context by discussing the institutional boundaries of the venture capital industry. Analysis of the survey results offers evidence concerning the nature of venture capital gaps.

The author argues that venture capital is a critical component of innovation-based localization economies. As such, it enables high factor-cost regions to remain competitive by counteracting the negative effects of the product/profit life cycle. However, the venture capital industry's size, cyclicity, and import-export characteristics place bounds on the industry's possibilities with regard to regional economic development. Changes in the industry's fund sources provide a plausible explanation for the existence of capital gaps in the face of booming investment. The author finds evidence that capital gaps exist by investment stage and size. Industry and regional gaps are found to be probable as well. The author concludes by recommending that policymakers resolve impediments to venture capital financing through small-scale interventions and countercyclical public sector investment.

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CHAPTER I

INTRODUCTION

The rhetoric and role models of economic development in the United States have changed drastically over the past two decades. Cities and regions that once sought growth from large corporate headquarters and the attraction of manufacturing branch plants now tout the dynamic potential of growth through entrepreneurial innovation (Teitz 1994). Although cities and regions continue to compete with one another through industrial tax abatements and other capital attraction strategies, a growing recognition exists that such efforts constitute a zero-sum game in which economic development gains are often fleeting. Many cities and regions have thus shifted their economic development focus from policies designed to capture growth from outside the region to policies designed to cultivate the conditions that lead to growth from within the region (Isserman 1994). Silicon Valley and Boston's Route 128 are held up as the archetypes of this new economic development ideal.¹

The new models of locally generated growth—which I shall refer to as indigenous growth models—have many components. They involve small firms, technology development, research partnerships, financing infrastructure, and extensive networking among their many actors. Business incubators and “hot” industries that often have few roots in the local economy also figure prominently in the new roadmaps for economic development. Startup firms are the centerpieces of these new economic visions. Both government and private actors (foundations, nonprofits, business organizations) have taken part in the attempt to spur indigenous entrepreneurial growth (Eisinger 1988).

The reasons behind the appeal and subsequent adoption of these models are not hard to see. The flight of large-scale manufacturers and the high-wage jobs they provided from the urban areas of the Midwest and Northeast is well known. High labor and land costs, as well as stable or negative population growth, have made the attraction of large branch plants in mature industries an outmoded strategy for these regions. The creation of

¹ For a comparison of Silicon Valley and Route 128, see Saxenian (1994).

innovative new firms with high growth potential and export markets is thus seen not merely as a strategy for regional improvement, but as a necessity for regional survival. Regions outside the Northeast and Midwest are turning to indigenous growth models as well. As their economies mature and as commodity manufacturing becomes even more globalized, cities in the Southeast and Southwest are experimenting with technology transfer arrangements and other promotional measures for startup firms.

One of the institutional cornerstones of the indigenous growth models is the venture capital industry. The innovative new firms whose generation is sought are high-risk/high-reward undertakings ill-suited to traditional debt financing. Venture capital firms, by providing equity for the development of new businesses or the rapid expansion of existing ones, enable the transformation of new concepts and technologies into commercial job-generating enterprises. Business leaders, planners, government officials, and community members are all concerned with the timely provision of adequate equity capital for their region's indigenous business growth opportunities. They all wish to ensure that windows of opportunity are not lost in the fast-moving world of national and global markets. Planners and other officials have taken a particular interest in venture capital as it is one of the key variables (along with funding for local research institutions) on which policy-makers can have an influence. At the national level, the federal government has long subsidized the provision of venture capital through the Small Business Investment Corporation (SBIC) program. Over the past decade, as the venture capital industry has expanded and as regions have taken note of the tremendous entrepreneurial growth in areas such as Silicon Valley, many regions have begun to view the promotion of the local venture capital industry as a means of stimulating the new firm births and technological development that are central to the indigenous growth models. As of 1997, at least 43 states had some form of state-subsidized venture capital (Lerner 1997).

Despite the current popularity of venture capital-oriented strategies, a key question remains: Does a problem exist that the increased provision of venture capital can solve? Another way of phrasing this question is, do capital gaps exist? A venture capital gap is a disjunction between the supply of venture capital and the demand for this capital. In order for economic development policy interventions that involve venture capital to have a

positive effect, some impediment to venture financing must exist. If all firms that could productively employ equity investments have adequate access to the venture capital markets, then planners and policymakers should turn their attention elsewhere. The justification for venture capital-oriented development strategies thus depends upon the existence of capital gaps. Two forms of capital gaps are possible. The first is a private, or market, gap. In this type of gap, capital does not flow to businesses offering the highest risk-adjusted rate of return due to structural imperfections in the venture capital industry. The second type of gap is a public, or development, gap. In this type of gap, insufficient venture capital flows to viable firms that have attractive social returns but below-market risk-adjusted private returns. Such social returns include job creation, stimulation of economic activity in economically depressed areas, and provision of business opportunities to disadvantaged populations. I will argue that both types of gaps are likely to exist in the venture capital markets.

These venture capital gaps have important implications. If the disbursement of venture capital is uneven, inconsistent, or otherwise lacking with regard to desirable investments in particular firm types, industries, or regions, then the regional economies that are affected may not be living up to their potential. Such regions may either grow at sub-optimal rates or experience undesirable patterns of economic activity (due to the presence of a development capital gap). Market or social underinvestment may thus impair the competitive development of certain cities or regions. Such underinvestment would obviously be an appropriate object of concern for local and regional leaders.

The issue of capital gaps is a challenging one. It is very difficult to prove definitively the presence or absence of such gaps. In order to do so, one must have access to both supply-side data on the venture capital industry and detailed demand-side data on the quality and quantity of demand at the firm level. In this thesis I will primarily investigate the supply side of the capital gap story. I will analyze data from a national survey of venture capital firms (which I conducted in February and March of 1998) to determine whether the supply-side characteristics of the venture capital industry are consistent with the existence of capital gaps. I will also utilize these data to draw conclusions about the likely characteristics and attributes of such gaps.

Before discussing the survey results and their implications for capital gaps, I will analyze several key issues concerning the venture capital industry and indigenous economic growth strategies. The first important question is, why should we care about venture capital? In order to assess the operation of the venture capital industry and its impact on regional economic development, we must have knowledge of how venture capital fits into economic development strategies. If it were the case that venture capital did not make unique or substantial contributions to regional economies, then the presence or absence of capital gaps would be of little concern. Specifically, we must ask, what is the economic rationale behind indigenous growth strategies, and how is venture capital related to this rationale? I will argue that venture capital is tied to innovation, technological rents, and increased export levels. All of these elements are critical to indigenous growth strategies and the continued competitiveness of high factor-cost regions.

After exploring the nexus between venture capital and indigenous growth, I will discuss issues surrounding small firms and economic growth. The role of small firms in economic development—particularly with regard to employment growth—has recently come under attack. Because venture capital is inevitably involved with small firms, it is important to examine the implications of the small firm debate for arguments concerning the significance of venture capital. As with venture capital's contribution to regional economic growth, if it were the case that doubts about the role of small firms in economic development greatly diminished the importance of venture capital, then the presence or absence of capital gaps in the venture capital markets would lose a great deal of relevance for planners and policymakers. I will argue that the significance of venture capital depends upon the importance of startup firms—which may be small—but not on small firms per se.

Following the small firm discussion, I will analyze aggregate venture capital industry trends in order to develop a context for the presentation of the survey results. I will attempt to derive lessons from this analysis regarding the possibilities and limitations of venture capital in economic development. Specifically, I will explore what the size, cyclicity, concentration, import-export characteristics, and fund sources of the industry

imply about venture capital's role in regional economic development. I will also point to some of the structural characteristics of the venture capital industry that may result in capital gaps.

I will then present evidence from the survey concerning capital gaps. I will discuss the compatibility of the survey data with the existence of capital gaps. I will also analyze the likely contours of such gaps. I will argue that venture capital gaps are most likely to exist by investment stage and size. Regional and industry gaps are also probable. Finally, I will tie the above discussions together by drawing general conclusions about capital gaps, the venture capital industry, and regional economic development. Ultimately, I find that capital gaps are related to the institutional characteristics of the supply-side of the venture capital industry and not to the overall level of the supply of venture capital. I also conclude that any venture capital-related policy interventions must take the procyclicality of the venture capital-industry into account.

The specific chapter plan is as follows. In Chapter II, I will lay out the theories underpinning indigenous economic growth strategies and then connect venture capital to these theories. In Chapter III, I will discuss the characteristics of startups and small firms and how these characteristics relate to the argument for venture capital's role in regional economic development. In Chapter IV, I will describe the way in which aggregate venture capital industry trends and attributes place bounds on the potential economic development impact of venture capital. In Chapter V, I will present the results of the survey of venture capital firms in order to draw inferences about the presence or absence of capital gaps and the likely characteristics of such gaps. Finally, in Chapter VI, I will summarize my conclusions and point to the policy implications of my findings.

CHAPTER II

ECONOMIC THEORIES AND INDIGENOUS REGIONAL GROWTH

From a theoretical perspective, the main questions behind indigenous growth models are: what the economic mechanisms that allow for the creation of dense networks of firms within a prescribed geographic area, and what are the economic benefits of these concentrations? There are a number of theories that set forth these issues. My contention is that innovation-based localization economies provide the principal rationale for indigenous growth strategies. The existence of the product life cycle further underscores the importance of indigenous growth strategies and the technological rents they are capable of producing. Venture capital is a key enabling ingredient in innovation-based strategies. Without adequate venture capital, high factor-cost regions would be unable to commercialize innovation and command technological rents. Venture capital is also significant because it is associated with the promotion of businesses—particularly manufacturing firms—that have high levels of exports. Such exports are of great importance to indigenous regional growth.

General Theories of Indigenous Growth

Central to all of the theories of indigenous growth is the existence of agglomeration economies. Agglomeration economies can be defined as the greater-than-proportional factor productivity gains that result from the dense clustering of firms in a given geographical area. To the extent that these benefits accrue to all firms in a metropolitan area, they are referred to as urbanization economies. To the extent that these benefits accrue to a cluster of firms in a particular industry, they are referred to as localization economies. The distinction is important. Urbanization economies come from what Michael Porter refers to as “generalized” factor endowments (Porter 1990, p. 78).² These factors, which contrast with “specialized” factor endowments, include such features

² In addition to differentiating between generalized and specialized factor endowments, Porter also employs a parallel classification scheme involving basic and advanced factor endowments. Although some distinction between the two systems exists, it is not crucial to the current discussion. I will therefore only refer to the generalized/specialized categories. See The Competitive Advantage of Nations (1990).

as highways, a college-educated labor pool, a wide array of general suppliers, and basic financial services. The presence of these factors has the effect of lowering key firm costs, such as transportation, communication, and labor search costs.

Most of these more basic factor endowments are related to the size of a metropolitan area, as opposed to any particular specialization of such an area. As Edwin Mills has noted, empirical evidence has shown that “a doubling of MSA [Metropolitan Statistical Area] size leads to a 4-6 percent increase in MSA total factor productivity” (Mills 1993, p. 198). Of course, this statistic does not imply that we will see ever-increasing urban concentration in the future. Much of the enhanced productivity stemming from the urban concentration of capital and human resources just compensates for the higher factor costs associated with such areas (DiPasquale and Wheaton 1996, p. 110). What the existence of higher MSA productivity provides us with is the economic rationale for cities. The general factors giving rise to urbanization economies are the baseline conditions for the continued existence of competitive urban areas. However, these urbanization factors tell us little about the reasons why particular cities and regions grow or decline. Indeed, it is the concentration of particular industries or groups of related industries through localization economies that sheds light on interurban variation and differences in regional economic growth.

Localization economies arise from the presence of specialized factors of production. As opposed to their generalized counterparts, specialized factors are specific to particular industries. These factors range from specialized suppliers to a labor force highly trained in narrowly designated fields to research institutions undertaking cutting-edge scientific studies. The presence of such factors allows firms in specific industries to undertake new projects and secure skilled labor more quickly and inexpensively than similar firms that lack easy access to these same factors. Such specialized factors also allow for the development of competitive local markets that simultaneously stimulate new product demand and prepare a firm for global competition (Porter 1990, p. 71). The increasing returns that these external economies give rise to result in the spatial concentration, or clustering, of particular industries in particular geographic regions (Krugman, 1991, p. 5). However, the story of localization economies is more complicated

than a simple story of firms responding to exogenous specialized factor endowments. First, these endowments are *created* through a dynamic, interactive process; they are not simply inherited (Porter 1990, p. 80; Krugman, 1991, p. 7). Second, the reduced transaction costs relating to specialized labor and suppliers are of secondary importance. It is the capacity to innovate that is the most important feature of specialized, geographically concentrated firms embedded within the above-described context. I will deal with the implications of these two points in order.

Economic theories concerning agglomeration economies and industry clustering must constantly wrestle with ambiguities concerning causation. Although it is certainly true that firms respond to factor conditions and that trade and exports follow regional differences, successful firms generating jobs and wealth in a particular industry also stimulate the further development of beneficial factor conditions. In addition, industries may cluster in certain geographic areas as a result of the deliberate actions of government or arbitrary historical turns of events. It is this bi-directional character of causation that provides a link between theories of localization economies and economic development policies. The potential for influencing the development of localization economies through the nurture of specialized factor conditions forms the core of indigenous growth-oriented regional economic development strategies. The rationale behind this thesis' investigation of the venture capital industry is that venture capital is one of the specialized factors whose creation and promotion may lead to greater industry clustering. As Black and Gilson have shown, the structure of the venture capital industry in particular countries has powerful effects on the type and level of venture financing available for new, young firms (1998). At least some of the observed differences in venture capital industry structure derive from the "instrumental hand of politics" (1998, p. 244). Venture capital, as a partially *created* specialized factor of production, may well have the power to interact positively with other factors of production, thereby stimulating greater concentration in targeted industries.

With regard to the second complicating factor mentioned above, one of the reasons it is quite difficult to measure the effects of localization economies is that one of the chief benefits of such firm agglomeration is thought to be increased technological

innovation through knowledge “spillovers” between firms, local institutions, etc. It is an easier task to model and measure transportation or labor search costs given a fixed technology than it is to determine what constitutes technological innovation and how much of that innovation derives from external economies due to firm location. The evidence, however, does suggest that commercial applications of innovations are related to geographic proximity to the sources of innovation. Utilizing patent citations as a proxy for innovation, Jaffe, Trajtenberg, and Henderson (1993) study the localization of innovation through knowledge spillovers. They find that patent citations are “two to six times as likely” to come from within the same metropolitan areas as the original cited patent once self-citing patents are removed (1993, p. 591).³ Audretsch and Feldman also present evidence concerning innovation and the clustering behavior predicted by theories involving localization economies (1994). Analyzing the SBA’s Innovation Database, these two researchers find that industries in which new economic knowledge plays an important role (as measured by the level of R&D, skilled labor, and reliance on university research) have a significantly greater likelihood of concentration of both production and innovation (as measured by announcements of innovative new products in trade journals).⁴ More recently, researchers have developed positive evidence concerning the presence of venture capital and technological innovation. I will discuss these findings later in this chapter.

It is the apparent connection between clustered economic activity and the rate and incidence of innovation that provides the most compelling case for the promotion of industry concentration as an economic development strategy. There are two potentially desirable outcomes that stem from concentrated innovation. The first is that such innovation may stimulate the birth of new innovative firms in the future as well as the present, thus creating an ongoing cycle of new jobs, flexible adaptation, and technological leadership. The second is that having a dynamic mix of innovative small firms “in the hopper” increases the chance that, when a new industry is born, one of the firms in your region will be able to ride the wave of growth and expand to become a corporate giant, employing tens of thousands of workers. The relative importance of these two outcomes

³ Self-citations occur when the same company or university cites one of its own patents in its application for a new patent. Such cases are removed because they do not represent external economies of innovation.

is clearly related to the role of small firms in regional economies. This is a subject that I will deal with in Chapter III.

It would appear from the above discussion that industry clustering benefits firms and that urban areas consisting of such clusters have fundamental advantages over isolated firms in the form of increasing returns. However, a wrinkle exists in this picture. It turns out, as America discovered in the 1960s, 1970s, and 1980s, that agglomeration economies become less important to firms as their products, technologies, and industries mature. In fact, the high factor costs that accompany agglomeration economies due to rents for skilled labor, expensive land, and high commuting costs (DiPasquale and Wheaton 1996, p. 110) serve as an impediment to profit maximization as firms move from strategies of innovation to strategies of commodity production. As Norton and Rees (1979) pointed out, this observed product cycle transformation from research and development to mass production has a spatial component to it. As the innovative products of a dense industrial area (such as the traditional U.S. manufacturing belt) become standardized, plant production will migrate to low-wage areas (as U.S. industrial production migrated to the South and the West). Ann Markusen (1985) has further elaborated on this phenomenon by linking it to the profit-maximizing behavior of firms. In the beginning of what she refers to as the “profit life cycle,” firms invest in the pursuit of product and process innovations. Following this zero-profit stage comes a super-profit stage in which firms extract excess profits due to a temporary technological monopoly (1985, p. 27). This stage is followed by stabilized profit stages resulting from market entry and competition. A negative profit stage arises when an industry sector or its core product becomes obsolete. The stabilized and negative profit stages are characterized by a shift in firm strategy toward reduction in factor costs. As with the Norton and Rees formulation, these latter stages are likely to result in the movement of production away from high-wage regions and urban areas.

The implications of these spatial patterns of economic activity for economic development strategy are substantial. Specifically, the cyclical stages of production and profit indicate that constant innovation is essential for mature urban areas with high factor

⁴ See Audretsch and Feldman (1994), pp. 13-14.

costs, for the future benefits of today's innovations may well be lost to other regions with more competitive factor costs. Mature, high-wage urban areas have little choice but to pursue "super-profit" strategies involving firms that can extract technological rents from innovation-based monopolies. It is only natural for such areas to wonder what the role of venture capital is in undertaking these economic development strategies.

The Venture Capital Connection

Venture capital, which began as a distinct financial sector in the 1940s, can be defined as "equity or equity-linked investments in young, privately held companies, where the investor is a financial intermediary who is typically active as a director, an advisor, or even a manager of the firm" (Kortum and Lerner 1998, p. 6). As such, venture capital is more than just another diversified financial instrument that adds flexibility to a local economy. Despite the fact that regional economic theorists have often ignored the role of differentiated capital markets in regional economic development, venture capital is essential to the operation of innovation-based localization economies. Just as economists have difficulty modeling external economies, knowledge spillovers, and firms with increasing returns to scale, traditional sources of debt capital have great difficulty underwriting and monitoring small, risky firms with unproven—and potentially innovative—technologies or strategies. Economists refer to this situation as a problem of information asymmetries. The information that is available to the entrepreneur or small firm manager is much different than the information that is available to a banker who relies on standardized industry patterns and benchmarks to manage his or her portfolio. These asymmetries heighten the possibility of mutually disadvantageous behavior. The differing nature of debt and equity investment further increases the chance of conflicting incentives. Equity holders may gamble with firm assets or refuse to contribute equity capital to positive net present value projects in the presence of substantial amounts of debt because the owners of the firm have little to lose (or gain in the latter case).⁵ At the same time, a risky firm will have a hard time attracting additional equity investments in the presence of existing debt because of the seniority of debtors' claims on firm assets. Venture capital

⁵ For a discussion of agency conflicts, see Brealey and Myers (1996), pp. 491-493.

firms minimize the impact of these information asymmetries and agency conflicts by staging the release of capital, closely monitoring performance, and taking an active role in the management of the companies they invest in (Gompers 1995, p. 1461). As a result, venture capitalists enable startup firms relying upon localization economies to commercialize innovation and expand operations. In the absence of venture financing, risky research and product development would have to be internalized within larger corporate entities, thereby reducing the role of external economies in innovation and potentially the rate of innovation itself.

The consequences of such a development for high factor-cost regions could be severe. The severing of the connection between external economies and commercial innovation would transform the geography of innovation. Innovation and its accompanying technological rents would become footloose (dominated by firms that are at later stages of the profit/product life cycle), and high factor-cost regions would have to abandon indigenous growth strategies for alternative “low road” approaches to economic development. There are many reasons, of course, why these things do not happen, including the presence of skilled labor markets and specialized research institutions. However, it should be clear that without sufficient venture capital, regions (and cities, as well) run the risk of failing to commercialize innovation and extract technological rents from startup firms in early stages of the profit/product life cycle. Although the original theorists either minimized or omitted altogether analysis of venture capital, we can see from this discussion that the venture capital industry plays a critical part in both the industry cluster and product/profit life cycle theories outlined above.

Given this argument for the significance of venture capital, we would expect to find evidence of the connection between venture capital and innovation. We would also expect to find evidence linking venture capital with firm growth and industry clusters in ways that are consistent with the operation of localization economies. As discussed above, direct evidence concerning innovation and knowledge spillovers is hard to come by. Analysts must generally limit their focus to product innovations because process innovations are largely unrecorded. Despite these difficulties, researchers have found some evidence regarding venture capital and innovation. Kortum and Lerner (1998)

analyze a 1965-1992 national data set on manufacturers and a 1990-1994 Massachusetts data set on Middlesex County manufacturers to assess the relationship between venture capital and innovation. They compare R&D expenditures, the number of venture-backed companies, and industry and firm patenting rates. On a national level, the authors find that “a doubling of firms receiving venture financing translates into between a 5% and 18% increase in the rate of [an industry’s] patenting” (Kortum and Lerner 1998, p. 2). This patent effect was most pronounced in industries that contained the largest information asymmetries (as measured by book-to-market value). The results for the Massachusetts firms likewise showed significant increases in patent filings and citations for individual venture-backed firms. Venture capital thus does appear to be associated with the incidence of innovation.

Separately, Lerner has also evaluated the impact of government-subsidized venture capital on the firms that received Small Business Innovation Research (SBIR) awards in the early and mid-1980s (Lerner 1997). These awards are staged infusions of capital that 11 participating federal agencies administer to small technology-based companies. Although the SBIR awards are somewhat different than traditional venture capital because the government agencies that make the investments do not receive ownership stakes in these businesses, the program does provide a good indication of the effect of non-debt venture-type investments on small technology-based companies. After comparing the sales and employment performance of the recipient firms with firms receiving no such investments, Lerner found that “[o]ver a ten year period, the SBIR awardees enjoyed substantially greater employment and sales growth than the matching firms” (1997, p. 3). Specifically, between 1985 and 1995, SBIR awardees added a mean of 26 employees and increased sales by an average of \$4 million. By contrast, firms that did not receive SBIR funds added only 5 employees on average and saw revenues rise by \$600,000. The SBIR study also provides evidence that successful venture investments have a geographic concentration that is consistent with localization economies. The performance differences between SBIR and non-SBIR firms were only significant in geographic areas that had substantial levels of new firm births (as indicated by the presence of early stage venture capital). Thus isolated venture-type investments had little impact, while investments that

were made in firms with geographic proximity to other new firms had a pronounced impact. These results indicate that venture capital-type investments are related to both the productive commercialization of innovation and the operation of localization economies. Although we cannot conclude that venture capital caused the above outcomes, the findings are consistent with a picture of venture capital as an important enabling ingredient in *localized* innovation and firm growth.

Exports, Venture Capital, and Manufacturing

Having established the connection between venture capital and indigenous growth, I will turn to issues related to firm type and growth strategy. What does economic growth mean for a metropolitan area or a region? Does the creation of some types of firms have a larger impact than the creation of other types? Leaving the discussion of small firms and employment to Chapter II, I will briefly discuss here the intersection between venture investments, firm market-type, and economic growth strategy.

New or expanding firms have three options for growth: regional displacement, import substitution, or exports.⁶ Regional displacement involves the attraction of regional market share away from existing regional firms. Import substitution involves the attraction of regional market share away from firms located outside the region. Exports involve the sale of products and services to customers outside of the region. Of these three, exports are considered to be the most attractive from an economic development standpoint because they bring in external capital that expands the size of the regional economy. This increased “export base” can then stimulate growth in goods and services that are sold within the region. Given this desirability, it is worth asking what the relationship between venture capital and exports is. It is also worth asking whether firms in some industry sectors have a greater propensity to export than firms in other sectors.

With regard to venture capital, it turns out that venture-backed businesses export goods and services at substantially greater rates than the economy as a whole. Although

⁶ Creation of a new market through the introduction of a new product might constitute a fourth growth option. However, new product markets must generally displace existing product markets. Thus for a constant consumption rate this “new” growth fits into the scheme of regional displacement, import substitution, and exports.

regional export data are unavailable, we can use international exports as a proxy for the importance of extra-regional markets to a given set of firms. In a 1997 survey of venture-backed companies conducted by Coopers & Lybrand and VentureOne, researchers found that the “average one-year-old survey company already generates 17 percent of [its] revenues from export sales.” Furthermore, “By the time the company is five years old, 36 percent of [its] revenues [flow] from export sales.”⁷ By way of comparison, exports constituted 13.1% of private industry GDP in 1996.⁸ Venture-backed companies thus appear to offer enhanced export potential to the national economy and, by extension, the regional economies in which they are located.

The desirability of exports for regional economic development also indicates one of the main reasons why planners, policymakers, and local business officials should continue to care about the fate of manufacturing enterprises in the regional economy. Overall, manufacturers account for a disproportionate percentage of total exports relative to their share of the economy.⁹ Although manufacturers represent only 20% of private industry GDP, the goods they produce make up 71% of total exports. In 1996, manufactured goods accounted for \$617.5 billion out of \$870.9 billion in total U.S. exports.¹⁰ Although it is true that the United States runs a net trade deficit in goods and a net trade surplus in services, this situation does not diminish the fact that, from a dollar-volume standpoint, manufacturers play a greater role than service firms in the generation of international exports. Even on a regional basis, where service exports play a much greater role than they do in the international arena, the higher wages and denser economic linkages associated with manufacturing exports provide compelling reasons to pay special attention to manufacturing (Cohen and Zysman 1987, pp. 19, 204-205).

From the above discussion, we can see that the promotion of exports provides us with another reason for taking a strong interest in venture capital and venture capital-oriented indigenous growth strategies. Venture-backed firms exhibit both high levels of exports and rapid export growth. Of particular interest is the manufacturing sector and its

⁷ National Venture Capital Association, Seventh Annual Economic Impact of Venture Capital Study, 1997, p. 11.

⁸ Calculated based on data from the Bureau of Economic Analysis, U.S. Department of Commerce.

⁹ Once again, I will use international export data as a proxy for general export behavior.

intersection with venture capital. Capital gaps in the manufacturing sector might have a disproportionate impact on regional export bases. I will return to the subject of manufacturing, new firms, and venture capital in the next few chapters.

In this chapter, I have laid out the reasons why planners, policymakers, and business leaders should care about venture capital. Venture capital is a vital part of the indigenous growth strategies that high factor-cost regions are turning to in order to maintain and enhance competitiveness. Specifically, venture capital is linked to increased innovation, technological rents, and exports. The contributions of venture capital in these areas establish the relevance of venture capital to regional economic development and provide a reason for investigating the operating characteristics of the industry and the issue of capital gaps.

¹⁰ Bureau of Economic Analysis, U.S. Department of Commerce, 1996.

CHAPTER III

STARTUPS, SMALL FIRMS AND EMPLOYMENT

Before moving on to a detailed discussion of the venture capital industry (Chapter IV) and an assessment of survey evidence regarding capital gaps (Chapter V), it is necessary to explore one additional issue pertaining to the significance of venture capital in economic development. Having set forth venture capital's relation to economic theories, I will now examine issues concerning the role of small firms in the U.S. economy and the implications of these issues for our investigation of venture capital.

Small firms, which are typically defined as businesses with fewer than 100 employees, are an integral part of innovation-based indigenous growth strategies. Indeed, economic development strategies that rely on venture capital and localization economies inevitably involve small firms. The average venture-backed firm has just 21 employees one year into its existence.¹¹ Furthermore, only innovation that takes place through clusters of small firms is dependent upon external economies. If a few large firms were to conduct all of the innovative research and product development activities in a given area, the economies of innovation would become internalized within these companies, and the link between firm innovation and the enabling urban area would be broken. However, although the benefits of innovation are not very controversial, the relative advantages and disadvantages of small firms are. During the past 20 years a very contentious debate has taken place over the role of small firms in job creation. Proponents of small firms have consistently asserted that it is these firms that are responsible for the lion's share of new jobs in the American economy (Birch 1979, 1987). Skeptics, citing methodological errors and data inconsistencies in the writings of the small business camp, have pointed out that small businesses have high rates of job destruction and often have lower job quality than large businesses (Harrison 1994).

Is the argument in favor of small firms also an argument for venture capital-based strategies? We have seen that innovation is important for regional economic development,

¹¹ National Venture Capital Association, Seventh Annual Economic Impact of Venture Capital Study, 1997, p. 6.

but is this only due to the technological rents of such innovation, or does a small firm employment argument exist as well? One of the sources of confusion in the small firm debate has been the failure to distinguish between small firms as startups and small firms as small firms. In making arguments about small firms, it is important to note whether the argument concerns startups that happen to be small, or small firms whose principal attribute is their small size. I will first discuss the characteristics of small firms as startups. I will review evidence that startups in different industries have different survival and employment profiles. I will then discuss small firms as small firms. I will analyze data that show that in the sector in which *startups* have the most job-generation potential, *small firms* do not play a disproportionate role in job creation *while they are small*. In other words, the data indicate that the case for small firms as startups is more compelling than the case for small firms as small firms. Ultimately, the strongest justification for indigenous growth models and their associated venture capital components lies in the above-described innovation theories and in the fact that the small firms that are generated may one day become large firms. The continued existence of small firms as small firms is not essential to the argument for venture capital's significance in economic development.

Small Firms as Startups

Economists from Dun & Bradstreet (D&B) conducted a study based on their database in 1994 to determine what the job performance and survival rates are for firms founded in 1985 (Duncan and Handler 1994). Of the 249,768 startups that began operating in 1985, 99.6% had fewer than 100 employees and 93.6% had fewer than 20 employees in 1985. The authors find that 69.7% of these 1985 startups remained active in 1994. This survival rate stands in contrast to the widely reported statistic that four out of five small businesses fail in their first few years of operation. However, it should be noted that D&B only tracks companies that “are active in business, often purchasing supplies, selling products, or otherwise meriting a review of their importance, reliability, and resources” (1994, p. 9). Even among this group, a direct request for information about a company from a third-party is often necessary for a firm to make it into the D&B database. Thus the reported survival rate is probably inflated. Nevertheless, the D&B

database provides an interesting look at a large group of new firms and has the advantage of excluding solo consultants and shell corporations.¹² The industry breakdowns of the data are worth presenting in detail. These breakdowns, which are contained in Table 1, demonstrate a number of intriguing patterns.

The survival rates for the 1985 D&B startups in Table 1 are comparatively high across the board. Industry differences do exist, however. The industry figures reveal that service firms, FIRE industry firms, and construction firms are among the most likely startups to remain in business (I am ignoring agricultural and mining firms because they constitute such a small percentage of startups).¹³ All have survival rates in excess of 70% for the period from 1985 to 1994. By contrast, manufacturing and wholesale trade firms have survival rates of only 61% for the same period. The survival rates of the retail trade and transportation/public utilities industries fall in between these two industry groupings. It should be noted that not all of the firms who do not survive are business failures. The discontinued firms column indicates the number of firms who ceased operations without outstanding debts. Although some of these are no doubt unsustainable businesses, some are also firms that were acquired by larger corporations and thus no longer appear as independent small firms.

Table 1. 1985 Startups: Survival and Change in Employment 1985-1994 by Sector

Industry	Survival Figures			Employment Changes of Survivors (% Shares)								
	# Firms Started in 1985	# Firms Discontinued	# Firms Failed	Survival Rate (%)	Lost >10 Emp.	Lost 1-9 Emp.	Lost Any Emp.	No Change	Gained Any Emp.	Gained 1-9 Emp.	Gained 10-99 Emp.	Gained >100 Emp.
Agriculture	3,715	354	144	86.6	0.8	5.4	6.2	80.1	13.7	10.8	2.7	0.2
Mining	2,354	726	235	59.2	2.2	12.1	14.3	67.0	18.6	14.4	3.7	0.5
Construction	35,012	6,636	2,858	72.9	1.2	8.3	9.5	70.0	20.4	15.8	4.4	0.2
Manufacturing	21,999	6,193	2,291	61.4	2.2	10.7	12.9	46.9	40.2	24.5	13.7	2.0
Trans./Pub. Util.	8,914	2,225	775	66.3	1.9	8.4	10.3	63.5	26.2	16.7	8.2	1.3
Wholesale Trade	29,237	8,932	2,456	61.0	1.0	11.2	12.2	55.2	32.6	25.7	6.5	0.4
Retail Trade	72,813	17,580	5,728	68.0	1.3	11.9	13.2	65.3	21.4	17.8	3.3	0.3
Finance/Ins./R.E.	16,179	3,759	889	71.3	2.1	9.6	11.7	68.6	19.7	13.2	5.5	1.0
Services	57,419	10,328	3,037	76.7	1.3	18.7	20.0	57.9	22.0	15.9	5.3	0.8

Source: Duncan and Handler (1994), Dun & Bradstreet Corporation, Economic Analysis Department.

¹² Analysts have pointed out other matters of concern regarding the Dun & Bradstreet database, but these issues do not affect the following discussion. See Harrison (1994) and Davis, Haltiwanger, and Schuh (1996).

¹³ FIRE is an acronym for finance, insurance, and real estate.

The percentage breakdowns of employment change by sector add interesting depth to the picture of this cohort of D&B startups. Among the 1985 firms still active in 1994, 64.7% saw no change in employment, while 11% lost employees and 24% gained employees. These figures vary considerably by industry. In general, surviving manufacturing and wholesale trade startups showed more volatility than firms in other sectors. Surviving manufacturing startups were the most likely either to lose more than ten employees or to gain more than 100 employees out of all industry sectors. Manufacturing and wholesale trade were the most likely among the survivors to demonstrate a net gain in total employees. Forty percent of manufacturing survivors and 33% of wholesale trade survivors added jobs between 1985 and 1994. These figures contrast with 22% of service survivors, 21% of retail survivors, and 20% of FIRE industry survivors. On the job loss side of the equation, service survivors led the pack. Twenty percent of service survivors lost employees between 1985 and 1994. This compares with 13% for retail, 12% for FIRE and wholesale trade, and 13% for manufacturing. Thus while manufacturing and wholesale trade have the highest failure rates among industries, surviving firms in these sectors displayed greater employment growth potential than other industry sectors. Manufacturing and wholesale trade survivors also possessed comparatively high job loss percentages, but these two sectors trailed services and were comparable to retail and the FIRE industries in this regard. These results argue against lumping all small startups into a single category. The industry breakdowns are consistent with a picture of startup manufacturing and wholesale trade businesses as high-risk/high-reward enterprises. Service, retail, construction, and the FIRE industries have more staying power in terms of survival, but less upside job-generating potential. Small firms as startups thus seem to provide significant (if risky) employment growth opportunities, at least in the manufacturing and trade sectors.¹⁴

¹⁴ Analysis of the regional breakdowns of the Dun & Bradstreet survival data (not shown) reveals that the above industry patterns are fairly consistent across regions.

Small Firms as Small Firms

Having analyzed the differences in startup employment growth by industry, I will now examine existing evidence on the employment importance of small firms in the sector that demonstrated the most startup job-growth potential: manufacturing. Data on this issue comes from three economists who make use of the Census Bureau’s Longitudinal Research Database (LRD). Davis, Haltiwanger, and Schuh (1996) analyze data on the manufacturing sector from 1973 to 1988 to draw out lessons about the role of small firms, startups, and shutdowns in employment and the U.S. economy. Davis et al. find that, relative to their employment levels, small manufacturers “exhibit sharply higher gross job creation rates but not higher net creation rates” than large manufacturers (1996, p. 57). In absolute terms, the researchers find that large manufacturing firms create and eliminate far more jobs than small manufacturing firms (1996, p. 73). Tables 2 and 3 present the disaggregated results.

**Table 2. Net and Gross Job Flow Rates by Employer Size
Category: Mean Annual Rates, 1973-1988**

# of Employees	Job Creation Rate	Job Loss Rate	Job Reallocation Rate	Net Growth Rate
0-19	15.8	17.5	33.3	-1.6
20-49	11.9	13.4	25.3	-1.5
50-99	11.2	12.0	23.2	-0.8
100-249	10.7	11.1	21.9	-0.4
250-499	10.1	10.3	20.4	-0.2
500-999	9.7	10.4	20.1	-0.6
1,000-2,499	8.9	9.5	18.5	-0.6
2,500-4,999	8.4	9.5	17.9	-1.1
5,000-9,999	7.9	9.2	17.1	-1.3
10,000-24,999	7.1	8.5	15.6	-1.4
25,000-49,000	6.9	8.1	15.0	-1.3
50,000 or more	6.6	8.0	14.6	-1.4

Note: Rates calculated by average firm size method; see text for explanation.
Source: Davis, Haltiwanger, and Schuh (1996).

Table 2 breaks out the differences in job creation and job loss by average firm size. These rates are calculated by taking the total jobs created or destroyed in a given year and dividing by the average plant employment size over the entire 1973-1988 period. By

assigning firms a single mean size for the entire period, Davis et al. control for the deceptive regression-to-the-mean effect by which periodic fluctuations in firm size inflate small firm job growth statistics. Table 2 also contains a job reallocation column. This statistic is merely the sum of the job creation and loss rates. It indicates the overall level of churning or shuffling taking place in a given employment category. The final column of Table 2 is the net job growth rate. This rate is equal to the job creation rate minus the job loss rate. It indicates the net employment growth as a percentage of average firm size. The results in Table 2 are informative. Small manufacturers have much higher job creation rates than their larger counterparts, but also have much higher job destruction rates. Firms with an average of less than 20 employees expand employment at annual rates of roughly 16% of their employment base and eliminate employment at rates of around 18%. Firms with an average of between 500 and 1,000 workers, by contrast, create and eliminate jobs at rates of about 10%. In net terms, the job-creation performance of small firms does not stand out. Reflecting the troubles of U.S. manufacturing during this period, net employment growth rates are fairly uniform across the board. All firm sizes saw job losses at rates ranging from -0.2 to -1.6. The job reallocation rate indicates that the overall stability of jobs increases as firms grow larger. Total job loss and creation activity represents 33% of the smallest firms' average employment base, as opposed to 19% for firms with between 1,000 and 2,500 employees. Ultimately, these figures emphasize the idea that small manufacturers have a greater amount of overall job fluctuation than large firms, but *as a class* of firms they do not have significantly different net job growth rates than other size classes of firms.

Table 3 depicts the shares of absolute levels of employment growth by average firm size of manufacturer. It is apparent that larger firms account for most of the job creation and job loss that occurred in the manufacturing sector from 1973 to 1988. Firms with greater than 100 employees are responsible for 76% of both jobs created and jobs lost. This percentage is slightly less than such firms' 83% share of total manufacturing employment. The smallest two categories of firms in the data set, those with less than 20 and less than 50 employees, did possess greater shares of jobs generated and lost than their overall share of employment. Together these categories were responsible for

Table 3. Shares of Gross Job Creation and Loss by Employer Size Category: Annual Averages as Percentages of Employment, 1973-1988

# of Employees	Job Creation Share	Job Loss Share	Total Employment Share
0-19	7.5	7.3	4.2
20-49	8.8	8.9	6.6
50-99	7.9	7.5	6.2
100-249	9.7	9.0	8.0
250-499	6.7	6.1	5.9
500-999	5.8	5.5	5.2
1,000-2,499	7.6	7.2	7.5
2,500-4,999	6.5	6.5	6.8
5,000-9,999	8.3	8.6	9.2
10,000-24,999	12.6	13.5	15.7
25,000-49,000	8.7	9.1	11.2
50,000 or more	10.1	10.9	13.5

Note: Shares calculated by average firm size method; see text for explanation.

Source: Davis, Haltiwanger, and Schuh (1996).

16% of job creation and destruction, while they accounted for 11% of employment. Nevertheless, it is clear that large firms are responsible for the bulk of job activity that takes place in the manufacturing sector.

These results indicate that, for the manufacturing sector, the arguments concerning innovation and expansion of the export base provide stronger rationales for venture capital-oriented indigenous growth strategies than do arguments resting on the job-creation role of small firms. However, this is not to say that the ultimate employment contributions of small firms are not important. Although Davis et al. make a convincing case concerning the aggregate impact of small firms *while these firms are small*, it is important to note that tomorrow's large-firm growth derives in part from the existence of small firms today. In the long run, it is not essential that particular small firms continue to play important roles in a regional economy *as small firms*. It may well be that the most important thing about small firms is that they may one day become large firms. Furthermore, volatility and small aggregate employment figures do not diminish the importance to high-wage regions of capitalizing on the early commercial prospects of innovation. As Markusen has pointed out, it is likely that these regions will one day lose

the benefits of production as an innovation becomes standardized. Small firm job creation may not be the driver of economic activity nationally, but the creation of innovative startups (which generally begin as small firms) is an essential component of economic development strategies for high-factor cost regions.

Doubts about the role of small firms as small firms thus do not diminish the significance of the venture capital industry. The benefits of small firms as startups provide a compelling rationale for continued investigation of the nature and possibilities of the venture capital industry.

CHAPTER IV

THE VENTURE CAPITAL INDUSTRY: CHARACTERISTICS AND INVESTMENT PATTERNS

In order to assess venture capital's role in economic development and set the stage for the discussion of capital gaps in Chapter V, it is necessary to examine certain detailed aspects of the venture capital industry. We have already seen from Chapter II that the rationale for venture capital-oriented indigenous growth strategies lies with the innovation, technological rents, and increased exports that are associated with venture-backed firms. However, the characteristics and investment patterns of the venture capital industry place boundaries on the impact of venture capital on regional economic development. In this chapter, I will analyze these characteristics, patterns, and boundaries. Specifically, I will show how the venture capital industry's size, cyclical nature, investment concentrations, regional import-export patterns, and sources of funds all define the range of conclusions that may be drawn regarding venture capital and regional economic development. This analysis will also provide a context for the capital gap discussion in Chapter V.

Ultimately, venture capital is a small, but rapidly growing, portion of total investment. It is limited in its ability to reverse economic downturns due to its procyclical nature, and it is heavily concentrated in a small range of industries. Promotion of the local venture capital industry is not necessarily equivalent to promotion of local investment due to the export (leakage) of capital. The sources of funds and the general supply-side characteristics of the industry have changed dramatically over the past few decades. These shifts provide an explanation for the possible existence of capital gaps. I will utilize existing industry data as well as interview material to describe these venture capital industry aspects and develop interpretive boundaries for Chapter V.

Background and Definitions

As mentioned in Chapter II, venture capital is most often defined as equity or equity-related investments in relatively young companies by institutional investors who exert some level of management control. This definition captures both the orientation of

venture capital towards new businesses and the active role that venture capitalists play in the management of the companies in which they invest. For the purposes of this thesis, however, the above definition must be slightly enlarged. Because equity investment firms who fall under the rubric of venture capital firms often make investments in the expansion of later stage companies, I will also include substantial equity investments in later stage firms with high growth potential under the general term “venture capital.” It will often be important to distinguish between “true” early stage venture capital and later stage equity investments. In these instances, I will specifically refer to “early stage venture capital” to make the distinction clear.

I should also note that my discussion refers to institutional venture capital, as opposed to “angel” capital. Angel investors are wealthy individuals who make equity investments in startup and pre-startup entrepreneurial enterprises. The amount of angel and other “informal” capital is often estimated to be two to three times the size of the institutional venture capital markets (Fenn, Liang, and Prowse 1995, p. 3). Angel investors, along with personal savings and family money, are generally the only resources available to entrepreneurs who cannot access institutional funds. However, there are several reasons for minimizing discussion of angel capital. First, few data exist on angel investments due to their non-institutional character. Second, because securing angel capital is heavily dependent upon personal networks, and because angel investment is not professionalized, there are many reasons to think that angel capital does not neatly smooth out the wrinkles in the institutional venture capital markets. The existence of angel capital does not diminish the importance of boundaries and gaps in the institutional venture capital markets.

Throughout my discussion, I will rely on the following scheme of equity investment stages¹⁵:

¹⁵ Adapted from Pratt’s *Guide to Venture Capital Sources: 1997 Edition* (New York: Venture Economics, 1997), pp. 12-13.

seed financing:	capital provided to an entrepreneur for the purpose of concept development;
startup financing:	investment in a new company for the purpose of product development;
first stage financing:	investment in an early stage firm for the purpose of initiating full-scale operations or scaling up services/production;
second stage financing:	capital for initial expansion of a company that has achieved some level of production and sales;
third stage/mezzanine:	equity or equity-related debt investment in a company for the purpose of a major expansion; company may be mid- or late-stage with significant revenues;
bridge financing:	capital invested in a firm shortly before the firm goes public;
acquisition financing:	equity capital for the purpose of acquiring another company;
management/LBO:	capital to finance a management buyout or other leveraged buyout (LBO) of a product line or company; restructuring is often involved.

Size and Cyclicity

By most accounts, the United States is currently awash in equity capital. Venture capital investments have increased sharply over the past few years. In 1997, nearly 1250 venture capital firms invested \$12.2 billion, a figure that represents an 83% nominal increase over the 1995 total.¹⁶ Venture capital firms participated in 2,706 deals in 1997, up from 1,543 in 1995. The average 1997 deal size was \$4.5 million.¹⁷ From an aggregate standpoint, the venture capital industry is clearly booming. The increased influx of funds, coupled with the enviable growth of Silicon Valley and Boston's Route 128, have raised the profile of the industry considerably.

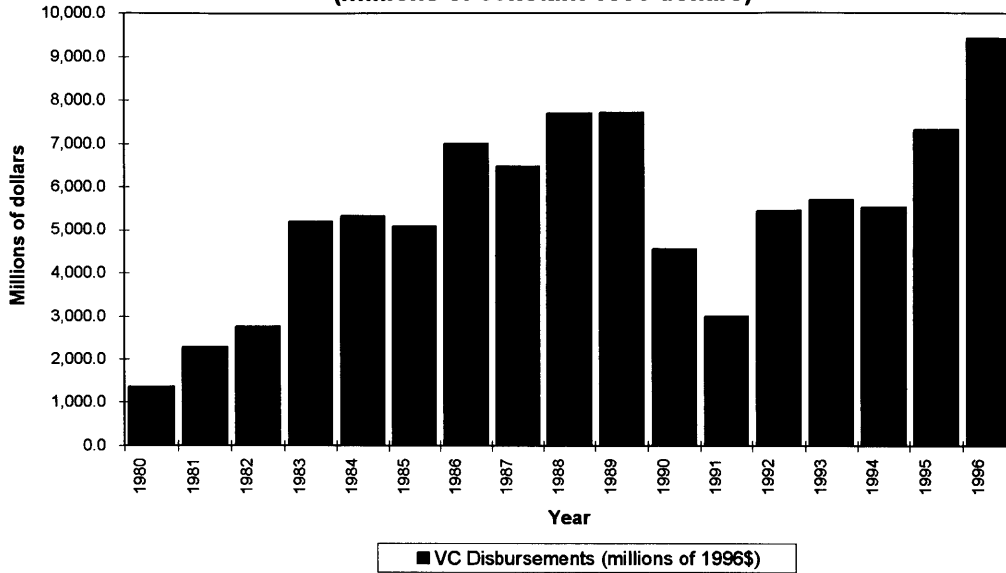
Despite this high profile, however, the venture capital industry remains a young and volatile industry. As Figure 1 demonstrates, funding levels in 1980 were only a small fraction of their current size in constant dollar terms. Total venture capital disbursements in 1980 were equivalent to \$1.36 billion in constant 1996 dollars. By 1996, disbursements had grown to \$9.42 billion. Figure 1 also indicates that the venture capital markets are very sensitive to economic cycles. Real venture financing rose dramatically between 1980

¹⁶ Investment totals are from Coopers and Lybrand, Money Tree Report: 1997 Results (1998), p. 1. Total number of firms is taken from Pratt's Guide to Venture Capital Sources: 1997 Edition (1998).

¹⁷ Coopers and Lybrand, Money Tree Report: 1997 Results (1998), p. 1.

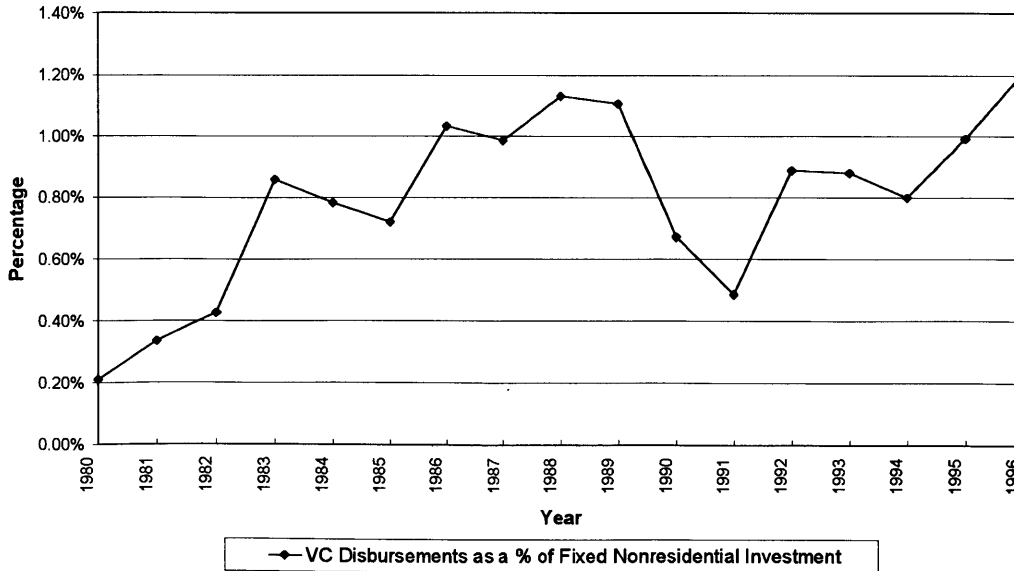
and 1989, fell sharply in the recession of the early 1990s, and—buoyed by a hot initial public offerings (IPO) market—has been climbing rapidly since 1994.

**Figure 1. U.S. Venture Capital Disbursements: 1980-1996
(millions of constant 1996 dollars)**



Source: data from Venture Economics; current figures deflated by GDP deflator (BEA).

Figure 2. U.S. Venture Capital Disbursements as a % of Fixed Nonresidential Investment: 1980-1996



Source: Author's calculations based on data from the Bureau of Economic Analysis (U.S. Dept. of Commerce) and Venture Economics.

Analyzing venture investment levels relative to overall investment in the U.S. economy is also instructive. Figure 2 presents annual venture capital disbursements as a percentage of total fixed nonresidential investment for the period from 1980 to 1996. The graph makes several points clear. First, venture capital represents a very small percentage (about 1%) of total investment. Second, venture investment has grown in percentage terms. Venture capital's share of total investment increased by a factor of six during this time period, expanding from 0.2% in 1980 to 1.2% in 1996. Finally, venture investments are heavily pro-cyclical. When the economy is strong, venture investments increase as a percentage of total investment. When the economy is weak, venture investments fall in percentage terms. This cyclicity has important implications for economic development. Theoretically, because returns are dependent on front-end pricing as well as future growth, economic downturns should provide attractive bargains for high-risk equity that possesses a longer time horizon than the risk-averse debt markets. As one Boston-based venture capitalist put it, "It's always more profitable to launch a startup in a recession."¹⁸ The fluctuations in Figure 2 indicate that venture capital has not responded to this incentive and thus has not had a stabilizing effect on the economy in the past. To the extent that planners and local businessmen look to venture capital to spark growth in the midst an economic downturn, they must beware of the fact that the venture capital markets have not reversed economic trends in the past. It remains to be seen whether the venture capital industry, as it matures and becomes more institutionalized, will have the capacity to exert a positive countercyclical investment effect similar to that credited to the entrance of public equity into the real estate markets.

The overall growth of the industry from the early 1980s to the present coincided with two key events. The first of these was a demand-side effect: the 1980s explosion of high-tech businesses in computer- and life science-related industries. The second event—a supply-side effect—was the U.S. Department of Labor's 1978 change in the ERISA "prudent man" standard for institutional retirement investments by pension funds (Gompers and Lerner 1997, pp. 9-10). I will first trace the interactions between

¹⁸ November 12, 1997 interview, Massachusetts Technology Development Corporation.

technology and venture capital, and then turn to supply-side issues relating to sources of funds.

Investment Concentrations

The simultaneous expansion of venture investing and high-tech industries was far from coincidental. High-tech firms, with their temporary technological monopolies and ability to create new standards and industries, traditionally have had the greatest potential to earn the high returns sought by venture capitalists. Indeed, venture money has been largely concentrated in a few industries. Figures 3 through 6 contain pie charts representing venture investments by industry for four selected years over a 12-year period. The figures demonstrate that computer related industries, electronics, telecommunications, and medical/life science industries have typically accounted for between 70% and 80% of total venture investments. In 1984, 1992, and 1996, these high-tech industries received 79%, 75%, and 71% of venture capital disbursements. Traditional non-high tech manufacturing, by contrast, garnered 10%, 9%, and 7% of total venture investments in these same years. These results offer one of the most obvious lessons about the venture industry: growth in venture investments does not imply across-the-board industry development.

Although venture capital investments are heavily concentrated in high-tech industries, this concentration is neither static in composition nor fixed in its overall level. The exception to the general pattern that makes this point is the pie chart representing investment shares in 1988 (Figure 4). At that time, the four high-tech industries took in only 53% of total venture investments. Analysis of more disaggregated data (not shown) from the surrounding years reveals that this fluctuation is the result of industry shifts within the high-technology sectors. As the computer hardware industry matured and startups within the industry declined, venture capital investment briefly shifted to non-high-tech industries. These shifts, which I will turn to now, shed light on key aspects of the operation of the venture capital markets.

Figure 3. U.S. Venture Capital Investment by Industry: 1984

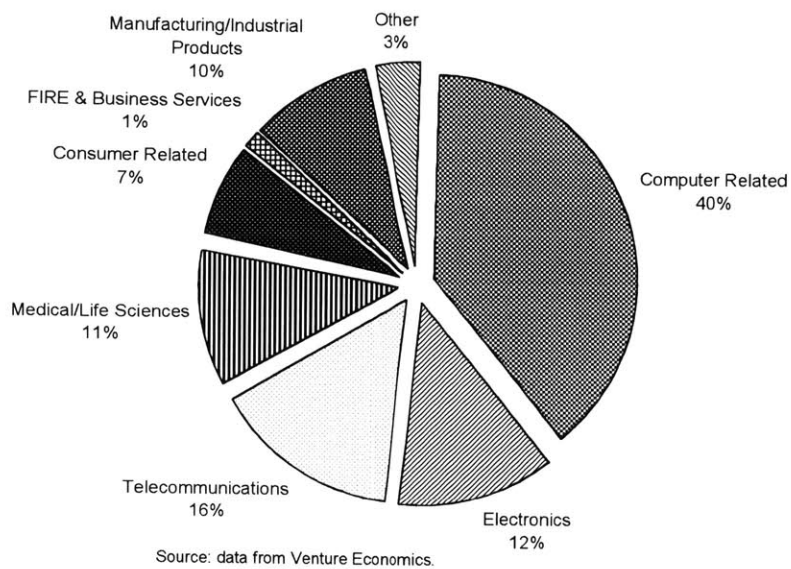


Figure 4. U.S. Venture Capital Investment by Industry: 1988

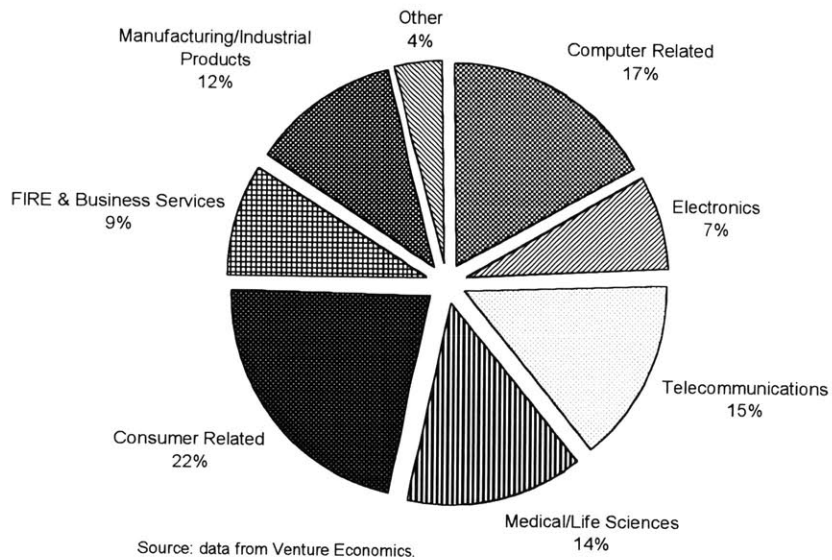
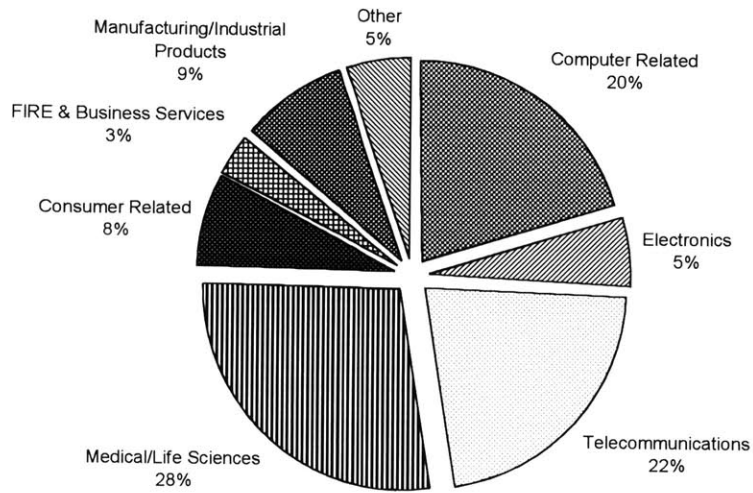
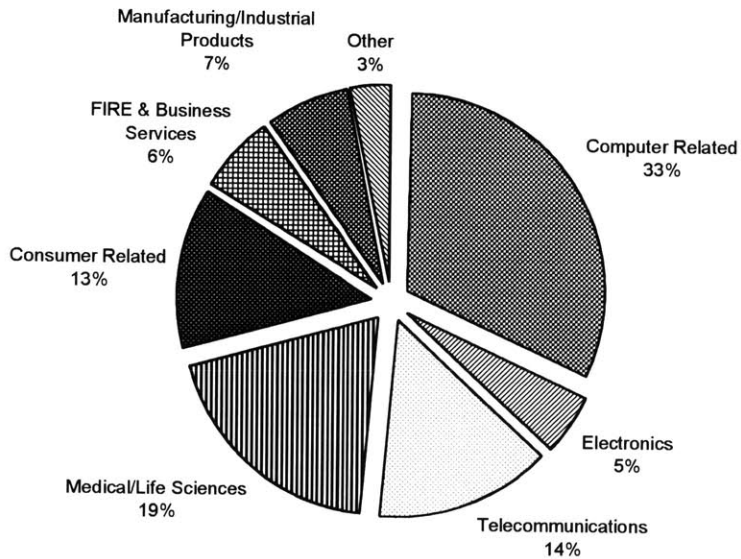


Figure 5. U.S. Venture Capital Investment by Industry: 1992



Source: data from Venture Economics.

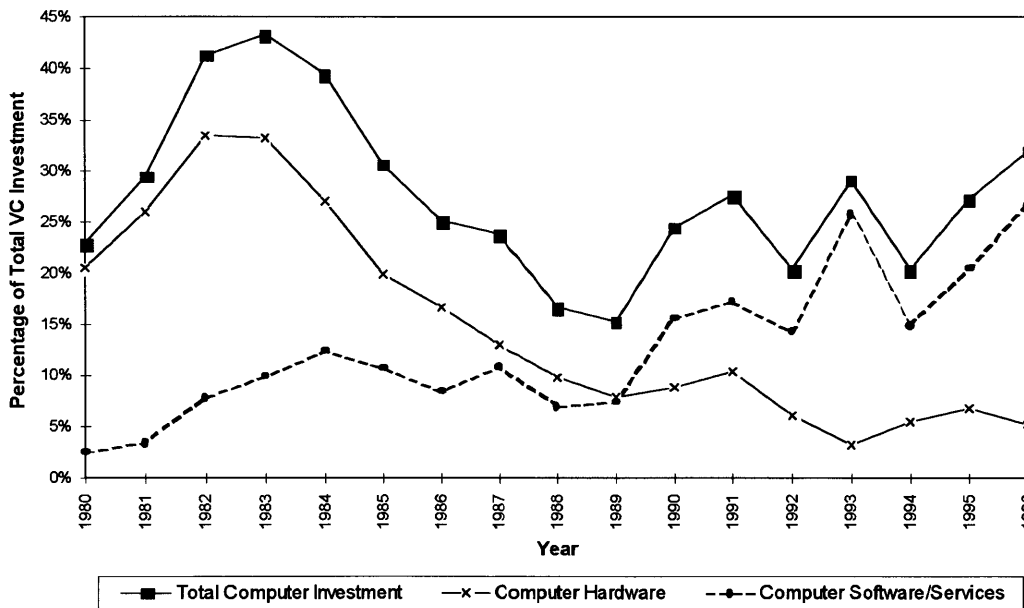
Figure 6. U.S. Venture Capital Investment by Industry: 1996



Source: data from Venture Economics.

Despite the popular impression of an ever-expanding computer industry that attracts more and more venture investments every year, computer-related venture investments have actually fluctuated substantially since 1980. Although computer-related investments have been and continue to be one of the mainstays of the venture capital world, the fortunes of subsectors of the computer industry have risen and fallen. In the early 1980s, computer-related venture investments climbed from 23% of total venture financing in 1980 to 43% in 1983 (Figure 7). This rise was largely fueled by increased investment in the computer hardware industry. However, as the 1980s went on, hardware

Figure 7. Composition of Venture Capital Investments in the Computer Industry: 1980-1996



Source: data from Venture Economics.

venture financing declined dramatically in both percentage and absolute terms. By 1990, computer hardware represented only 9% of new venture investments, down from 33% in 1983. In constant 1990 dollars, hardware venture investments fell from \$1.46 billion in 1983 to \$341 million in 1990. While hardware investments continued to fall in the late 1980s, computer software and services firms were beginning to claim a larger share of

new venture investments. After modest growth in the 1980s, software rose from 7% of total venture investment in 1989 to 27% in 1996.

One potential explanation for these industry shifts is the product/profit/firm life cycle theories discussed in Chapter II. In keeping with these theories, computer hardware startups appear to have declined in importance as the industry matured, leading to an overall decline in the high-tech industries' share of venture financing in the years before software startups began to increase dramatically. If this is the case, it would further emphasize the importance of innovation-based external economies. Industry clustering or concentration—even in high-tech industries—is not by itself sufficient to assure a region of continued competitiveness. Continual innovation (spurred by technological spillovers) and commercialization of this innovation through efficient venture capital markets are necessary for a region to “shift gears” and capture the technological rents from a new industry's temporary technological monopolies. Today's seedbed of startup high-tech entrepreneurialism may become tomorrow's standardized large-firm-dominated industry. Although such a development will often be positive in employment terms, high factor-cost cities and regions risk losing these employment gains in addition to the technological rents associated with innovation-based localization economies. Venture capital investment concentrations are a bellwether of these changes. Planners and analysts should take note of fluctuations in these concentrations in order to anticipate changes in the geography of competitiveness.

One additional aspect of the above-described industry investment patterns is that in the gap between the decline of hardware ventures and the rise of software/service ventures, total venture investment levels remained high despite the reduction in computer-related technological opportunities. The result was that, as Figure 4 shows, traditional manufacturing, consumer related businesses, and other non-technological industries increased their share of venture financing in the late 1980s. Absolute levels of venture financing increased for these non-technological industries as well. Thus it may not be the case that traditional industries are incompatible with venture capital investment. It may just be that in most years such investments are crowded out by the relative attractiveness of technological opportunities.

These occurrences both confirm and complicate the picture of macroeconomic cyclicity discussed above. On the one hand, the maintenance of high investment levels in the late 1980s (despite a falloff in computer investment opportunities) argues for the primacy of macroeconomic growth factors over technology demand conditions. On the other hand, the experiences of the early 1980s indicate that overall levels of venture financing may react strongly with specific technological demand (the rise of the computer hardware and life sciences industries). The lesson for economic development is most likely that venture financing for particular industries responds both to the economy as a whole (Figures 1 and 2) and to specific demand conditions.

Regional Import-Export of Funds

The characteristics of venture investing vary considerably by region of the country. Some areas of the country invest a very high proportion of their venture capital close to home, while other areas export the majority of their venture dollars. Specifically, as

Table 4. Percentage of Venture Capital Dollars Invested In-State, 1996

California	58.0%
Massachusetts	30.0%
Illinois	14.3%
New York	9.4%

Source: Coopers & Lybrand 1996.

Richard Florida has pointed out, venture capital firms in regions whose venture capital industries are related to a local technology base will make substantial local investments.

These regions will have high venture capital “capture” rates. By contrast, regions whose venture capital industries spring from the presence of a financial industry will tend to export a large percentage of their venture investments (Florida and Kenney 1988, p. 38; Florida and Smith 1990, p. 346). As Table 4 demonstrates, California is an example of a region whose indigenous business growth opportunities capture the majority of regional venture capital. Californian venture capital firms invested 58% of their total venture dollars in-state in 1996. New York, on the other hand, is an example of a financial-center region whose indigenous businesses capture only a small share of regional venture capital resources. New York venture firms invested only 9.4% of their 1996 venture dollars in New York companies. Massachusetts and Illinois fall somewhere in between these two extremes. The intermediate status of the capture rates of Massachusetts and Illinois may indicate that the venture capital industries in these

locations have both a local-industry and a financial-center rationale for their existence. These regional patterns—particularly the New York example—emphasize the fact that, despite information asymmetries that favor investment close to home, venture capital firms frequently invest outside of the regions in which they are based. Whether this leakage is due to the lack of an effective local demand or supply-side industry characteristics (discussed in the following section), the presence of venture capital alone is no guarantee of local or regional investment.

Sources of Funds

The sources of investments in private venture capital funds have altered dramatically over the past 20 years. Venture funds, which are typically organized as limited partnerships, raise money from a variety of corporate, institutional, and individual investors. The composition of these investors was very different in the late 1970s than it is today. In 1978, individuals and families provided 32% of investments in venture capital funds (Figure 8).¹⁹ Insurance companies supplied 16% of the total, and pension funds contributed 15%. However, the U.S. Department of Labor's 1978 clarification of the "prudent man" rule contained in the Employment Retirement Income Security Act (ERISA) of 1974 changed all of this. This rule, which required that pension fund managers choose their investments with the care of a prudent man, had previously discouraged venture investment. In its clarification, the Department of Labor stated that portfolio diversification through high risk investments was an acceptable, or prudent, strategy for the investment of retirement funds (Bygrave and Timmons 1992, p. 25; Gompers and Lerner 1997, pp. 9-10). The result was a large upsurge in pension fund investments in venture capital funds. As Figures 9 and 10 make clear, pension money became the dominant source of venture capital, increasing to 46% of the total by 1988 and 55% by 1997.

¹⁹ Data for 1978 and 1988 are from the Venture Capital Journal, as reproduced in Bygrave and Timmons 1992, pp. 45-6. Data for 1997 were obtained directly from Venture Economics.

Figure 8. Sources of Venture Capital: 1978

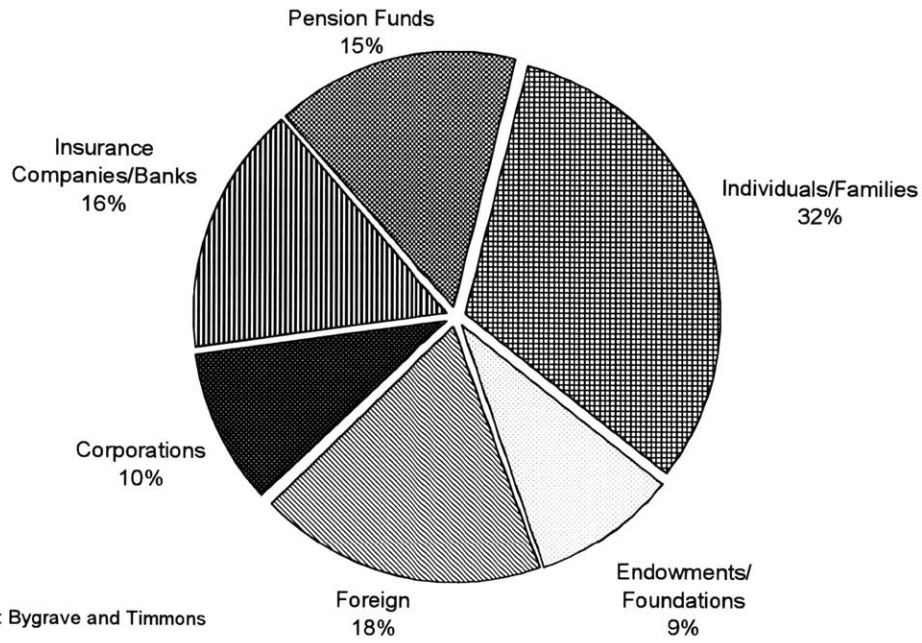


Figure 9. Sources of Venture Capital: 1988

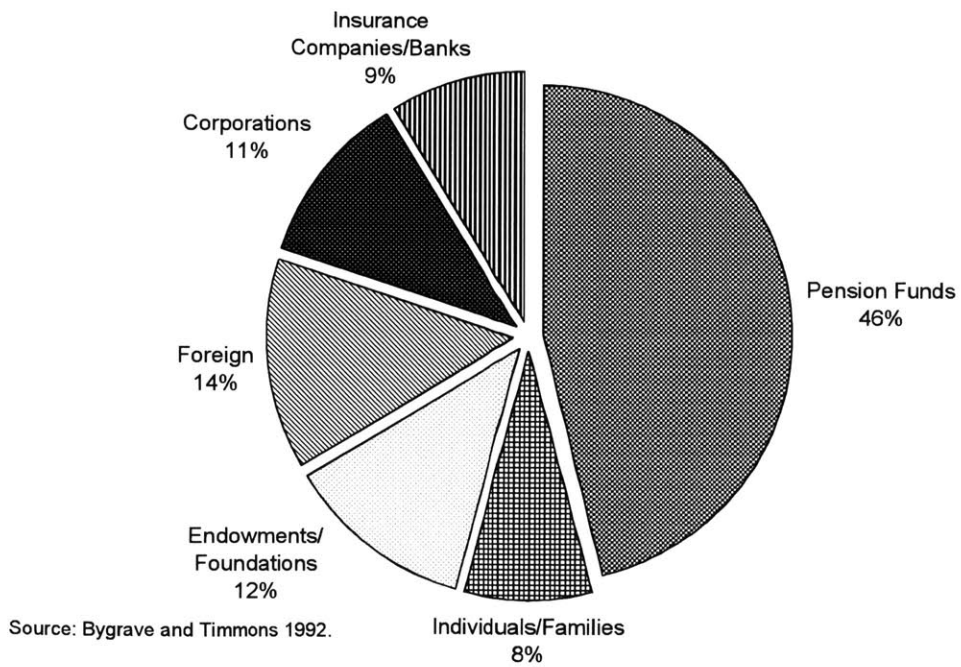
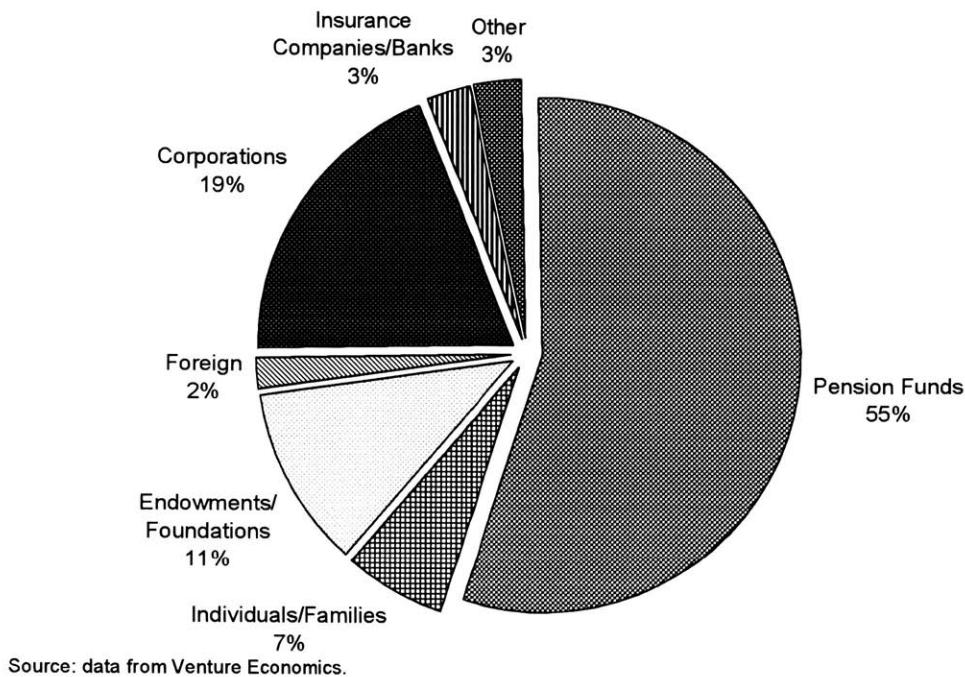


Figure 10. Sources of Venture Capital: 1996



This supply-side shift, together with the fund-raising growth described in the size and cyclicity section, has had important consequences for the venture capital industry and the issue of capital gaps. Specifically, the large influx of institutional money has helped to push the venture industry towards larger investment sizes and later stage investments.

Although the concept of capital gaps in the midst of a capital windfall at first seems counterintuitive, the abundant fund supply and its character have altered the economics of venture investing and thus the orientation of venture firms. As one Boston-based venture capitalist put it: “There will be fewer true venture capital firms in five years than 15 years ago, even though there will be ten times more firms calling themselves by that name.”²⁰ The problem is that small investments require the same amount of due diligence and monitoring as large investments. As a result, heavily-capitalized venture funds have an economic incentive to make a few larger investments rather than many smaller ones. Early stage deals, which typically are smaller in size, have the added disadvantage of requiring the most intensive research and monitoring (due to greater information asymmetries).

According to many venture capitalists, the consequence of these factors has been a shift away from early-stage and small-size investments. As the managing director of a venture capital firm located in Philadelphia noted: “One of our related funds raised more money [than they had in their previous fund] and had to double the size of their investments.”²¹

It is, of course, possible that the market will automatically correct any gaps that result from these supply-side factors. Indeed, many analysts and venture capitalists believe that increased competition for large deals and later stage opportunities will drive down returns in these investment categories in the near future. Such an occurrence could impel venture funds to fill underserved niches in the early-stage and small-deal markets.

However, self-correction is far from inevitable. The main reason lies with the institutional pension investors discussed above. Like heavily capitalized venture investors, pension fund managers have an incentive to reduce portfolio management overhead by putting capital to work in large blocks. As a result, they are reluctant to invest in the small funds that, in turn, are more likely to make small, early stage investments. As one New York-based venture capitalist noted, returns are not the only consideration for pension fund managers. Even if returns in large, late-stage equity investment funds fall, pension investment managers will likely continue to invest in them because “what they [large, late-stage equity investment funds] offer is the opportunity to invest \$800 million at a clip.”²²

Another survey respondent pointed to the conservative bias that is built into the incentive structure for pension fund managers: “[An] alternative investment manager gets no benefit for doing better but he gets slaughtered if something goes wrong.”²³ As a whole, the above scenario provides a plausible explanation for the existence and perpetuation of capital gaps. In the face of the institutional supply-side characteristics of the venture capital industry, lower returns alone may not guarantee the diversification of venture investing into areas where capital gaps currently exist.

The empirical evidence for this supply-side capital gap hypothesis is mixed. The data indicate that in percentage terms the industry has shifted toward later stage investing.

²⁰ February 11, 1998 interview.

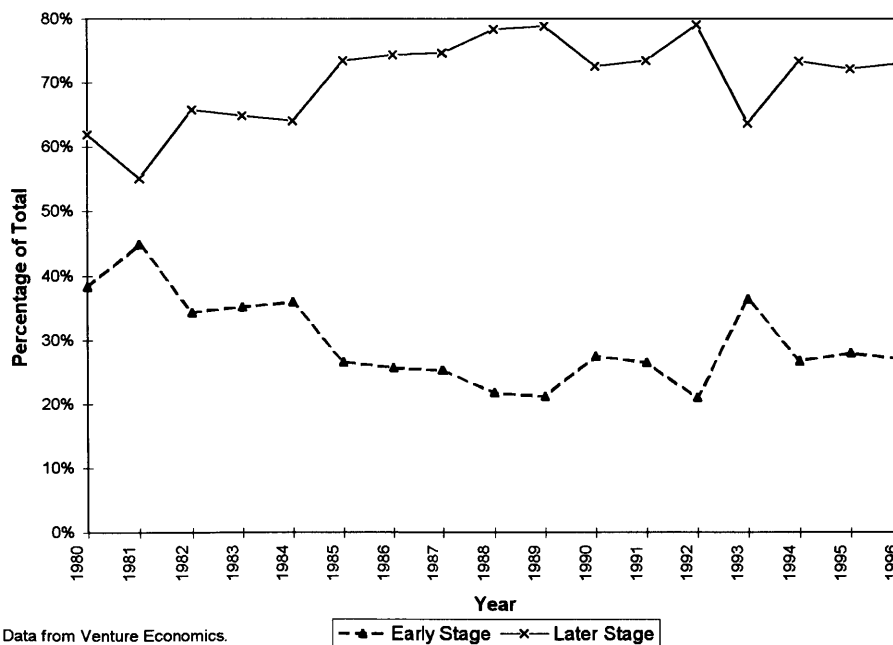
²¹ March 17, 1998 interview.

²² March 11, 1998 interview.

²³ March 12, 1998 interview.

As Figure 11 demonstrates, the percentage of early stage investments has exhibited a moderate but steady decrease over the past sixteen years, falling from around 40% to about 30% of total venture investment. However, other industry data reveal that this shift may be correlated with the returns generated by particular investment stages. Table 5 contains the comparative returns for early stage, late stage, and diversified funds over different time periods. Although recent returns have been higher for venture capital firms investing in early stage deals, the long-term returns of funds that make later stage investments have consistently outpaced early-stage returns. During the period from 1993 to 1996 (three-year returns column), early stage venture funds had an average annualized IRR of 39%, as opposed to 32% for later stage funds. By contrast, over the 10-year period from 1986 to 1996, later stage funds realized an average return of 22% while early stage funds generated an average return of only 17%.

Figure 11. Early and Late Stage Shares of Total Venture Investment, 1980-1996



Source: Data from Venture Economics.

There are many ways to interpret these two sets of data. On the one hand, it is possible to conclude that the shift away from early stage investing represents a rational allocation of capital to the opportunities offering the highest return. Such an

interpretation would indicate that public, or development, capital gaps are more likely to exist than private, or market, capital gaps. Although this conclusion is plausible, it is a bit too simplistic. It is important to remember that the shift towards later stage investments has continued in the face of the high recent returns for early stage funds. In addition, individual early stage deals that offer very attractive returns may suffer due to perceptions of general venture capital trends over the past decade. Nevertheless, these data provide a useful backdrop for the discussion of capital gaps in Chapter V.

Table 5. Investment Returns by Stage for Funds Formed between 1969 and 1996 (Internal Rate of Return expressed as percentage)

Fund Type	Time Period			
	1 Year	3 Year	5 Year	10 Year
Seed	46.7	31.1	22.0	14.6
Early Stage	42.9	39.0	25.5	17.3
Balanced	40.7	29.6	22.5	13.7
Later Stage	32.1	31.6	30.8	21.8
All Venture	40.1	31.9	23.9	15.1

Source: Venture Economics 1997 Annual Review.

From this chapter we can see that venture capital is a small, rapidly growing portion of total investment that is highly concentrated in the computer and life-science industries. Planners and others concerned with venture capital for economic development reasons should beware the fact that the cyclicity of the industry may exacerbate rather than soften movements in the regional economy. Analysts should also note that venture capital's investment concentrations are not static. They seem to operate in accordance with product/profit life-cycle theories. Furthermore, while the venture capital industry is clearly heavily dependent upon technological demand, other industries may increase their share of venture financing under certain macroeconomic conditions or as a result of changes in the relative fortunes of various industries. Finally, trends in fund sources and regional patterns are important. Differences in regional capture rates provide us with an indication of how venture capital's uneven distribution varies along regional lines. From a supply-side point of view, the influx of large blocks of institutional money may offer an explanation of how capital gaps could exist in the midst of booming investment. With

these factors providing an industry context, I will now examine the survey results for evidence on the issue of capital gaps.

CHAPTER V

THE SEARCH FOR CAPITAL GAPS: EVIDENCE FROM A NATIONAL VENTURE CAPITAL SURVEY

The results of the national survey of venture capital firms I conducted in February and March of 1998 give a more detailed picture of venture investment patterns and their implications for regional economic development. In particular, they provide evidence concerning the existence of capital gaps in the venture capital markets. Such gaps are of great concern to regional and local officials. As mentioned in the introduction, two types of capital gaps are possible. The first is a pure market, or private, gap. The second is a development, or public, gap. Private gaps are essentially instances of market imperfection. Such gaps indicate that, due to a particular structural characteristic of the venture capital industry, capital is not uniformly flowing to the opportunities that provide the highest risk-adjusted rates of return. As I discussed in Chapter IV, the supply-side attributes of the venture capital industry offer a possible example of a distorting structural characteristic. As large blocks of institutional capital become the dominant source of venture capital funds, certain types of venture investments, such as early-stage and small investments, may be drowned out.

Public gaps occur through the presence of externalities. These gaps occur when the (generally social) benefits of a particular class or type of investment do not accrue to the entity that bears the investment risk. Such benefits include job-creation, regional factor enhancement, stimulation of long-term innovation, provision of entrepreneurial opportunities to disadvantaged populations, and other positive economic developments that are difficult for individual private actors to internalize. Indeed, the interaction between venture capital and indigenous growth strategies provides a likely scenario for the existence of a public capital gap. The creation and promotion of localization economies by definition involves benefits that are external to individual companies. Because these benefits are spread over a wide range of actors throughout an entire region or locality, a venture investment that promotes industry clusters and diffused innovation (through technological spillovers) may not capture the entirety of the regional economic development benefits through its return. Thus venture capital firms may invest at lower-

than-desirable levels from a regional economic development standpoint. It should be noted that public capital gaps, like private ones, depend upon the existence of viable companies that have the capacity to earn returns for investors (I will refer to the existence of such companies as “effective demand”). Public gaps exist when these returns are not sufficient to induce a socially optimal amount of investment in particular opportunities within a given region.

The survey results presented below allow us to hypothesize about the existence of capital gaps and the likely contours of such gaps. By themselves, however, the data do not distinguish between market and public capital gaps. As a result, I will employ the general term “capital gap” to refer to the possibility that one or both of these types of gaps is present. My point in discussing these two types of venture capital gaps is to depict a plausible framework within which several types of underinvestment may take place.

Although in the absence of demand-side data on small firm capital needs and rejection rates we cannot definitively prove the existence of capital gaps, we can analyze whether the remaining survey data are consistent with the general presence of capital gaps. We can also interpret what the survey data tell us about the likely characteristics of such gaps. With the above caveats in mind, I will analyze the stage, size, industry, and regional patterns contained in the closed-response portion of the survey. I will also present data on the screening criteria that venture capitalists employ.

In the end, I find that venture capital gaps are most likely to occur by investment stage and size. The survey results indicate that early-stage and small-size deals are more likely to suffer from underinvestment. Some evidence also points to the presence of industry and regional capital gaps. The results confirm the general pervasiveness of regional capital leakage. To the extent that capital gaps exist by industry, they are most likely to occur in traditional (non-high-tech) industries, consumer-oriented industries, or industries with particularly long product-to-market time frames (biotechnology, for example). Manufacturers, whose importance to regional economic development in terms of exports was discussed in Chapter II, appear to capture a greater-than-proportional share of venture financing. Finally, data on investment screening criteria emphasize the importance of human capital to venture investment decisions. The absence of a factor

endowment such as management talent may provide an additional explanation for the distribution of capital gaps. Before I turn to the presentation of survey data, I will describe the survey's methodology.

Description of the Survey

The survey instrument is reproduced in Appendix A. To carry out the survey, I took a systematic random sample of the venture capital firms listed in the 1997 Pratt's Guide to Venture Capital Sources. I employed systematic methodology in order to assure national geographic representation (the guide is organized by state). Out of the 1,244 venture capital organizations listed, I selected a sample of 139 venture capital firms.²⁴ I contacted each firm by phone and attempted to arrange an interview to administer the survey instrument.²⁵ Overall, representatives of 35 venture firms responded to the survey, yielding a response rate of 25%. I followed the administration of the survey questions with an open-ended series of questions designed to elicit qualitative responses and opinions. I oriented these latter questions toward the issue of capital gaps.

The survey poses questions concerning investment targeting, stage preferences, investment size, industry preferences, and screening criteria. It also contains questions regarding intraregional investment percentages, target return, and preferred exit time frame. The survey treats the number of business plans received as a rough proxy for demand. The survey also contains several specialized questions concerning manufacturing as a proxy for the relationship among venture capital, the export base, and high wage jobs (see Chapter II). In some instances survey questions ask for specific numbers and percentages, while in others attitudinal ratings and rankings are sought.

²⁴ Many of these firms are not classic early stage venture investors. The Pratt's Guide includes late stage equity investment firms, as well as firms specializing in equity-related mezzanine-type investments. I think that the inclusion of these latter types of firms is useful because it allows for a more accurate picture of the distribution of equity investment funds.

²⁵ In most cases I interviewed general partners or executives of the funds. In a few cases, I interviewed investment analysts.

The responding firms in the survey had an average of \$86.3 million in capital under management. This figure is comparable to the 1996 average of \$88.4 million

Table 6. Regional Breakdown of Survey Respondents

Region	Percentage of Firms
Northeast	46%
West	20%
Midwest	20%
Southwest	9%
Southeast	6%

Note: Total adds to more than 100% due to rounding.

Source: Author's Survey, 1998.

recorded by Venture Economics.²⁶ Capital per firm ranged from a low of \$240,000 to a high of \$450 million. The geographic distribution of the respondents is contained in Table 6. As the percentages in Table 6 show, the Northeast, with 46% of respondents, was the most heavily represented region among firms answering the survey. The West and Midwest follow with 20%. The Southwest and Southeast accounted

for 9% and 6% of survey firms, respectively.

As with all surveys, bias is a concern. To the extent this survey is biased, it is likely that the bias is in favor of small and geographically diverse venture capital firms. Adjustments to reflect the composition of the parent population or the amount of capital under management (as opposed to the number of firms) would require weighting the responses of the western venture capitalists more heavily than their sample percentages. I have chosen not to make such adjustments because I believe the distortions introduced would outweigh the benefits.

²⁶ Venture Economics, 1997 Annual Review, p. 3 of unbound copy.

Overview of Capital Gap Opinions

As mentioned above, the survey results provide evidence concerning the existence of capital gaps. Overall, 63% (22 out of 35) of the interviewees felt that capital gaps exist in the venture capital markets, despite the large influx of funds that has taken place over

Table 7. Most Common Sources of Capital Gap Attribution by Respondents Believing In the Existence of Gaps

Investment Characteristic	Percentage of Respondents
Investment Stage	59%
Investment Size	45%
Industry	36%
Region	23%

Note: Percentages add to more than 100% because respondents cited multiple characteristics.

Source: Author survey, 1998.

the past few years.²⁷ Of the respondents who believed in the persistence of capital gaps, most described such gaps in terms of investment stage, investment size, industry, or region.

Many respondents pointed to more than one of these categories as sources of capital market imperfections. The most commonly cited gap was that of investment stage. As Table 7 shows, 59% of the interviewees who felt that gaps exist believed that such gaps occur by stage, with

most asserting that early stage investments exhibit the greatest disjunction between venture capital supply and demand.²⁸ Forty-five percent of the capital gap believers pointed to gaps for firms looking for small amounts of venture capital (generally under \$1 million). Industry gaps and regional gaps were the other two major gap sources cited, respectively drawing mention from 36% and 23% of those affirming the presence of capital market imperfections. I will examine these most frequently cited sources of capital gaps in turn. I will also discuss the screening criteria of the survey respondents and how these criteria contribute (or do not contribute) to the problem of capital gaps.

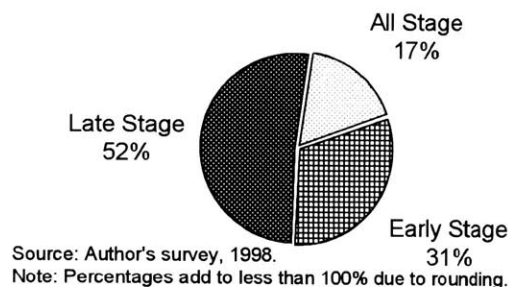
²⁷ The interviewees were asked about the presence of capital gaps and the nature of such gaps in the open-ended portion of the survey. These responses were then coded and tabulated.

²⁸ Demand here refers to effective demand. As noted earlier, the concept of a venture capital gap is predicated on the idea that firms exist that could productively employ additional equity capital.

Investment Stage

The investment stage results support the contention that the focus of gravity in the venture capital industry has shifted to later stage equity investments. In terms of firm

Figure 12. Stage Distribution of Survey Venture Capital Firms



orientation, 52% of the survey firms stated that they primarily targeted late-stage equity investments (Figure 12). By contrast, a little less than a third of the survey firms identified themselves as early-stage (seed, startup, or first stage) investors. Seventeen percent were

diversified across stage categories. All survey firms were asked what percentage of their investments were in early-stage deals (even venture firms that concentrate on later stages may devote some portion of their portfolios to early stage investments). Collectively, only 37% of the investments made by survey firms were identified as early stage.

The attitudinal stage results also provide some confirmation of the assertion of a late-stage preference, although the evidence is mixed. In this series of questions,

Table 8. Stage Preferences of Respondents, 1-10 Scale

Stage	Mean Rating	Median Rating
Seed/Startup	4.68	5.00
First Stage	5.53	6.00
Second Stage	5.47	5.00
Mezzanine	5.26	5.00
Bridge	4.41	4.00
Acquisition	6.06	6.50
Mgmt./LBO	6.56	7.00

Note: Mgmt./LBO = management or leveraged buyout.

Source: Author's survey, 1998.

interviewees were asked to rate the desirability of investment by stage on a scale of one to ten, with ten being the most desirable. Desirability was defined as the interviewee's assessment of the attractiveness of the rate of return available in

the current market, taking both growth potential and deal pricing into account.

Respondents were asked for their personal opinions of all investment stage categories, regardless of whether their individual firms invested in particular stages. The idea behind seeking such opinions is that venture capitalists deploy their capital along a continuum of

investment stages and periodically evaluate the relative attractiveness of different types of equity investments. The mean responses, as shown in Table 8, reveal a preference for acquisition and leveraged buyout (LBO) deals. These two “late” stages, with respective mean ratings of 6.06 and 6.56, garnered the highest average ratings of all equity investment stages. The median ratings for these two categories are also the highest out of all the stages. The picture for the remaining categories is somewhat more complicated. Although seed and startup deals had the second most unattractive mean rating, in median terms these deals were on a par with second stage and mezzanine deals. Bridge financing—perhaps suffering from unattractive pricing due to intense competition—received the lowest mean and median ratings of the group. First stage deals received a high median rating (6.00), but wide variation among their low ratings pulled their average down into a range comparable to second stage and mezzanine deals. In general, the earlier stages showed greater dispersion of ratings, with more extreme scores on the low end of the rating scale. The results thus provide mixed support for the late stage hypothesis. Although the differences between some of the “middle” stages were not pronounced, other aspects of the data, particularly the highly positive outlook on acquisition and LBO deals, are consistent with the picture of a shift towards later stage investing. Such a shift could imply either a market capital gap for early stage firms or an allocation of capital away from truly unattractive returns.

Another indicator of stage preferences—albeit an imperfect one—is preferred size of investment recipient. In this series of questions, respondents were asked to rate on a

Table 9. Preferred Revenue Size in Recipient Companies, 1-10 Scale

Sales	Mean Rating	Median Rating
< \$500,000	3.82	3.00
\$500,000-\$1 million	4.30	5.00
\$1-\$5 million	5.30	5.00
\$5-\$50 million	6.76	7.00
> \$50 million	5.00	4.00

Source: Author's survey, 1998.

scale of one to ten the desirability (based on rate of return) of investments in companies with differing levels of existing revenues. As with the stage preferences (and all subsequent questions of this

variety), one is the least attractive and ten is the most attractive rating. The results indicate that perceived attractiveness of investment rises steadily with the level of sales

(Table 9). The mean ratings begin at a lowly 3.82 for companies with less than \$500,000 in annual revenues and work their way up to 5.3 for companies with sales between \$1 million and \$5 million. This trend reverses itself, however, at sales levels above \$50 million. At this point the average rating falls to 5.0 from its high of 6.76 in the \$5-50 million category, possibly reflecting expensive pricing and intense competition. The median figures confirm this general pattern. The revenue-size results thus complement the stage preference ratings. Just as with seed/startup stage investments, survey venture capitalists held pessimistic views concerning the relative attractiveness of investments in (generally small) firms with very low current revenues.

Investment Size

One frequently heard comment is that “it’s very hard to get under \$1 million” in venture financing.²⁹ Indeed, 86% of the venture firms in the survey have minimum investment levels for their initial participation in a deal. The mean minimum investment

Table 10. Threshold Distribution Of Initial Investment Sizes for Survey Venture Capital Firms

Investment Size	Mean Percentage
< \$5 million	86%
< \$1 million	28%
< \$500,000	8%

Source: Author’s Survey, 1998.

size was \$1.02 million across all firms surveyed.

This figure compares with a mean average investment size of \$2.58 million. The percentage distribution of the initial investments of the venture firms in the survey is contained in

Table 10.³⁰ Initial investments should not be

confused with the total amount of money that a venture firm anticipates investing in a company before exiting the financial relationship. In this context, initial investments refer to the first-round disbursements of venture capitalists to the recipient companies. The distribution of these initial investments below certain thresholds gives an indication of how venture capital is deployed. The majority of initial investments are in the \$1 million to \$5 million range. Eighty-six percent fall below \$5 million. A sharp drop occurs in the number of investments below the \$1 million threshold. About 28% of initial investments fall in this category. Finally, only 8% of the initial investments made by survey venture

²⁹ March 4, 1998 interview with general partner in New York-based venture capital firm.

³⁰ The table refers to distribution by number of investments, not by dollar amount.

capital firms are in amounts below \$500,000. This orientation toward larger investment sizes would likely become even more pronounced if the analysis were carried out by percentage of investment dollar amounts or by amount of funds invested over the life of a company (as opposed to number of investments). Nevertheless, these percentages show that among the survey firms, venture capital tends to be disbursed in large chunks as opposed to small pieces.

Industry Patterns

Analysis of the industry preferences of survey respondents adds depth to the industry concentration analysis from Chapter IV. The detailed industry results conform in many ways to expected patterns. Interviewees were asked to rate their view of the desirability (based on rate of return) of investment in a series of industries on a scale of one to ten. Table 11 contains the mean results. In general, high-tech industries such as

Table 11. Detailed Industry Preferences of Respondents, 1-10 Scale

Industry	Mean Rating	Median Rating
Telecommunications	7.31	8.00
Software	6.54	7.00
Other Medical	6.11	7.00
Medical Devices	6.03	6.00
Industrial Electronics	5.51	6.00
Other Computer	5.29	6.00
Biotechnology	4.14	4.00
Computer Hardware	4.11	4.00
Energy	3.60	3.00
Transportation	3.51	3.00
Consumer Electronics	3.43	3.00
Retail	3.06	2.00

Source: Author's survey, 1998.

telecommunications, software, and medical devices received the highest ratings, with mean scores ranging from 6.03 (medical devices) to 7.31 (telecommunications). Industries not falling under the high-tech classification, such as energy, transportation, and retail, drew notably lower ratings. Mean responses for this group ranged from 3.06 (retail) to 3.60 (energy). Consistent with the theories of localization economies, technological rents, and

the importance of innovation, the commodity manufacturing category of consumer electronics received a low rating of 3.43. Likewise, as expected from the discussion in Chapter IV, computer hardware garnered a low mean score of 4.11. The median responses largely mirror the mean results. Telecommunications and software lead the pack with median scores of 8.00 and 7.00, respectively. Retail, energy, and consumer electronics bring up the bottom with median ratings of 2.00, 3.00, and 3.00.

The one industry that defied the general trend was biotechnology. Despite the industry's high-tech status, survey respondents felt that biotech was an unattractive investment, as indicated by its average score of 4.14 (median = 4.00). The most common reason given for this low rating was the extremely long time frame before products could be brought to market (often eight to ten years). This long time period stands in clear contrast to the survey respondents' mean desired exit period of 5.4 years. These overall industry results have implications for the issue of capital gaps. If gaps exist by industry, from a supply-side perspective (based on this attitudinal data) these gaps are most likely to occur in traditional "low-tech" industries or in industries that require extremely patient capital. Of course, if demand were particularly strong, such gaps could also occur in the highly rated software and telecommunications industries.

Another way of exploring the industry preference issue is through the manufacturing/services distinction. From an economic development perspective, the issue of the attitudes of venture capitalists toward manufacturing is of particular concern. Because of manufacturing's high wages and export levels, investment shifts in the manufacturing sector can have profound consequences for regional economic development. Employing the same methodology outlined above, the survey asked respondents for their opinions of the desirability of investments in a more aggregated set of industry categories based on the division between manufacturing and services. As Table 12 demonstrates, interviewees rated high-tech and business services as the most

Table 12. Aggregate Industry Preferences of Respondents, 1-10 Scale

Industry	Mean Rating	Median Rating
High-Tech Services	6.31	7.00
Industrial/Business Services	6.09	6.00
High-Tech Manufacturing	5.69	6.00
Industrial Product Manufacturing	5.51	6.00
Consumer Services	4.94	5.00
Consumer Product Manufacturing	4.14	3.00

Source: Author's survey, 1998.

desirable broad industry categories. High-tech and industrial product manufacturing came next, with consumer services and consumer product manufacturing garnering the least desirable ratings. As the median ratings show, the differences between the top service and manufacturing categories are not pronounced enough to draw any hard and fast conclusions. Business services, high-tech manufacturing, and industrial product manufacturing all have median responses of 6.00. In general, the results do not provide much evidence of a strong bias against manufacturing or in favor of services. These results do, however, indicate a preference for industrial products and services, as opposed to consumer products or services. This outcome may stem from negative feelings about the commodity nature of consumer products and the low export potential of consumer services.

One final piece of evidence concerning manufacturing comes from a set of survey questions that focus on the distribution of business plans received and investments made by the survey venture capital firms. In order to obtain venture financing, companies must first submit business plans to the venture capital firms. These business plans thus serve as a broad indication of the level and type of demand for venture financing. The survey evidence, which is presented in Table 13, indicates that manufacturers' share of venture investment deals (48%) is roughly proportional to their share of submitted business plans (44%). From the point of view of survey respondents, supply is proportional to demand at this aggregate level. The data do reveal a couple of interesting aspects of venture

**Table 13. Distribution of Business Plans
And Investments by Sector and Technology**

Percentage of business plans from manufacturers:	44%
Percentage of manufacturing business plans that are high-tech:	55%
Percentage of recipient companies that are manufacturers:	48%
Percentage of recipient manufacturers that are high-tech:	55%

Note: Respondents were told not to include software companies as manufacturers in the above questions.

Source: Author's survey, 1998.

investing and manufacturing, however. First, manufacturers receive a greater share of venture financing than their share of the economy. In total, 48% of businesses receiving venture financing from survey firms are manufacturers (not including software companies). This percentage is substantially larger than manufacturers' share of total employment (19%), establishments (6%), or output (20% of private industry GDP).³¹ The second interesting aspect of these results is the fact that the interviewees reported that only 55% of the manufacturers that submit business plans and that receive venture financing are in high-tech industries. This somewhat surprising outcome could reflect the high proportion of later stage firms in the sample. These firms tend to prefer investments in more mature industries with proven technologies, including (generally large-scale) traditional manufacturing enterprises.

Regional Patterns

As pointed out earlier, venture capital markets are both fluid and regional in nature. On the one hand, venture firms have always exported significant amounts of capital outside of their home regions in order to take advantage of productive opportunities. On the other hand, information asymmetries inherent in the financing of unproven technology and high-risk growth strategies place a premium on local knowledge and limit the degree to which venture capital can approach the undifferentiated status of debt capital. These issues are crucial to planners and business officials seeking to plug regional capital gaps and promote economic development through stimulation of the

³¹ The employment and establishment percentages were calculated from 1995 aggregate County Business Patterns data, U.S. Census Bureau. The GDP percentage was calculated from 1996 Bureau of Economic Analysis data.

regional (or local) venture capital industry. It is important to recognize that not all venture capital is invested locally or regionally. The survey provides some evidence on these matters. As Table 14 demonstrates, the capital “leakage” rate can be substantial.

Table 14. Regional Venture Investment Patterns

Percentage of business plans received from within same region:	53%
Percentage of investments made within the same region:	55%
Percentage of investments made within the same metropolitan area:	24%

Note: Regions were defined as Northeast, Midwest, Southeast, Southwest, and West.

Source: Author's survey, 1998.

On average, venture capital firms in the survey made 55% of their investments within the same broad geographic region (Northeast, Midwest, Southeast, Southwest, West) in which they were located. This percentage is proportional to the share of business plans received from companies located in the same region as the venture firm (53%). For cities and metropolitan areas, the capital leakage rate is much higher. Overall, survey venture firms made 76% of their investments outside the greater metropolitan area in which they were located. From a national perspective, these results imply that the presence of four dollars of local venture capital results in about one dollar of local venture investment. Of course, as I discussed in Chapter IV, these import-export ratios vary greatly from region to region. Nevertheless, the above percentages indicate that solving the problem of regional and local capital gaps may require other actions (increased investment in R&D, etc.) that improve the effective demand—and thus the “capture” rate—of the target region or locality.

Screening

The screening procedures and criteria of venture capitalists constitute another source of information about venture capital investment patterns. The portions of the survey that deal with screening shed light on the relative importance of various factors in the investment decision-making process. These results have implications for our inquiry into the possible contours of capital gaps because they provide evidence about what types of firms—and how many firms—are likely to secure venture financing.

On average, firms in the survey received 455 business plans seeking venture financing during the course of 1997 (Table 15). Of this amount, the average survey firm seriously reviewed 47 business plans, or roughly 10% of those submitted.³² Out of the population of serious candidates, survey venture firms invested in an average of five new companies in 1997.³³ In addition to new financings, survey firms undertook a mean of

Table 15. Survey Venture Investment Demand and Supply, 1997

	Mean	Median
Business plans received:	454.8	350
Business plans seriously reviewed:	46.5	28
New financings:	4.9	5
Total financings (new financings plus follow-ons)	9.5	9

Note: Serious review is defined as ten hours or more of due diligence.

Source: Author's survey, 1998.

five follow-on financings for existing portfolio companies (for a per-firm total of 10 financings in 1997). Ultimately, just over 1% of those businesses seeking venture capital succeeded in securing financing.³⁴ These numbers reveal the highly selective nature of the venture capital industry.

The decision-making process by which venture capital firms weed out applicant businesses involves a number of factors. The most important of these is expected rate of return. The venture firms in the survey had a mean annualized target internal rate of return (IRR) of 31%. The median target return was 30%. These figures represent the return that venture capital firms seek across an entire fund. In order to achieve such a return, the annualized hurdle rates for individual deals must often exceed 50%. Among survey firms, the mean target time period for realizing these gains was five years (the median was also five years). Clearly there are likely to be many profitable and potentially profitable companies who do not meet these explosive growth criteria. One important

³² Serious review was defined as ten hours or more of due diligence.

³³ By new I mean new to the venture capital firm, not new as in startup.

³⁴ It should be noted that the percentage of successful applicants may be somewhat higher due to the submission of the same business plan to different venture capital firms. However, in general businesses seeking venture investments target their submissions to avoid the negative reputation that accompanies

question for future research on capital gaps is whether businesses with lower growth trajectories can be profitably served by a diversified venture capital industry, or whether such businesses are fundamentally unsuitable for venture financing.

An additional screening issue involves the identity of the individual who conducts the initial weeding-out process for submitted business plans. As with the banking industry,

Table 16. Responsibility for Initial Screening Among Survey Firms

Partner/Fund Executive	51%
Analyst/Other Employee	23%
Both	26%

Source: Author's survey, 1998.

it is sometimes hypothesized that the biases of less experienced, junior employees can result in the elimination of otherwise deserving applicants for venture financing. The survey results, however, provide evidence that in the

venture capital industry it is general partners or fund executives who carry out the bulk of initial screening. In 51% of the survey firms, general partners or fund executives make the initial determination of a business plan's prospects (Table 16). Analysts or other junior employees are responsible for this early filtering in only 23% of the survey venture firms. In the remaining 26% a mixture of the two groups performs these duties. Thus, although the investment screening process may contain significant biases, it is the attitudes of partners, not junior employees, that should be the focus of investigation.

In order to develop a picture of the attitudinal orientation of institutional venture capitalists, survey respondents were asked to rank five investment-screening criteria from most important (1) to least important (5). The results reveal some interesting aspects of the way in which venture capitalists evaluate deals (Table 17). The consensus choice for the most important factor in assessing the attractiveness of a deal was management experience. With an average rating of 1.51 and a median rating of 1.00, the quality of management stood out as the paramount concern of venture capitalists. As one Cleveland-based survey respondent stated, "If you could hand me six good CEO's, I could find them opportunities [to start new companies]."³⁵ This result indicates that, despite the overwhelming emphasis on technology and R&D investment in venture-oriented growth

business plans that are "shopped around" too much. The point thus remains that successful venture applicants are a very small percentage of the total pool of applicants.

³⁵ February 27, 1998 interview.

strategies, the development of local management talent may be just as critical to fostering a dense network of venture-funded high-growth companies.

The remaining screening criteria are grouped fairly closely. Following management experience, survey respondents rated industry sector and proprietary

Table 17. Investment Screening Criteria, Ranked From Most Important (1) to Least Important (5)

	Mean	Median
Management Experience	1.51	1.00
Industry Sector	3.06	3.00
Proprietary Technology	3.29	3.00
Market Size	3.29	4.00
Marketing Strategy	3.86	4.00

Source: Author's survey, 1998.

technology as the next most important screening criteria. Both had median ratings of 3.00. The emphasis on these two categories is in keeping with the heavy concentration of venture capital within particular industries

(Chapter IV), as well as the importance of technological rents to innovation-based high-growth strategies (Chapter II). Market size and marketing strategy, with median scores of 4.00, were the lowest rated screening criteria. In general, survey respondents felt that, given the right management team and an attractive technology, they could use their influence to redirect marketing strategy and employ their contacts to increase the market size. With regard to capital gaps, these attitudinal data indicate that such gaps would be most likely to involve unproven management teams and firms in more traditional industries whose product or process innovations are not proprietary.

Summary of Results

These results indicate that venture capital gaps are most likely to exist by investment stage and size. The survey data are consistent with a picture of gaps for early-stage firms and those seeking small amounts (generally under \$1 million) of venture capital. These findings are consistent with the supply-side/institutional investor hypothesis laid out in Chapter IV. The survey confirms the concentration of venture capital in particular high-tech industries, but it does not provide evidence for the existence of capital gaps in the crucial export-oriented manufacturing sector. In fact, manufacturers—even non-high-tech manufacturers—appear to receive a greater-than-proportional share of venture investments. To the extent that industry capital gaps exist, they are most likely to

occur in industries requiring very patient capital (biotech) or in consumer-oriented or other non-high-tech industries. It should be noted that the latter two industry types are not integral to the innovation-based localization economies that provide the strongest rationale for venture capital-oriented indigenous growth strategies. The biotech gap, on the other hand, should be a matter of concern to policymakers in high factor-cost regions who are seeking to promote innovation-based localization economies. Regional capital gaps are also quite likely to exist, although the size of the data cells in this survey is too small to permit disaggregated regional comparisons. It is nevertheless clear that significant regional and local leakage occurs. Such leakage indicates the importance of building regional infrastructure and effective demand. Finally, from a screening perspective, management capacity is vital to the success of firms seeking venture financing. Human management capital may be just as important in the formation of effective demand as a technology base.

CHAPTER VI.

CONCLUSION

I have undertaken two strands of analysis in this thesis. First, I have described the reasons why planners, policymakers, and business leaders should care about venture capital and its role in regional economic development. Second, I have investigated the question of whether impediments to regional economic development—capital gaps—are likely to exist in the venture capital industry. In order to explore these two issues, I laid out the theoretical underpinnings of venture-led indigenous growth strategies; discussed the relationship between the argument for such strategies and small-firm employment arguments; depicted the institutional boundaries of the venture capital industry as it pertains to regional economic development; and described the likely characteristics of capital gaps through analysis of survey data.

Those who are concerned with regional economic development should care about venture capital because it is a critical component of the indigenous growth strategies towards which many regions—particularly high factor-cost regions—are turning. Although regional economic theorists have minimized or omitted discussion of venture capital in the past, venture capital has a strong connection to both industry cluster theories and product/profit life cycle theories. It is a specialized factor of production that enables the development of the concentrated innovation-based localization economies that form the core of indigenous growth strategies. Venture capital is particularly important for high factor-cost regions that seek to capitalize on the temporary monopolies associated with the early stages of the product/profit life cycle. The increased levels of innovation, technological rents, and exports associated with venture-backed firms attest to the significance of venture capital for regional economic development and provide a justification for further examination of the industry and its characteristics.

Venture capital's relevance to regional economic development is not dependent on small-firm arguments. Although venture capital-oriented development strategies inevitably involve small firms, it is the innovative character and reliance upon external economies of

these firms that provides a rationale for venture capital, not the continued small size of such firms.

Despite the critical role of venture capital, a number of industry characteristics place bounds on its impact on regional economic development. Venture capital is a small portion of total investment that is highly concentrated in the computer and life science industries. Levels of venture financing appear to respond to both specific technological demand and macroeconomic conditions. The macroeconomic responses of the venture capital industry may, in certain circumstances, provide opportunities for non-high-tech and other industries to increase their share of venture financing, but these responses have a down side as well. In particular, the data show that the industry is heavily procyclical. Planners and policymakers should take note of the fact that venture capital investments have not counteracted economic downturns in the past. The export of venture capital outside of the region or locality in which a venture capital firm is located places a further restraint on the impact of venture capital on local investment. Finally, the increasing importance of pension funds in the supply of venture capital and the large venture funds that result from these capital inflows provide a plausible explanation for the existence of capital gaps in the face of the tremendous expansion of the venture capital industry.

Although we cannot definitively determine whether observed capital gaps are public or private in nature, we can see from the survey results that the characteristics of the venture capital industry are consistent with the general presence of both of these types of capital gaps. The results indicate that such gaps are most likely to exist by stage and size. Early-stage and small-size deals may suffer from underinvestment. Regional and industry gaps are also probable. Differing regional capital leakage rates open up the possibility that gaps may exist in the presence of a substantial number of local venture capital funds. Industry gaps do not appear to exist for the manufacturing sector as a whole, but they are somewhat more likely in consumer-oriented industries, traditional non-high-tech industries, and industries requiring extremely patient capital.

The above-described conclusions concerning the venture capital industry have several implications for regional economic development strategies. First, if policymakers wish to address capital gaps by investment stage and size, they must recognize that the

institutional form of the policy intervention matters. Only the creation and promotion of small venture funds can remedy investment stage and investment size capital gaps. The critical issue is not the total amount of capital available, but the size of the institutions that supply and invest venture funds. Regardless of whether regions form new funds or provide incentives to existing private-sector funds, only small funds will make small investments and seek out the non-standardized early stage investments that are inimical to large-scale venture investors. Such small-scale venture investments are one way in which high factor-cost regions can promote the innovation-based localization economies that are central to regional economic development.

A second policy implication is that, despite the limitations of venture capital as a policy instrument, the presence of a vibrant local or regional venture capital industry is very desirable. Although on average 45% of venture capital leaks outside the region in which a venture capital firm is located, and 76% leaks outside the home-base metropolitan area (see Chapter V), the residual venture investments that are captured by a region or locality are important. It is certainly true that regions must first assure through infrastructure investments—scientific research, human capital training, specialized technical assistance—that area firms constitute an effective demand for venture capital, but once these basic infrastructure and demand conditions are met, the presence of a substantial local or regional venture capital industry is likely to result in higher capture rates for innovative new firm growth.

Finally, the introduction of public sector capital to the venture capital industry during economic downturns might have the effect of smoothing the industry's procyclical behavior. The public sector, by providing a countercyclical source of investment, might be able to encourage existing venture capital firms to act on the otherwise attractive front-end pricing incentives that exist during recessions. By increasing investment at the bottom of the economic cycle, regions may bring about quicker economic recoveries. Such countercyclical public venture capital investments may have additional benefits. First, due to the longer time frames that downcycle investing inevitably involves, these investments may be able to go some way towards filling the capital gap for industries requiring extremely patient capital (i.e. biotechnology). Second, such investments may stimulate

healthier economic recoveries by increasing the proportion of indigenous growth opportunities in the post-recession regional economy. Countercyclical public sector venture investments thus may help ensure that the economic restructuring that often accompanies recessions and recoveries does not take a particularly undesirable form from a regional perspective. Through such venture investments, high factor-cost regions can focus their efforts on reinvigorating their innovation-based localization economies, thus providing themselves with some insulation from the ill effects of industry maturation and the geographic dispersion of production.

APPENDIX A: SURVEY INSTRUMENT

Survey Method

The survey instrument is reproduced in Appendix A. To carry out the survey, I took a systematic random sample of the venture capital firms listed in the 1997 Pratt's Guide to Venture Capital Sources. I employed systematic methodology in order to assure national geographic representation (the guide is organized by state). Out of the 1,244 venture capital organizations listed, I selected a sample of 139 venture capital firms. I contacted each firm by phone and attempted to arrange an interview to administer the survey instrument. Overall, representatives of 35 venture firms responded to the survey, yielding a response rate of 25%. I followed the administration of the survey questions with an open-ended series of questions designed to elicit qualitative responses and opinions. I oriented these latter questions toward the issue of capital gaps.

The survey poses questions concerning investment targeting, stage preferences, investment size, industry preferences, and screening criteria. It also contains questions regarding intraregional investment percentages, target return, and preferred exit time frame. The survey treats the number of business plans received as a rough proxy for demand. The survey also contains several specialized questions concerning manufacturing as a proxy for the relationship among venture capital, the export base, and high wage jobs. In some instances survey questions ask for specific numbers and percentages, while in others attitudinal ratings and rankings are sought.

Company: _____
 Contact: _____
 Phone: _____
 Location: _____
 Date: _____

- 1.) How much (venture) capital does your fund have under management? _____
- 2.) Does your fund target its investments (by industry, geography, etc.)?
 What type of targeting? _____
 Industry (which ones?): _____
 Geography (where?): _____
 Other: _____
- 3.) Are there industries that you will not consider investing in? _____

4.) On a scale of 1 to 10, with 10 being the most desirable, what is your view of the desirability (based on rate of return) of the following investment stages?

Seed/Startup _____ (product development)
 1st stage _____ (initiating full-scale operations, scaling up services/production)
 2nd stage _____ (initial expansion)
 3rd/Mezz. _____ (existing firm expansion)
 Bridge _____ (shortly before going public)
 Acquisition _____
 Mgmt./LBO _____

- 5.) What percentage of the investments your fund makes are early stage (seed/startup or 1st stage)? _____
- 6.) Of the stages mentioned above, are there particular ones you target?
 Which stages? _____
- 7.) What is your fund's target return? _____
- 8.) Over what time period? _____
- 9.) How many business plans seeking venture financing did your fund receive last year? _____
- 10.) How many of these did your fund seriously review (at least 10 hours)? _____
- 11.) How many different companies did you actually make venture investments in? _____
- 12.) How many individual financings did you make? _____
- 13.) What is the average size of venture investment your fund makes? _____
- 14.) Do you have a minimum investment size? _____
 What size? _____

- 15.) What percentage of your investments are under \$5 million? _____
 What percentage of your investments are under \$1 million? _____
 What percentage of your investments are under \$500,000? _____
- 16.) On a scale of 1 to 10, with 10 being the most desirable, what is your view of the desirability
 (based on rate of return) of venture investments in firms of the following sizes:
- <500K in Sales _____
 500K-1M in Sales _____
 1-5M in Sales _____
 5-50M in Sales _____
 >50M in Sales _____
- 17.) What percentage of the business plans you receive are from companies that manufacture
 a product? _____
- What percentage of these manufacturers are in high-tech industries? _____
- 18.) What percentage of the companies that you finance manufacture products? _____
- What percentage of these manufacturers are in high-tech industries? _____
- 19.) What percentage of the business plans you receive are from firms located within the same
 region (region=NE,SE,MW,SW, or West) that your company is located in? _____
- 20.) What percentage of the firms you have made investments in are located in the same
 region (region=NE,SE,MW,SW, or West) that your company is located in? _____
- 21.) What percentage of the firms you have made investments in are located in the same
 metropolitan area (city) that your company is located in? _____
- 22.) On a scale of 1 to 10, with 10 being the most desirable, what is your view of the desirability
 (in terms of potential return) of the following aggregate industry sectors?
- High-Tech Manufacturing _____
 Consumer Product Mfg. _____
 Industrial Product Mfg. _____
 High-Tech Services _____
 Consumer Services _____
 Industrial/Bus. Services _____
 Retail _____

(next page please)

23.) On a scale of 1 to 10, with 10 being the most desirable, what is your view of the desirability (in terms of potential return) of the following more detailed industry sectors?

- Telecommunications _____
- Software _____
- Computer Hardware _____
- Other Computer Related _____
- Industrial Electronics _____
- Consumer Electronics _____
- Biotechnology _____
- Medical Devices _____
- Other Medical/Health _____
- Energy _____
- Transportation _____

24.) Who performs the initial screening of business plans (gen. ptrn. or analyst)? _____

25.) Please rank the following five investment screening criteria from most important to least important in terms of your decision-making process (please assign the number 1 to the most important and the number 5 to the least important; use each number only once).

- Industry Sector _____
- Management Experience _____
- Proprietary Technology _____
- Market Size _____
- Marketing Strategy _____

26.) Finally, what do you see as the key trends in venture capital investing?
Do you perceive capital gaps in the venture capital markets?
If so, what form do these gaps take?

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