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ABSTRACT

We examine the determinants of venture capital fundraising in the U.S. over the past twenty-five years. We study industry aggregate, state-level, and firm-specific fundraising to determine if macroeconomic, regulatory, or performance factors affect venture capital activity. We find that shifts in demand for venture capital appear to have a positive and important impact on commitments to new venture capital funds. Commitments by taxable and tax-exempt investors seem equally sensitive to changes in capital gains tax rates, consistent with the notion that decreases in capital gains tax rates increase the demand for venture capital as more workers are incented to become entrepreneurs. Aggregate and state level venture fundraising are positively affected by easing of pension investment restrictions as well as industrial and academic R&D expenditures. Fund performance and reputation also lead to greater fundraising by venture organizations.

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1. Introduction

During the past twenty years, commitments to the U.S. venture capital industry have grown dramatically. This growth has not been uniform: it has occurred in quite concentrated areas of the country and peaks in fundraising have been followed by major retrenchments. Despite the importance of the venture capital sector in generating innovation and new jobs, few academic studies have attempted to determine the underlying causes of these dramatic movements in venture fundraising.

In this paper we examine the forces that affect fundraising by independent venture capital organizations from 1972 through 1994. We study both industry fundraising patterns and the fundraising success of individual venture organizations. We find that regulatory changes affecting pension funds, capital gains tax rates, overall economic growth, and research and development expenditures—as well as firm-specific performance and reputation—affect fundraising by venture capital organizations. The results are potentially important for understanding and promoting venture capital investment.

Various factors may affect the level of commitments to venture capital organizations. Poterba (1989) argues that many of the changes in fundraising could arise from changes in either the supply of or the demand for venture capital. When we refer to the supply of venture capital, we mean the desire of investors to place money into venture capital funds. Demand is then the desire of entrepreneurs to attract venture capital investment in their firm. For example, decreases in capital gains tax rates might increase commitments to venture capital funds through increases in the desire of taxable investors to make new commitments to funds as well as through increases

in the demand for venture capital investments when workers have greater incentives to become entrepreneurs. Our research methodology attempts to distinguish between supply and demand factors that affect the quantity of venture capital.

We find that demand-side factors appear to have had an important impact on commitments to venture capital funds. Capital gains tax rates have an important effect at both the industry, state-, and firm-specific levels. Decreases in the capital gains tax rates are associated with greater venture capital commitments. The effect, however, appears to occur through the demand for venture capital: rate changes affect both taxable and tax-exempt investors. Similarly, R&D expenditures, especially expenditures by industrial firms, are positively related to venture investments in particular states.

We also find that The Department of Labor's clarification of its "prudent man" rule, which enabled pension funds to freely invest in venture capital, and individual venture firm performance and reputation influence fundraising. Higher recent returns (as measured by the value of equity held in firms taken public) lead to greater capital commitments to new funds. Older and larger organizations also attract more capital. Finally, we examine factors that affect venture organizations' decisions to raise funds targeted at early-stage, start-up firms. These funds are potentially the most important for generating new firms and innovation. We find that smaller, West Coast venture organizations are more likely to have raised an early-stage venture fund.

The rest of the paper is organized as follows: A brief discussion of the institutional details of venture capital is presented in Section 2. Section 3 discusses the economics of venture capital and presents factors that might affect venture capital fundraising. Industry-wide fundraising patterns, at both the aggregate and state level, are explored in Section 4. Section 5 explores fundraising by individual venture organizations in an exhaustive database of venture capital funds. Section 6 considers alternative explanations. Section 7 concludes.

2. The Institution of Venture Capital[1]

In this section we briefly review the institutional details of venture capital organizations. The discussion highlights the structure and function of venture capital organizations in the U.S. and how venture capital is distinct from other sources of financing for young, entrepreneurial companies. In addition, we seek to place the development of the venture capital industry in context so the tests discussed in Section 3 are better understood.

Many start-up firms require substantial capital. A firm's founder may not have sufficient funds to finance these projects alone and might therefore seek outside financing. Entrepreneurial firms that are characterized by significant intangible assets, expect years of negative earnings, and have uncertain prospects are unlikely to receive bank loans or other debt financing. For many of these young companies, the tremendous uncertainty and asymmetric information may make venture capital the only potential source of financing. Venture capital organizations finance these high-risk, potentially high-reward projects, purchasing equity stakes while the firms are still privately held. Venture capitalists have backed many high-technology companies including Apple Computer,

[1]Much of this discussion is based on Gompers and Lerner (1996).

Cisco Systems, Genentech, Intel, Microsoft, Netscape, and Sun Microsystems. A substantial number of successful service firms (including Federal Express, Staples, Starbucks, and TCBY) have also received venture financing.

Venture capitalists are often active investors, monitoring the progress of firms, sitting on boards of directors, and meting out financing based on the attainment of milestones. While banks monitor the financial health of firms that they lend to, venture capitalists monitor strategy and investment decisions as well as take an active role in advising the firm. Venture capitalists often retain important control rights that allow them to intervene in the company's operations when necessary. In addition, venture capitalists provide entrepreneurs with access to consultants, investment bankers, and lawyers. Brav and Gompers (1997) show that venture capital backing adds value even after the initial public offering: venture-backed companies substantially outperform nonventure-backed firms in the public aftermarket.

The first modern venture capital firm, American Research and Development (ARD), was formed in 1946 by MIT President Karl Compton, Harvard Business School Professor Georges F. Doriot, and local business leaders. A small group of venture capitalists made high-risk investments into emerging companies that were based on technology developed for World War II. The success of the investments ranged widely: almost half of ARD's profits during its 26-year existence as an independent entity came from its $70,000 investment in Digital Equipment Company (DEC) in 1957, which grew in value to $355 million. Because institutional investors were reluctant to invest, ARD was structured as a publicly traded closed-end fund and marketed mostly to individuals [Liles

(1977)]. The few other venture organizations begun in the decade after ARD's formation were also structured as closed-end funds.

The first venture capital limited partnership, Draper, Gaither, and Anderson, was formed in 1958. Imitators soon followed, but limited partnerships accounted for a minority of the venture pool during the 1960s and 1970s. Most venture organizations raised money either through closed-end funds or small business investment companies (SBICs), federally guaranteed risk-capital pools that proliferated during the 1960s. While the market for SBICs in the late 1960s and early 1970s was strong, incentive problems ultimately led to the collapse of the sector. Even so, the annual flow of money into venture capital during its first three decades never exceeded a few hundred million dollars and usually was substantially less.

One change in the venture capital industry during the past twenty years has been the rise of the limited partnership as the dominant organizational form.[2] Limited partnerships also have an important advantage which makes them attractive to tax-exempt institutional investors: capital gains taxes are not paid by the limited partnership. Instead taxes are paid only by the (taxable) investors. Venture partnerships have pre-determined, finite lifetimes (usually ten years though extensions are often allowed). Investors in the fund are limited partners. In order to maintain limited liability, investors must not become involved in the day-to-day management of the fund.

[2]The rise of the limited partnership also allows us to accurately track venture capital fundraising. Venture capital limited partnerships raise a pre-specified amount of money to be invested. The data discussed in Section 5 is fund-by-fund tracking of these amounts.

3. The Economics of Venture Capital

3.1.Supply and demand in venture capital

In this section we develop predictions about what factors might influence the quantity of venture capital provided in an economy. In order to understand the mechanism through which these factors work, it is important to discuss supply and demand in the venture capital market. Figure 1 presents a simple illustration of equilibrium in the venture capital market. Supply of venture capital is determined by the willingness of investors to provide funds to venture firms. The willingness of investors to commit money to venture capital is dependent upon the expected rate of return on venture investments. Therefore, in the venture capital market, price is the expected rate of return on new venture capital investments. Higher expected returns lead to a greater desire of investors to supply venture capital, *i.e.*, like most supply schedules it slopes upward.

The demand schedule is simply the quantity of entrepreneurial firms seeking venture capital that can supply a particular expected rate of return. As the price increases—the expected return increases—fewer entrepreneurial firms demand capital because the quantity of projects meeting that threshold declines. The demand schedule therefore slopes downward.

We will discuss the equilibria in the supply and demand framework by examining the quantity of venture capital. While any supply and demand equilibrium also implies a particular price, *i.e.*, an expected rate of return, we can not measure the anticipated rate of return in the venture capital market. Nor does the actual rate of return provide a useful proxy. Returns from venture capital investments can only be observed many years after the original investments because private firms are valued at cost until they are sold or taken public many years later.

Because of these accounting policies, the stated returns for venture funds are exceedingly variable and somewhat misleading. [See the discussion in Gompers and Lerner (1997).][3] We feel fairly comfortable that the expected rate of return, *i.e.*, price, will not vary substantially across the sample period. As discussed below, however, supply curves for venture capital are likely to be very elastic. Hence, changes in equilibrium will have a significantly larger effect on quantities than on prices.

The supply schedule for venture capital is likely to be quite flat. Investors choose to place money in financial assets because of the monetary returns that they return. Because close substitutes for these cash flows exist either through a single security or combination of securities, investors will have a particular expected return on venture capital that just compensates for the systematic riskiness of the investments [Scholes (1972)]. If perfect substitutes for venture capital existed, then the supply curve should be totally flat. We draw supply curves as slightly upward sloping in Figure 1. One source of an upward slope would be differential taxes. Because the return on venture capital investments is taxable, investors with higher tax rates would require progressively higher expected rates of return to induce them to invest in venture funds versus some tax-free investment.

3.2. The Employment Retirement Income Security Act and venture commitments

One policy decision that potentially had an effect on commitments to venture funds via supply changes is the clarification by the U.S. Department of Labor of the Employment Retirement

[3]In addition, practices of reporting valuations of companies across various venture organizations is often quite different. Finally, information on fund returns is closely guarded, and even the intermediaries who specialize in compiling this data do not have very comprehensive coverage.

Income Security Act's (ERISA) prudent man rule in 1979. Through 1978, the rule stated that pension managers had to invest with the care of a "prudent man." Consequently, many pension funds avoided investing in venture capital entirely: it was felt that a fund's investment in a start-up could be seen as imprudent. In early 1979, the Department of Labor ruled that portfolio diversification was a consideration in determining the prudence of an individual investment. Thus, the ruling implied that an allocation of a small fraction of a portfolio to venture capital funds would not be seen as imprudent. That clarification specifically opened the door for pension funds to invest in venture capital.

We conjecture that the supply curve for venture capital before the clarification of ERISA might have looked like S_1. The upward inelastic segment of S_1 results because pension funds, a segment of the U.S. financial market that controls substantial amounts of capital, were unable to invest in venture funds. The supply of venture capital may have been limited at any expected rate of return. If the initial demand for venture capital were given by D_1, then the equilibrium quantity of venture capital would be given by Q_1.

After ERISA, the supply curve moved to S_2. The supply curve moved down and flattened out. The supply curve moved down because pension funds, which are tax exempt, required a lower expected rate of return on venture investments than other taxable investors. The curve would not have an inelastic segment because the resources of pensions could now be invested in venture capital funds. When we look at the data, we expect that the quantity of venture capital supplied will increase after ERISA was clarified to Q_2. This effect should only be significant for contributions by pension funds because ERISA regulations have no bearing on other types of investors.

3.3. Capital gains taxes and venture capital fundraising

The effect of capital gains tax rates on commitments to the venture capital industry has been debated in the academic literature as well as political circles. The effect of reductions in the capital gains tax rate on commitments to venture capital was one of the intended benefits of the reduction of the tax from 28% to 14% on investments in small companies held for five years that was enacted in 1993.

Poterba (1989) argued that it was unlikely that capital gains taxes affected venture capital by shifting the supply curve. The supply effect of capital gains tax reductions is illustrated by C in Figure 1. A reduction in the capital gains tax rate would lower the required expected (pre-tax) rate of return on venture investments for taxable investors. This would cause the right-hand side of supply curve S_2 to shift down to S_3. Most investors in venture capital after 1980 have been tax-exempt institutions and the supply effect may therefore have been small.

Poterba then develops a model of the decision to become an entrepreneur. He argues that the capital gains tax rate could have a dramatic effect on this choice. Lower capital gains tax rates make it relatively more attractive for a manager or worker to start his or her own company. Most of a manager's compensation comes in the form of salary and cash bonuses which are taxed at the ordinary income tax rate. Most of the compensation from being an entrepreneur is in the form of capital appreciation on the equity of the company. Poterba argues that it is possible that reductions in the capital gains tax rates could have a first-order effect on the demand for venture capital as more people are induced to become entrepreneurs and better projects are brought to market. This

would increase the quantity of venture capital demanded to D_2 and increase the equilibrium quantity of venture capital to Q_3.[4]

If the capital gains tax rate has an important impact on commitments to venture capital funds, then we would expect a significant relation at the industry level and at the fund-specific level. Lower capital gains taxes should lead to increases in commitments to the industry as a whole as well as to individual funds. We can also shed light on whether Poterba's argument about supply and demand effects is valid. If capital gains taxes affect commitments to venture capital primarily through the demand for venture capital, then we expect that reductions in the capital gains tax rate should have a positive impact on the commitments of both tax-exempt and tax-sensitive investors. If the effect is primarily due to supply changes, then contributions by tax-exempt investors should be unrelated to the capital gains tax rate. Because we can separate contributions to venture funds by investor type, we should be able to determine whether the demand effects (B in Figure 1) or supply effects (C in Figure 1) of decreases in the capital gains tax rate are more important.

3.4. Other macroeconomic factors and venture fundraising

Venture capital fundraising is potentially affected by other macroeconomic factors as well. Commitments could be affected by both the expected return on alternative investments and the

[4]Anand (1996) examines the effects of capital gains tax rates on investment in the communications industry. He examines investments by venture capital firms into private communication companies and finds that the level and composition of investment appears to be affected negatively by increases in the capital gains tax rate. The author's ability to draw conclusions, however, is limited by the fact that he looks only at one industry. Investments in one industry may be affected by myriad other factors, including technology shifts, tastes, or other investment opportunities. Examining the impact of capital gains tax rates on the quantity of venture capital raised appears to be a much more satisfactory way to address the issue.

general health of the economy. If the economy is growing quickly, then there may be more attractive opportunities for entrepreneurs to start new firms and, hence, increases in the demand for venture capitalists. Formally, the demand curve would shift to the right. The greater investment opportunity set might be associated with greater commitments to the venture capital industry. GDP growth, returns in the stock market, and R&D expenditures would all be potential proxies for demand conditions.

The level of interest rates in the economy also could affect the supply of venture capital. An alternative investment to venture capital is bonds. If interest rates rise, then the attractiveness of investing in venture capital funds may decline. This would decrease the willingness of investors to supply venture capital at all prices, *i.e.*, at all expected return levels.

3.5. Firm performance and fundraising

In this section we develop hypotheses about factors that might affect venture capital fundraising at the firm level. In addition to the market-wide factors discussed above, we look for venture capital firm-specific characteristics that may influence fundraising. First, a substantial body of research examines the relation between past performance and investment. Allocations by investors across asset classes seem to be driven by, in part, the relative performance of various sectors over the recent past. If there is short-run momentum in returns—as shown by Grinblatt, Titman, and Wermers (1995)—this response may be rational.

The flow of money into and out of various types of financial institutions in response to performance has been documented extensively of mutual funds. While the early research on mutual

funds [Jensen (1968); Ippolito (1989)] indicated that mutual fund managers as a group do not significantly outperform the market, recent work has shown cash flows appear to respond to past performance. Sirri and Tufano (1998) find that performance relative to peers in the same investment category is an important determinant of new capital commitments to mutual funds. They examine 690 equity mutual funds and rank the funds by their performance relative to funds that have the same investment focus. They find that the top performing funds in any particular investment style have substantial new commitments to their funds in the subsequent year. The relation between performance and commitments, however, is not linear. Funds that perform poorly do not appear to be penalized in the following year. Money does not leave poor performing funds. Sirri and Tufano (1998) find that one exception to these findings is new funds. Money does seem to leave a new fund if it is a poor performer.

Chevalier and Ellison (1997) examine how these patterns affect investment incentive functions. They find that funds which have underperformed their peers in the first part of the year have an incentive to increase the riskiness of their portfolios in order to increase the chances that they will end up near the top of the performance charts. If they bet wrong and fail, they will lose few of their current investors.

If the evidence from mutual funds has implications for venture capital, then we would expect that recent performance would be positively related to commitments to new funds. As in Sirri and Tufano's (1998) mutual fund results, reputation of the venture organization may influence the flow of new commitments when it raises a new fund. Several measures of reputation may be important. These include venture organization age and capital under management. Older and larger

venture organizations are likely to have more established reputations. They may therefore receive larger capital commitments than similar younger funds.

4. Venture Industry-Wide Results

We examine the implications of performance and capital gains tax rates for commitments to venture capital funds by performing two layers of analysis: aggregate flows and commitments to individual funds. The first level of analysis examines the flow of venture capital commitments into the industry. We examine the commitments to new venture capital funds from 1969 through 1994 first aggregating all commitments in the U.S. We then take up an analysis of the level of venture activity on a state-by-state basis.

4.1. Aggregate fundraising results

Data on annual commitments to U.S. venture capital funds come from the consulting firm Venture Economics. This organization has tracked venture fundraising since the 1960s. This database not only records venture capital organizations, but also the names of their individual funds. We have checked the entries in this database against the historical information reported in over 400 venture offering memorandums and partnership agreements, as well as against the fund profiles in the *Venture Capital Journal* and *Private Equity Analyst*. [The construction and verification of the database are described in Gompers and Lerner (1998a).] This database is also used in the analysis of individual organizations' fundraising data analyzed in Section 5.

This database includes over two thousand venture capital funds, SBICs, and related organizations. It is used in preparation of directories such as their annual volume *Venture Capital*

Performance. It is compiled from information provided by venture capitalists and institutional investors. In examining fundraising behavior, we only look at venture capital limited partnerships. First, these partnerships are the dominant organizational form in the industry, accounting for roughly 80% of commitments to the venture capital industry in recent years. Furthermore, the actual size of SBICs and corporate venture affiliates is often very difficult the estimate. SBICs have access to matching government funds, often several times greater than the amount contributed by private investors. Corporate programs usually do not have a pool of capital specified in advance and are frequently disbanded before being investing much capital. Limited partnerships—with their well-defined size and life-span—offer the cleanest estimate of venture capital inflows.

We total commitments to venture funds each year. Commitments are defined as the pledges that venture capitalists receive for investment over the lifetime of the fund. They are not the amount of money that is actually invested in a given year. Typically, venture funds draw on and invest the committed capital over a two to three year time period. For example, in 1995 Sierra Ventures raised their fifth fund with aggregate commitments of $100 million. This $100 million would be invested between 1995 and about 1999, but we would classify the entire $100 million as having been committed in 1995.

We also need some measure of returns in the venture capital industry. Ideally, we would have year-by-year performance data for individual funds. These data present several problems. As discussed above, calculation of returns is hampered by policies of many venture organizations that potentially delay the write-up or write-down of assets. As a proxy for performance of the venture organizations, we use a measure of the market value of equity held by venture capitalists in firms

that went public in a particular year. This measure will be highly correlated with returns on venture funds. Most money in venture capital is earned on firms that eventually go public. Ignoring the companies that do not go public is reasonable because their impact on returns is usually quite small. A Venture Economics study (1988) finds that a $1 investment in a firm that goes public provides an average cash return of $1.95 in excess of the initial investment with an average holding period of 4.2 years. The next best alternative, an investment in an acquired firm, yields a cash return of only 40 cents over a 3.7 year mean holding period. Using the IPO measure also makes sense because marketing documents for venture capital funds often highlight the successful public companies which have been backed by the venture organization. We therefore expect that the amount of venture capital raised will be a positive function of the value of firms taken public by venture capitalists in the previous year.

We identify potential venture-backed IPOs using three sources. The first is the listings of venture-backed IPOs published in Venture Economics' *Venture Capital Journal*. This is the same source used by Barry, *et al*. (1990) and Megginson and Weiss (1991). We also use listings of the securities distributions by venture funds. Venture capitalists typically unwind their successful investments by distributing the shares to their limited partners. They avoid selling the shares themselves and distributing the proceeds to their limited partners because their investors include both tax-exempt and tax-paying parties. To sell the shares would generate an immediate tax liability, which some of the limited partners may wish to avoid. We obtain lists of the distributions received by a pension fund which is among the largest venture investors and by three investment managers [Gompers and Lerner (1998b)]. (These investment managers allocate funds from numerous pension funds into venture capital and other asset classes.) These investors

had received distributions from 135 venture funds, most of which are managed by the oldest and most established venture organizations in the industry. Most of the successful investments by these funds can be identified from these lists.

The final source used to identify IPOs for the sample are the offering documents used by venture capitalists to raise new funds from investors. Venture organizations will often list in these offering memorandums their past investments that either went public or were acquired on favorable terms. We examine over four hundred of these memorandums in the files of Venture Economics [Gompers and Lerner (1998a)]. We identify any investments listed as having gone public. Most of the offering documents compiled by Venture Economics are from young venture organizations. This is because their Fund Raiser Advisory Service counsels less experienced firms on strategies for raising capital.

We include in the IPO sample all firms if a venture investor listed in the "Management" and "Principal and Selling Shareholders" sections of the IPO prospectus is listed in the Venture Economics database. In many cases, it is not immediately obvious whether a venture investor or director is an exact match with a venture organization listed in the database.[5] To address these ambiguities, we consult the edition of Venture Economics' *Pratt's Guide to Venture Capital Sources* (1996) published in the year of the IPO. We compare the addresses and key personnel of each of these ambiguous venture organizations with the information reported in the prospectus. If we are not virtually certain that the venture organizations in the prospectus and

[5]In many cases, individual investors (often called "angels") will describe themselves as venture capitalists. Groups of individual investors often make their investments through partnerships, which frequently are given a name not unlike those of venture capital organizations.

the database are the same, we do not code it as a match. For each investor, we code the venture organization, the particular venture fund investing in the firm, and the size of the stake before and after the offering. This process leads to the identification of 885 IPOs in which a venture capitalist served as a director or a venture capital fund was a blockholder.

In each year, we calculate the market value of the equity stakes in firms going public held by each venture capital organization. This value is the number of shares held by the venture organization multiplied by the IPO offering price. We then sum the market values for each IPO in a given year to obtain an annual performance number for each venture capital organization. We then sum across all venture organizations in a given year to get a measure of venture industry performance.

In Figure 2, we graph the time series of venture capital commitments and the market value of all firms brought public by venture capitalists in each year from 1969 through 1994. We see that from 1969 through 1979, commitments to venture capital and venture-backed IPOs were quite low. Starting in 1980, both commitments to the venture capital industry and the value of firms brought public by venture capitalist rise. The rise of both reversed in 1983. After 1983, it appears that the shift in venture-backed IPO market leads to changes in commitments to new venture funds. For example, increases in the market value of venture-backed IPOs in both 1986 and 1991-1992 preceded resurgences in the venture capital market.

The relation between capital gains taxes and venture capital commitments is documented in Figure 3. The relation is clearly negative. In the 1970s, high capital gains tax rates were associated

with low levels of venture capital fundraising. Increases in the capital gains tax rates in 1988 were followed by reductions in venture capital commitments, while the reduction of capital gains for long-held investments in 1993 was followed by a rise in venture fundraising. This negative relation between venture capital funding levels and capital gains tax rates is clearly only suggestive, because the influence of multiple factors needs to be examined.

Detailed information on the nature of commitments is shown in Table 1. Several patterns are prominent. First, the volatility of commitments is readily apparent. The level of fundraising (expressed in 1994 dollars) can vary dramatically from one year to the next. The volatility in venture fundraising is mirrored by a similar volatility in the IPO market, both for venture-backed companies and for the entire IPO market. We see the dramatic shift from individuals to pension funds over the past fifteen years as the primary capital source for new venture funds.[6]

In order to assess the impact of each of these variables controlling for the others, we present multivariate regressions in Table 2. Our approach here and in the individual firm regressions is to estimate reduced-form specifications and identify which factors potentially work through demand shifts and which factors work through supply shifts. The time series of data runs from 1972 through 1994. The dependent variable is the natural logarithm of real commitments to the venture capital industry (in millions of 1994 dollars). We present regressions for commitments to the entire venture capital industry, as well as four subgroups: taxable investors, tax-exempt investors, individuals, and pension funds. The independent variables include the natural logarithm of the market value of firms

[6]The measures of the sources of funds are taken from various issues of Venture Economics' *Venture Capital Journal.*

brought public by venture organizations in the previous year (in millions of 1994 dollars), the real return on Treasury bills in the previous year, the real CRSP value-weighted stock market return in the prior year, the previous year's real GDP growth, a dummy variable that equals one for years after 1978 when ERISA's prudent man rule was clarified, and the top marginal capital gains tax rate.

Changes in ERISA's prudent man rule are associated with greater commitments to the venture capital industry, but the effect is not significant for commitments by taxable investors and individuals. As expected, the strongest effect of ERISA's clarification is on contributions by pension funds. An F-test of the null hypothesis that the coefficient for pension funds is significantly different from the coefficient for individuals and taxable investors shows that ERISA's effect on contributions by pension funds is different at the five percent level. This is consistent with a supply side effect: the easing of pension fund restrictions increased the number of investors wishing to invest in venture capital funds.

Increases in capital gains tax rates have a consistently negative effect on contributions to the venture industry, although the effect is only significant for contributions to the entire industry and contributions by pension funds.[7] While we do find an effect of capital gains taxes on venture capital commitments, it does not appear to be working through the supply side. If changes in the capital gains tax rates had a first-order effect on investors' willingness to invest in venture capital, then the

[7]The coefficients on capital gains tax rates are not significantly different from one another across different investor classes. The purpose of the comparison is simply to show whether capital gains tax rates affect taxable investors only (as the supply effect would predict) or whether they affect all investors equally (as the demand effect would predict).

effect would be strongest for individuals and taxable parties. The opposite is true. As Poterba (1989) suggests, the effect of changes in the capital gains tax rate is likely to come through changes in the demand for venture capital. More and better quality managers are incented to become entrepreneurs when the capital gains tax rate declines and thus the demand for venture capital increases. This increase in demand leads to a greater quantity of venture capital being supplied in equilibrium.

Once other factors are included, the value of firms taken public by venture organizations in the previous year does not appear to have a dramatic effect on contributions. While we cannot rule out a role for IPOs creating liquidity in the venture sector and potentially affecting contributions, we cannot find an effect in the multivariate regressions. This finding is contrary to the arguments of Black and Gilson (1998), who emphasize the importance of a vibrant public market in the development of a venture capital industry. It is consistent, however, with the experience of Israel and Singapore, whose venture industries have experienced dramatic growth without having strong domestic public equity markets.

Of the macroeconomic variables, only real GDP growth is important. Increases in the real rate of growth lead to greater commitments to venture funds. Once again, this suggests that increasing demand for venture capital is an important determinant of the quantity. Robust economic growth creates new opportunities for entrepreneurs and increases demand for such capital.

One concern may be that because we are using time series observations on venture fundraising and the independent variables, the results may be affected by serial correlation in the

error terms. The Durbin-Watson statistics for each of the regressions were between 1.88 and 2.00, indicating that such serial correlation does not affect the results. As a diagnostic, we also ran Cochrane-Orcutt regressions using a lag term which did not materially change the results.

4.2. State-level venture activity

One difficulty with the analysis in the previous section was the relatively small number of observations. In order to gain additional power for our tests of market-wide venture activity, we examine venture capital activity in each of the fifty states and the District of Columbia from 1976 through 1994. We can then examine how state level demand and supply factors affect venture investing in those states.

We employ a slightly different approach here than in Sections 4.1 and 5: rather than examining the formation of venture funds in each state, we measure the actual venture capital investments. This reflects the difficulty of assigning venture organizations to particular states. Many venture organizations have multiple offices, which may account for differing shares of the investments. Venture organizations' headquarters may reflect the need to be proximate to their sources of capital and not their portfolio firms. For instance, many venture organizations are based in New York City, even though this has historically been the site of few start-up firms. This pattern is particularly true for groups specializing in the later-stage investments, which typically occur after other groups (who may be geographically more proximate to the portfolio firm) have already joined the board [Lerner (1995)].

We once again use the data of Venture Economics to determine venture capital activity by state. In this case, we undertake a special tabulation of the number of companies financed and dollar volume of financing in each state and year between 1976 and 1994. We include all investments by private equity groups into young entrepreneurial firms, but exclude investments into leveraged buyouts and restructurings by groups that primarily make venture capital investments.

We also collect a variety of additional data on a state by state basis. Gross state product has been compiled on an annual basis by the Department of Commerce's Bureau of Economic Analysis (1997) [also used was Friedenberg and Beemiller, (1997)]. For each state, we compiled the total amount of research performed in industry and in academia, regardless of funding source. The state industrial R&D data was compiled by the National Science Foundation (NSF) as part of the "Survey of Research and Development in Industry" (1980, 1998b). The data posed two problems. First, since 1978 this information has only been collected on a biannual basis. Thus, it was necessary to impute the missing years. Second, certain states are persistently missing. In these instances, the unassigned R&D in each region is assigned to each suppressed state on the basis of its Gross State Product.[8] The allocation of academic R&D expenditures by state is determined the NSF's annual "Survey of Research and Development Expenditures at Universities and Colleges" (1998a). We obtain the marginal state tax rate on capital gains through the use of the TAXSIM tax simulation program. We compute the impact of $1000 of

[8]For instance, in 1977, as in earlier and later years, data for New Hampshire and Vermont are suppressed. Of the $2.4 billion of R&D spending in New England in that year, $2.3 billion is accounted for by Connecticut, Maine, Massachusetts, and Rhode Island. We divide the remaining amount 65%-35% between New Hampshire and Vermont, proportional to their Gross State Products in that year.

capital gains on a wealthy individual in each state and year, controlling for the possible deductibility of state taxes in Federal taxes. [The program is described in Feenberg and Coutts (1993); the simulation and the resulting data are reproduced at http://www.nber.org/~taxsim/state-rates.]

Table 3 looks at venture capital activity in each state by tabulating the total number of companies that received venture capital and the total amount of venture capital invested from 1976 through 1994. The tremendous concentration of investment in four states is clearly evident. California has by far the most venture investing activity with nearly $20 billion invested (in 1994 dollars). Massachusetts, New York, and Texas are the next most active states and account for the bulk of the remaining capital. It is also clear that many states have almost no venture capital activity. We seek to explore these patterns in a regression framework.

In Table 4 we present state fixed-effects regressions for the level of venture capital investment per capita (in millions of 1994 dollars) and the number of companies receiving venture capital per capita. We employ an observation for each year in each state, *i.e.*, a balanced panel. Independent variables include market-wide measures used in the regressions in Table 2 (logarithm of IPO activity, the previous year's real T-bill return, and the previous year's equity market return). In addition, we include several variables that might proxy for state-level demand conditions. These include the previous year's growth in state Gross State Product (GSP) per capita as well as measures of last year's academic and industrial expenditure on R&D (in millions of 1994 dollars) per capita. The R&D expenditure potentially captures demand effects of high-technology firms. If R&D is

higher in a state, it may mean that the number of potential entrepreneurs with promising ideas may be greater.

In addition, we include a dummy variable that is equal to one after 1978 to capture the effect of changes in ERISA's prudent man rule. Finally, we include several measures of the capital gains tax rate burden. We first control for state and Federal capital gains taxes separately by including the maximum marginal state and Federal capital gains tax rate separately. We then add the Federal and state rates to create a variable which captures the total capital gains tax burden in that state.[9]

Table 4 shows that both industrial and academic R&D spending are significantly related to state-level venture capital activity. Increases in state R&D levels increase both the amount of venture capital invested as well as the number of firms receiving venture capital. This result suggests that both academic and industrial R&D spending are potentially important for the creation of entrepreneurial firms that demand venture capital.

Similarly, growth in GSP per capita is positively related to venture capital activity. This result, consistent with the aggregate results, may indicate the importance of the demand effects, *i.e.*, it is important to have a strong growing economy to create new firms that need venture capital financing.

[9]The state tax measure only includes the marginal impact: *i.e.*, any savings in Federal taxes due to the deductibility of state taxes are factored in. All regressions include state fixed-effects.

The dummy variable measuring the shift in ERISA policy continues to have a positive effect in the state-level regressions. After the clarification of ERISA, the amount of venture capital invested per capita as well as the number of firms receiving venture capital per capita increases. Finally, capital gains tax rates continue to matter. In the regressions including both state and Federal rates, it is only the Federal rate that is significantly related to venture capital activity. The state capital gains tax rate is, however, always negatively related to venture capital activity and is of the same order of magnitude as the effect of Federal rates. The combined Federal and state capital gains rate is also significantly related to venture capital activity. The result confirms the earlier results. Capital gains tax rates do appear to be negatively related to venture capital activity.

5. Individual venture organization results

5.1. Summary statistics

In this section, we examine fundraising patterns by individual venture organizations. We perform three levels of analysis. First, we present summary statistics for the database, both in its entirety and segmented by year. We then analyze factors affecting the fundraising ability of individual venture organizations. Finally, we examine the decision of venture organizations to raise funds with a focus on early- and seed-stage firms. The importance of early- and seed-stage funds in creating new firms is widely recognized. Many of the efforts to stimulate venture activity focus on stimulating seed capital funds. Understanding the unique factors affecting the decision to target these firms is important for potential policy decisions. We examine fund information collected by Venture Economics from 1961 through 1992.

Table 5 presents information on the completeness of the venture fundraising database. In all, we have information on 1294 venture capital funds. Of those, we have information on the fund

size and closing date for 846 (20 of these are missing month of closing). The average venture organization in the sample raised 2.23 funds while the median raised only 1. The maximum number of venture funds raised by an organization is 25. The average venture organization raised $126 million in 1994 dollars while the largest organization had raised over $2 billion.

The time series distribution of our sample is presented in Table 6. We see growth in both the number of funds raised and dollar volume of commitments in the early- and mid-1980s. The sample also appears to exhibit a slight growth in the size of funds raised (in constant 1994 dollars). If we look at the sum of all the funds in our sample, we have data on $45.0 billion in venture funding which represents nearly all the capital raised by organized venture capital partnerships during the sample period.[10] The lack of size data for 448 of the funds does not impart bias to our results. Our data cover almost all the capital raised over the sample period and, hence, the results are clearly applicable to the most important firms.

5.2.Fundraising regression results

We analyze firm level fundraising by using one yearly observation for each venture organization starting with the year that they raise their first venture capital fund. The dependent variable is either a dummy variable indicating whether the venture organization raised a fund or the amount of money (in millions of 1994 dollars) raised in that year. Independent variables include the age of the venture organization, the amount of money it raised during the previous

[10]The Federal government does not collect numbers on venture capital inflows. The Venture Economics database, however, corresponds closely to those of another consulting firm, Asset Alternatives, as well as estimates by practitioners.

ten years[11] (in millions of 1994 dollars), the value of equity held by this venture organization in firms brought public in that year and the previous year, the value of all venture-backed firms brought public in the previous year, real GDP growth in the previous year, the previous year's Treasury bill return, the previous year's stock market return as measured by the annual return on the CRSP value weighted market index, a dummy variable that equals one after 1978 (indicating years after the clarification of the ERISA prudent man rule), and the top marginal capital gains tax rate on individuals.

We estimate a Heckman two-stage model. The Heckman model estimates two equations. The first is the probability that a fund was raised in a given year. The second equation then estimates the amount raised given that a fund was raised in a particular year. This two-stage model is appropriate if the correct decision is that venture capitalists first decide whether to raise a new fund or not. Once they decide to raise a new fund, the venture capitalists then decide the size of fund they wish to raise. The two equations give us insights about factors that affect the probability of raising a new fund and ones that primarily affect the optimal fund size.

Table 7 gives the results from the Heckman models. The first regression in each model gives the probability of raising a new fund, while the second regression gives the size of a fund conditional on it being raised. We find that neither the capital gains tax rate nor ERISA's clarification have a significant effect on the probability of a venture organization raising a new fund. The ERISA dummy has no effect on the size of the fund either. The capital gains tax rate

[11]We look at money raised over the previous ten years because that is the specified life-span of a typical venture capital limited partnership agreement. The ten-year sum provides the best available estimate of capital under management.

does, however, have a significant effect on the size of the fund raised. Lower capital gains tax rates are associated with larger funds. This would be expected if venture organizations raised new funds on a normal cycle that was typically unaffected by external factors. Changes in the capital gains tax rate may affect the quantity of good start-ups to finance as managers are induced to start firms. The greater quantity of good projects would lead venture capitalists to raise larger funds.

We also find that firm performance has a dramatic effect on fundraising. Both the value of equity held in firms taken public by the venture capital firm in the current year and in the previous year have a positive effect on the probability of raising a new fund and the size of the fund. The effect of the previous year's IPO volume is nearly four times as large as the current year's. This might be due to the long process of raising a new fund (which may take many months). Venture organizations go on "road shows" and gauge investor interest, sign up prospective investors, and generate the necessary documents prior to closing. The more relevant performance is probably the previous year's returns, which are foremost in investors' minds during fundraising.

Reputation also appears to have a positive effect on the size of the fund raised. Older and larger venture organizations have higher probabilities of raising funds and raise larger funds. The reputation variable potentially captures beliefs about future returns not captured in recent performance variables. The effect of venture organization size is particularly strong on the size of the fund raised. This could indicate that venture organization size is a good proxy for reputation. Venture organization size might also measure the need to raise larger funds. Large

venture organizations may have more employees and general partners. In order to keep all of them working at capacity, the minimum fund size needed is substantially higher.

We find that the Treasury bill return in the previous year is positively related to the probability of raising a new fund. This effect may stem from the rapid increase in funds being raised in the early 1980s at a time when real interest rates were high. Both the probability of raising a fund and the size of a new fund raised first decline and then increase with time from the previous fund.[12]

We present the fixed-effects regression models in Table 8. The fixed-effects models include dummy variables for each venture organization that are intended to pick up unmeasured firm-specific factors. If we find a result even after controlling for firm fixed effects, we can be confident that the effects are robust. We could not estimate the fixed-effects Heckman model. Therefore, we run two separate regressions. The first is a fixed-effects logit which estimates the probability of raising a fund in a given year. The second regression is a fixed-effects least squares regression that estimates the size of funds raised conditional on a fund being raised. The approximation to the two-stage maximum likelihood Heckman model is consistent in the estimations without the fixed effects, so we are confident that the results in Table 8 are reasonable [Maddala (1987)].

In both specifications, the capital gains tax rate continues to be a significant factor in venture fundraising. A decrease in the capital gains tax rate increases the size of funds raised in

[12]The regression results are robust to various segmentations of the data, e.g., examining firms located on the West Coast and East Coast.

all the specifications. In the first model, the ERISA dummy variable has an important impact. Controlling for firm factors, the ERISA clarification leads to a greater probability of raising a new fund.

Venture organization performance (as measured by the value of equity stakes in initial public offerings) continues to have a positive effect on fundraising. In the two-stage model with firm fixed effects, the probability of raising a fund increases with greater performance, but the size of the fund does not appear to be affected. We find, however, that the reputation variables have mixed signs in the fixed-effects regression, which are different from the regressions without the firm fixed effects. In the two-stage model, the probability of raising a fund is lower for older and larger organizations, but the fund size is larger. As a firm ages, the probability of raising a new fund declines, although the size of funds being raised increases. This lower probability of raising a fund may reflect the retirement of partners within older venture organizations. Unconditionally, older firms are more likely to raise a fund because of their better track record. Controlling for firm effects, however, as a firm ages, it becomes less likely to raise a fund.

5.3.Stage focus results

We also undertake an analysis of the ability of venture capital organizations to raise a fund that focuses on early-stage investments. The early-stage venture market is often seen as being critical to the success of later-stage investments. Early-stage funds provide new firms with critical financing in their infancy [see for instance OECD (1996)]. Many of the policy initiatives undertaken across the country and around the world are aimed at increasing the availability of early-stage capital. Similarly, firms in their very early stages are the most prone to capital

rationing and liquidity constraints because the uncertainty and asymmetric information are the greatest. If we can understand the incentives to raise a focused fund, we might be able to understand industry dynamics better and may make better recommendations about promoting new entrepreneurial firms.

We divide firms into two categories in this analysis. We indicate whether the funds analyzed above have a stated investment focus on early-stage firms only. (Venture Economics characterizes each fund's focus in their database.) Table 9 presents summary statistics for venture funds that have a stated early-stage focus and those that do not. We find that funds focusing on early-stage investments are significantly smaller, with a mean [median] size of $42 [$25] million, than are funds that do not focus on early-stage investments (mean of $57 [$36] million). This makes sense because early-stage investments are typically smaller than later-stage investments. Gompers (1995) finds that the average early-stage investment is only half as large as the mean later-stage investment. Because the amount of time spent during the investment and monitoring process (e.g., due diligence, negotiations, etc.) and the need for oversight after the investment is similar, early-stage funds are usually smaller.

We also find that early-stage funds tend to be raised by venture organizations that are slightly older and larger. One possibility is that older, more experienced venture organizations have the necessary knowledge to raise a focused fund. The early-stage funds are, on average, more recent and are more likely to be raised on the West Coast. Clearly, the mix of investments on the West Coast, primarily California, is heavily concentrated on early-stage, technology-based

companies. East Coast firms are more balanced and tend to invest in greater fractions of later-stage companies.

In Table 10 we present multivariate regressions analyzing the determinants of fund focus. We use each new venture capital fund as an observation and examine whether it had an early-stage focus. As the summary statistics hinted, smaller funds are more likely to have an early-stage focus. Similarly, we find that firms on the West Coast are more likely to raise an early-stage fund. Finally, we find that a venture organization is more likely to raise a fund with an early-stage focus after the Department of Labor's clarification of ERISA's prudent man rule. This greater probability following ERISA change is potentially due to the clarification stating that investments would be judged prudent not by their individual risk, but by their contribution to portfolio risk. Prior to this amendment, early-stage funds may have been viewed as too speculative and may have had a more difficult time raising money than a later-stage or general purpose venture capital fund. After the amendment, venture organizations could raise focused funds without worrying that pension funds would avoid it out of concern over its perceived riskiness.

6. Alternative Explanations

Several alternative explanations may account for the findings in Sections 4 and 5. First, the supply and demand for venture capital may be affected by the supply of substitute financing. We have attempted to control for the cost of credit by including the real interest rate. In periods of high real interest rates, venture capital may be more attractive from the entrepreneur's perspective. Similarly, if the availability of bank financing were a major factor in the

determination of venture capital commitments, then we should have seen an increase in venture capital commitments in the late 1980s and early 1990s, when bank credit to young, small firms substantially declined. Instead, we see a decline in venture capital commitments over this time period, indicating that bank credit and venture fundraising moved together.

A second alternative explanation for our results on capital gains taxes and venture commitments may be the inability to accurately measure expected GDP growth. If expected GDP growth is somehow correlated with capital gains tax rates, then we might be incorrectly interpreting the significance to capital gains tax rates. In unreported regressions, we modeled expected GDP growth using the previous four years of real GDP growth. Instead of lagged GDP growth, we reestimated the regressions using the expected GDP growth rate. Results were qualitatively the same as in Sections 4 and 5. This is not surprising since the expected GDP growth rate is primarily affected by last year's growth.

Finally, the growth in venture capital commitments may have less to do with policy changes and more to do with changes in the amount of technological opportunities. In fact, the state level R&D expenditures indicate that this may be the case. If changes in technological opportunity were causing increases in venture capital investments, we would expect several measures of technological innovation to lead increases in venture fundraising. In particular, Kortum and Lerner (1998) show that a surge of patents occurred in the late 1980s and 1990s. This suggests that some of the recent growth in venture capital fundraising in the mid-1990s may be due to increases in technological opportunities. The increase in venture fundraising in the late 1970s and 1980s (the period of our sample), however, does not seem to be caused by similar

technology shifts. Similarly, the state level analysis shows that even controlling for R&D spending, regulatory policies still have an effect.

7. Conclusion

In this paper, we examine the determinants of fundraising for the venture industry and individual venture organizations. We examine supply and demand effects as well as the importance of individual firm performance and reputation.

We find that demand for venture capital appears to play a critical role. Higher GDP growth and increases in R&D spending lead to greater venture capital activity. We also find that capital gains tax rates matter, with lower rates leading to a greater quantity of venture capital raised. The effect, however, appears to stem from a greater demand for venture capital: commitments by tax-exempt pension funds are the most affected by changes in the capital gains tax rate. We find evidence that ERISA clarification in rules governing pension fund investment have generally increased commitments to the industry.

Fund performance is an important determinant of the ability of venture organizations to raise new capital. Firms that hold larger equity stakes in firms that have recently gone public raise funds with greater probability and raise larger funds. Reputation, in the form of firm age and size, also positively impacts the ability to raise new capital.

We also provide evidence that the decision to raise an early-stage venture fund has been affected by pension regulations. The probability of raising a focused fund increased after

ERISA's clarification. We also find greater early-stage activity in smaller funds and venture organizations on the West Coast where technology-based startups are more prevalent.

Our research has a variety of implications for policy makers who wish to stimulate venture capital activity. The fundraising results indicate that regulatory reform and policy decisions may have an effect on commitments to the venture industry. While the capital gains tax rate is an important driver of venture capital fundraising, blanket reduction in capital gains tax rates may be a blunt instrument for promoting venture capital. Our analysis suggests that an important factor for the increase in venture capital is probably increases in the number of high quality startups. The greater number of good firms leads to more demand for venture capital. Policies that increase the relative attractiveness of becoming an entrepreneur and promote technology innovation probably would have more of an effect on venture capital investments than an across the board cut in the capital gains tax rate. Furthermore, the results highlight the highly localized nature of venture capital activity. Countries that wish to promote venture capital activity may consider concentrating efforts rather than spreading resources uniformly around the country. This is in contrast to many of the efforts that various countries have instituted.

The results also raise a series of questions for further research. In general, the role of reputation and performance as determinants of fundraising is consistent with earlier literature for other types of money managers. The decision to invest is clearly predicated on the expectation of future returns, and both past performance and reputation are components of the expected future returns. But in recent years, many of the most established venture organizations in the U.S. have experienced internal corporate governance problems and have been disbanded. The

issue of who carries the reputation with them is important. Does reputation follow general partners who start their own fund or must they establish new reputations? In markets without experienced venture capitalists, how can the lack of reputation be overcome? Clearly, more work is necessary.

Another set of unanswered questions relates to the effectiveness of public efforts to transfer the venture capital model to other regions. Even if venture capital organizations spur technological innovation in the United States, it is not evident that the model can be seamlessly transferred abroad. Different employment practices, regulatory policies, or public market avenues might limit the formation these funds [see Black and Gilson (1998) for a discussion]. Even if it were feasible to transfer such efforts, public economic development programs can be subject to political manipulation: e.g., pressures to award funds to politically connected businesses.

On the other hand, overseas venture initiatives may be able to benefit from the experience of venture organizations in the United States. In particular, the Israeli Yozma program seems to have successfully captured "spillovers" of knowledge from U.S. and British venture organizations. In contrast to many forms of government intervention to boost economic growth, the implementation of these programs has received little scrutiny by economists. [Two recent exceptions are Irwin and Klenow (1996) and Lerner (1996).] This is a ripe area for further exploration.

Venture capital is increasingly regarded as an important component of the U.S. economic landscape. While policy makers have often tried to affect the flow of funds into the sector, little has been known about the real impact of such policy measures. Our paper begins to answer those questions and points towards areas for future research.

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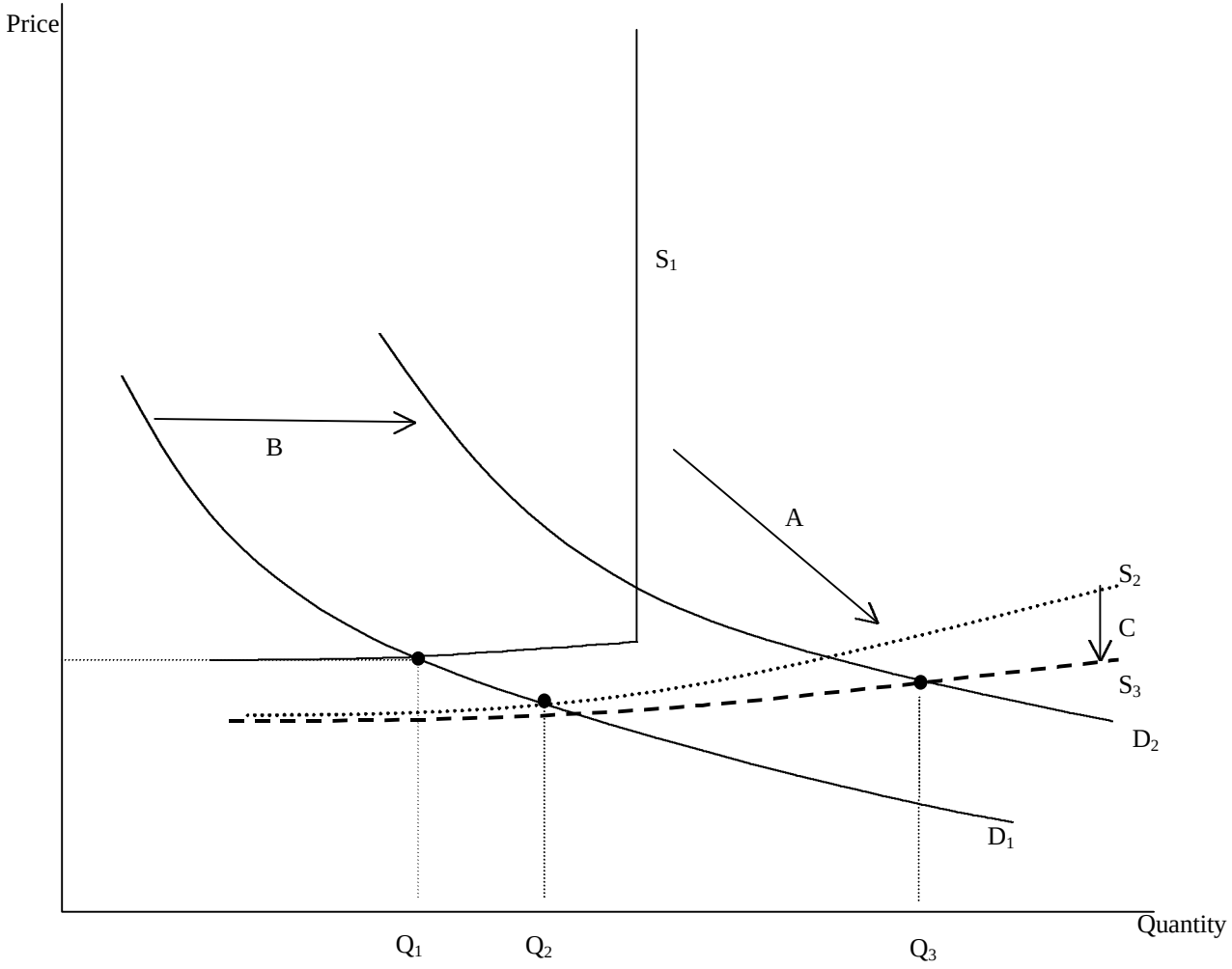

Figure 1 Supply and demand in venture capital. This figure gives a graphical illustration for the changes in supply and demand in the venture capital market. Equilibrium prior to the clarification of ERISA is represented by Q_1. After ERISA, the supply curve shifts down to S_2 (A) and the new equilibrium quantity of venture capital is Q_2. Capital gains tax reductions move both demand to D_2 (B) and supply to S_3 (C) and the equilibrium quantity of venture capital moves to Q_3.

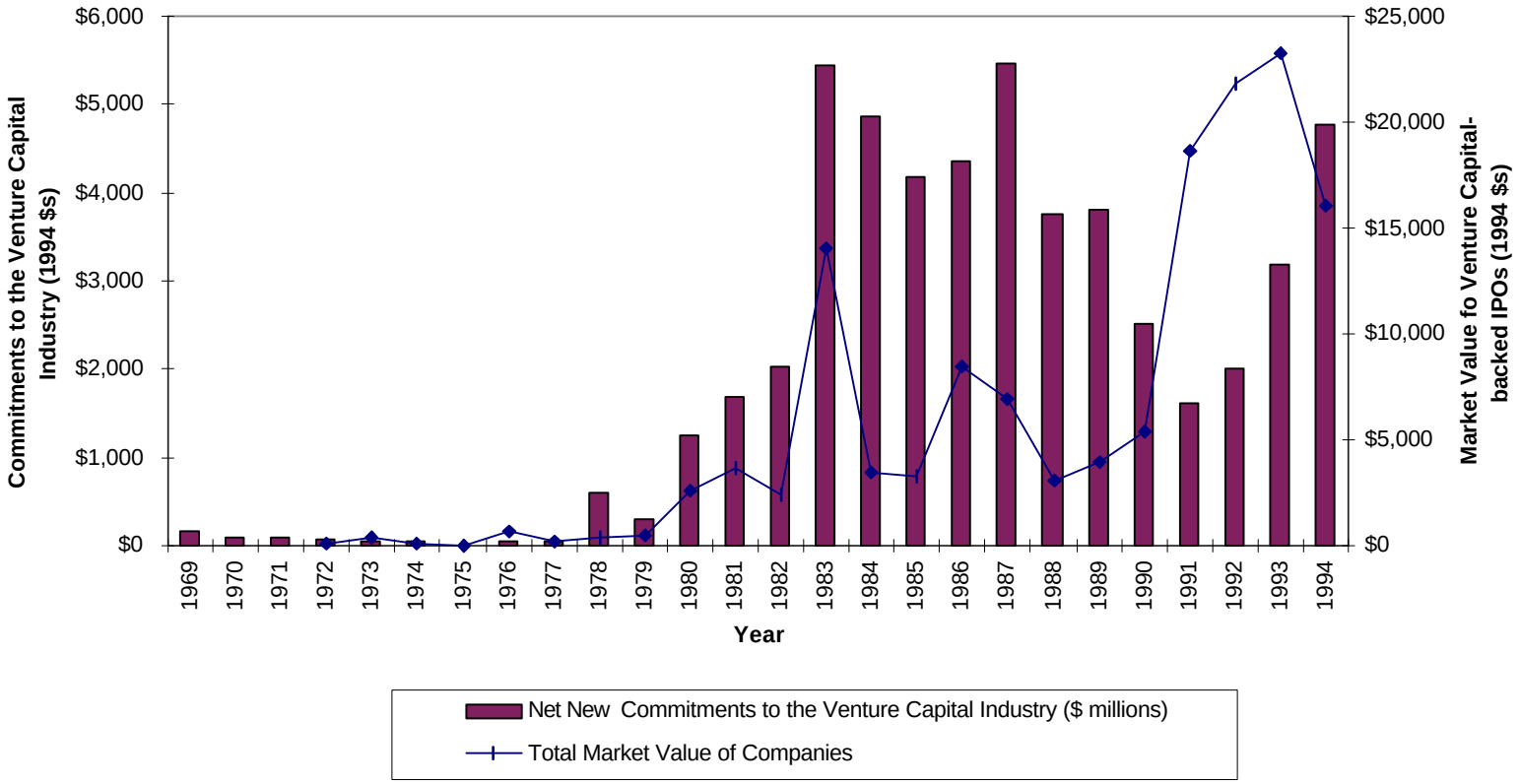

Figure 2 Venture fundraising and IPO activity. The bar graph shows annual commitments to the venture capital industry in millions of constant 1994 dollars. The line graph shows the annual market value of all venture capital-backed firms issuing equity in an initial public offering.

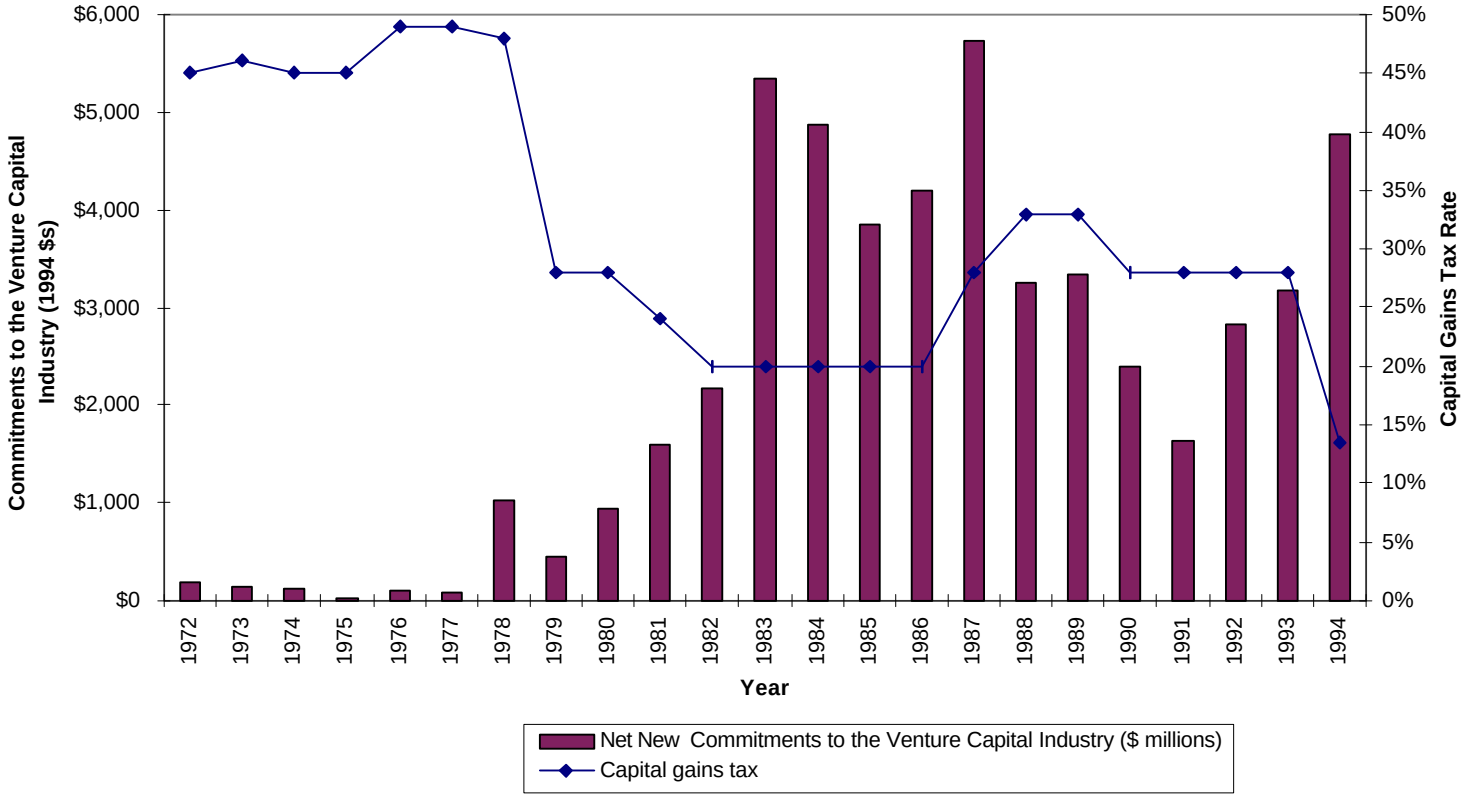

Figure 3 Venture fundraising and capital gains tax rate. The bar graph shows annual commitments to the venture capital industry in millions of constant 1994 dollars. The line graph shows the highest marginal capital gains tax rate effective in that year.

Table 1

Venture capital industry summary statistics. All figures in millions of 1994 dollars.

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Net New Commitments to Independent Venture Capital Partnerships (1994 $ millions)	$427	$483	$1,245	$1,712	$2,089	$5,453	$4,839	$4,191	$4,427	$5,378	$3,718	$3,458	$2,507	$1,529	$2,011	$2,545	$4,766
Source of Venture Contributions																	
Corporations	10%	17%	19%	17%	12%	12%	14%	12%	11%	10%	12%	20%	7%	5%	3%	8%	9%
Individuals	32%	23%	16%	23%	21%	21%	15%	13%	12%	12%	8%	6%	11%	12%	11%	7%	12%
Pensions Funds	15%	31%	30%	23%	33%	31%	34%	33%	50%	39%	47%	36%	53%	42%	42%	59%	47%
Foreign	18%	15%	8%	10%	13%	16%	18%	23%	11%	14%	13%	13%	7%	12%	11%	4%	2%
Endowments	9%	10%	14%	12%	7%	8%	6%	8%	6%	10%	11%	12%	13%	24%	18%	11%	21%
Insurance Companies	16%	4%	13%	15%	14%	12%	13%	11%	10%	15%	9%	13%	9%	5%	15%	11%	9%
Venture Capital-Backed Initial Public Offerings																	
Number of Companies	6	4	27	68	27	121	53	46	97	81	35	39	42.00	122	157	165	136
Total Amount Raised	$231	$95	$563	$946	$661	$3,605	$863	$979	$2,546	$2,156	$851	$1,068	$1,158	$4,031	$4,702	$4,923	$3,351
Total Market Value of Companies	$501	$335	$3,519	$4,436	$2,860	$16,694	$4,059	$3,805	$10,136	$8,078	$3,516	$4,183	$5,536	$19,269	$22,476	$23,531	$16,018
All IPOs																	
Number of Companies	42	103	95	227	100	504	213	195	417	259	96	254	213	403	605	819	646
Total Amount Raised	$835	$1,189	$1,460	$3,346	$1,461	$11,395	$2,956	$3,698	$10,204	$6,118	$2,694	$14,699	$10,481	$26,001	$41,057	$58,248	$33,841
Total Market Value of Companies	$2,320	$4,334	$7,662	$13,423	$6,585	$48,140	$12,534	$13,570	$37,998	$27,908	$13,242	$46,445	$28,841	$72,668	$104,775	NA	NA

Source: Authors' analysis of Venture Economics' database, Brav and Gompers [1997], and various issues of the *Venture Capital Journal.*

Table 2

Regressions for industry-wide fundraising. The dependent variable is the natural logarithm of the amount of venture capital commitments (in millions of 1994 dollars) for either all independent private venture capital funds or only those commitments by various groups of investors from 1972 through 1994. Taxable commitments are defined as all commitments from individuals, corporations, or insurance companies. Nontaxable contributions are defined as those from pension funds and endowments. Independent variables include the natural logarithm of the market value of all venture capital-backed firms issuing equity in the previous year (in millions of 1994 dollars), the previous year's real growth in gross domestic product (GDP), the return on t-bills in the previous year, the previous year's CRSP value weighted stock market return, a dummy variable that equals one if the Department of Labor clarified the prudent man rule and allowed pension investment in venture capital (equals one for all years after 1978), and the highest marginal capital gains tax rate effective in that year. All regressions are ordinary least squares estimates. [t-statistics are in brackets.]

	Dependent Variable				
	Natural logarithm of commitments to the venture capital industry (millions of 1994 $):				
Independent Variable	Total	Taxable	Tax-exempt	Individuals	Pensions
Natural logarithm of value of all venture capital-backed IPOs in previous year (millions of 1994 $)	-0.0124 [-0.06]	-0.0300 [-0.11]	-0.2453 [-1.71]	0.0046 [0.17]	-0.3037 [-1.92]
Previous year's real GDP growth	13.28 [2.01]	16.08 [2.34]	14.48 [3.92]	14.92 [2.10]	12.38 [3.05]
Previous year's t-bill return	0.0022 [0.04]	0.0436 [0.64]	-0.1212 [-3.28]	0.0417 [0.59]	-0.1556 [-3.83]
Previous year's equity market return	0.3836 [0.48]	-0.2240 [-0.22]	0.1648 [0.30]	-0.3920 [-0.36]	-0.1092 [-0.18]
Was ERISA's prudent man rule clarified?	2.172 [3.05]	0.8598 [1.25]	2.183 [5.92]	0.6299 [0.89]	2.454 [6.05]
Capital gains tax rate	-3.835 [-1.66]	-2.068 [-0.96]	-1.803 [-1.65]	-2.498 [-1.52]	-2.726 [-2.14]
Constant	6.551 [3.01]	5.3195 [1.95]	8.579 [5.85]	5.307 [1.88]	8.918 [5.53]
Adjusted R^2	0.824	0.303	0.874	0.250	0.884
p-value of F-statistic	0.000	0.000	0.000	0.000	0.000
Number of observations	22	17	17	17	17

Table 3

Summaries of venture capital activity by state. The sample is all venture capital investments by independent venture organizations by state from 1976 through 1994. The table indicates the number of companies receiving venture capital and total amount of venture capital invested in each state during this time period. For those with size data, the distribution of total funds committed in each state is also tabulated with size denoted in millions of 1994 dollars.

State	Companies Financed	Total Venture Capital Invested	State	Companies Financed	Total Venture Capital Invested
Alaska	3	$52.11	Montana	17	$49.19
Alabama	75	199.12	Nebraska	15	8.05
Arizona	189	693.91	Nevada	22	25.77
Arkansas	12	14.69	New Hampshire	136	344.32
California	6,154	19,967.67	New Jersey	643	2,019.21
Colorado	609	1,557.01	New Mexico	38	56.47
Connecticut	486	2,094.18	New York	811	2,369.43
Washington, DC	70	210.95	North Carolina	239	612.23
Delaware	26	42.62	North Dakota	4	28.23
Florida	338	779.66	Ohio	342	1,351.21
Georgia	395	872.04	Oklahoma	60	134.78
Hawaii	4	1.23	Oregon	297	789.34
Idaho	12	58.46	Pennsylvania	575	2,292.38
Illinois	514	1,879.06	Rhode Island	85	226.61
Indiana	137	260.33	South Carolina	37	165.86
Iowa	60	143.39	South Dakota	15	7.57
Kansas	46	90.33	Tennessee	235	844.14
Kentucky	59	173.54	Texas	1,254	3,861.13
Louisiana	45	137.59	Utah	117	246.69
Maine	50	126.77	Vermont	313	969.05
Maryland	321	989.15	Virginia	17	61.55
Massachusetts	2,276	5,886.44	Washington	327	835.79
Michigan	267	808.56	West Virginia	16	33.68
Minnesota	483	837.11	Wisconsin	144	269.40
Mississippi	26	32.01	Wyoming	5	4.22
Missouri	107	611.60			

Table 4

Regressions for state level venture capital activity. The dependent variable is the venture capital activity at the state level (either amount invested in millions of 1994 dollars per million residents or the number of companies receiving financing per 1,000 residents) for each year from 1976 through 1994. Independent variables include the natural logarithm of the market value of all venture capital-backed firms issuing equity in the previous year (in millions of 1994 dollars), the previous year's real growth in gross state product (GSP) for that state per capita, the natural logarithm of the previous year's expenditure on academic and industrial R&D per capita in the state (in 1994 dollars), the return on t-bills in the previous year, the previous year's CRSP value weighted stock market return, a dummy variable that equals one if the Department of Labor clarified the prudent man rule and allowed pension investment in venture capital (equals one for all years after 1978), and the highest marginal capital gains tax rate effective in that year at the state and national level. All regressions include state fixed effects (not reported). [t-statistics are in brackets.]

	Dependent Variable			
	Logarithm of real venture capital investment in the state per million residents		Number of companies receiving venture financing in state per 1,000 residents	
Independent Variable				
Logarithm of value of all venture capital-backed IPOs in previous year (millions of 1994 $s)	-0.2008 [-3.35]	-0.1973 [-3.37]	-0.2414 [-1.46]	-0.2372 [1.46]
Logarithm of previous year's real GSP per capita	0.5343 [1.73]	0.5438 [1.77]	4.5621 [4.59]	4.5854 [4.68]
Previous year's real GSP growth in the state	0.0480 [3.11]	0.0478 [3.11]	0.1609 [3.45]	0.1605 [3.45]
Logarithm of previous year's real expenditure on academic R&D per capita in the state	0.7939 [4.88]	0.8032 [5.15]	0.1898 [0.36]	0.2044 [0.39]
Logarithm of previous year's real expenditure on industrial R&D per capita in the state	0.1359 [3.23]	0.1362 [3.24]	0.3208 [2.67]	0.3211 [2.67]
Previous year's t-bill return	-0.1332 [-5.44]	-0.1337 [-5.48]	-0.1294 [-1.83]	-0.1295 [-1.83]
Previous year's equity market return	0.0386 [0.15]	0.0235 [0.09]	1.4166 [1.98]	1.3983 [1.99]
Was ERISA's prudent man rule clarified?	1.1713 [6.45]	1.1830 [6.70]	1.6815 [3.32]	1.6948 [3.41]
State capital gains tax rate	-2.5838 [-0.91]		-5.0675 [-0.61]	
Federal capital gains tax rate	-3.4408 [-5.14]		-6.2439 [-3.37]	
Sum of the state and Federal capital gains tax rate		-3.3684 [-5.45]		-6.1480 [-3.61]
Overall R^2	0.425	0.425	0.188	0.425
p-value of χ^2-statistic	0.000	0.000	0.000	0.000
Number of observations	765	765	765	765

Table 5

Summary statistics for funds in database. The sample is all funds raised by independent venture organizations included in the Venture Economics Venture Intelligence database. The first panel indicates the completeness of the records of independent venture partnerships in the corrected database. The second panel presents summary information for each venture organization.

Panel A: completeness of records in corrected database	
Items in record	**Observations**
Month and year of closing and fund size	826
Year of closing and fund size	20
Month and year of closing: No size	428
Year of closing: No month or size	20
Neither closing date nor fund size	112

Panel B: Summary Information for each venture organization				
	Mean	**Median**	**Minimum**	**Maximum**
Number of funds raised	2.23	1	1	25
Total funds raised (millions of 1994 $)[a]	$126.46	$57.11	$0.46	$2,267.02
Closing date of first fund in sample[b]	3/82	7/83	1/63	12/92
Closing date of last fund in sample[b]	5/85	12/86	1/63	12/92

[a]This tabulation does not include venture organizations where the size of all funds cannot be determined. It does include, however, those venture organizations where the size of some funds cannot be determined.

[b]This tabulation does not include venture organizations where the closing date of all funds cannot be determined. It does include, however, those venture organizations where the closing date of some funds cannot be determined. Funds whose month of closing cannot be determined are regarded as closing in July.

Table 6

Venture capital funds by year. The sample is all funds raised by independent venture organizations included in the Venture Economics Venture Intelligence database. The table indicates the number of independent venture partnerships that closed each year, as well as the number which have information on the size of the fund. For those with size data, the distribution of total funds committed each year (in millions of 1994 dollars) is also tabulated.

			Size of funds (millions of 1994 $s)	
Year	**Funds closed**	**Funds with size data**	**Average**	**Sum**
1961	2	0		
1962	2	0		
1963	1	0		
1964	0	0		
1965	1	1	$41.53	$41.53
1966	1	0		
1967	2	0		
1968	12	0		
1969	16	6	72.95	437.72
1970	14	5	50.25	251.25
1971	13	5	61.32	306.62
1972	11	5	24.22	121.10
1973	13	3	36.47	109.39
1974	11	6	14.41	86.46
1975	11	0		
1976	14	3	38.18	113.51
1977	9	3	28.39	85.18
1978	23	14	30.51	427.09
1979	27	11	43.95	483.46
1980	57	26	47.92	1,245.93
1981	81	47	36.43	1,712.10
1982	98	51	40.96	2,088.79
1983	147	99	55.08	5,452.48
1984	150	106	45.65	4,839.34
1985	99	74	56.63	4,190.56
1986	86	61	72.58	4,427.82
1987	112	95	56.61	5,378.32
1988	78	66	56.33	3,717.95
1989	88	70	49.40	3,457.52
1990	50	36	69.64	2,507.02
1991	34	23	66.47	1,528.73
1992	31	30	67.03	2,010.82
Total	1294	846	$53.22	$45,021.73

Table 7

Regressions for individual venture organization fundraising. The sample is all funds raised by independent venture organizations included in the Venture Economics Venture Intelligence database. The dependent variables are a dummy variable that equals one if the venture organization raised a fund in that year and the size of funds raised in millions of 1994 dollars. Independent variables include number of years since the venture organization raised a previous venture fund, the age of the venture organization, the total amount of venture capital raised by the organization in the past ten years, the dollar value of equity held by the venture organization in firms taken public this year and in the previous year, the market value of all venture capital-backed firms issuing equity in the previous year (all in millions of 1994 dollars), the previous year's real growth in gross domestic product (GDP), the return on t-bills in the previous year, the previous year's CRSP value weighted stock market return, a dummy variable that equals one if the Department of Labor clarified the prudent man rule and allowed pension investment in venture capital (equals one for all years after 1978), and the highest marginal capital gains tax rate effective in that year. All regressions are Heckman two-stage models. [t-statistics are in brackets.]

	Dependent Variable			
	Model 1		Model 2	
Independent Variables	Was fund raised?	If so, logarithm of fund size (1994 $s)	Was fund raised?	If so, logarithm of fund size (1994 $s)
Years since raising last fund	-0.4560 [-15.84]	-21.17 [-7.55]	-0.4692 [-21.58]	-14.15 [-7.02]
Square of the number of years since raising last fund	0.0272 [11.94]	0.8710 [3.94]	0.0291 [16.27]	0.5293 [3.28]
Age of the venture organization (years)	0.0136 [2.79]	0.9820 [2.32]		
Total venture capital raised during previous ten years for venture organization (millions of 1994 $s)			0.0004 [2.14]	0.1670 [9.56]
Value of equity held in firms brought public this year (millions of 1994 $s)	0.0037 [3.30]	0.3326 [3.50]	0.0029 [2.46]	0.1124 [1.15]
Value of equity held in firms brought public in the previous year (millions of 1994 $s)	0.0091 [4.39]	1.0310 [6.11]	0.0058 [2.58]	0.3742 [2.07]
Total value of firms brought public in previous year by all venture capitalists (millions of 1994 $s)	1.3xE-06 [0.23]	-0.0006 [-1.60]	1.7xE-06 [0.34]	-0.0006 [-1.72]
Real GDP growth in the previous year	-0.0048 [-0.72]		0.0006 [0.08]	
T-bill return in previous year	0.0724 [3.84]		0.0759 [5.45]	
Return on the CRSP value weighted index in the previous year	0.0027 [2.37]		0.0036 [2.86]	
Capital gains tax rate	0.0018 [0.31]	-1.1650 [-3.50]	0.0021 [0.41]	-1.8156 [-5.50]
Was ERISA's prudent man rule clarified?	-0.0382 [-0.37]	8.3666 [0.96]	-0.0472 [-0.44]	-5.4530 [-0.66]
Constant	-0.6230 [-2.15]	-0.5752 [-0.04]	-0.6357 [-2.27]	28.99 [1.98]
Log Likelihood		-8159.3		-8197.4
p-value of χ^2-statistic		0.000		0.000
Number of observations		5573		5573

Table 8

Fixed-effects regressions for individual venture organization fundraising. The sample is all funds raised by independent venture organizations included in the Venture Economics Venture Intelligence database. The dependent variables are a dummy variable that equals one if the venture organization raised a fund in that year and the logarithm of the size of funds raised in millions of 1994 dollars. Independent variables include number of years since the venture organization raised a previous venture fund, the age of the venture organization, the total amount of venture capital raised by the organization in the past ten years, the dollar value of equity held by the venture organization in firms taken public this year and in the previous year, the market value of all venture capital-backed firms issuing equity in the previous year (all in millions of 1994 dollars), the previous year's real growth in gross domestic product (GDP), the return on t-bills in the previous year, the previous year's CRSP value weighted stock market return, a dummy variable that equals one if the Department of Labor clarified the prudent man rule and allowed pension investment in venture capital (equals one for all years after 1978), and the highest marginal capital gains tax rate effective in that year. Dummy variables for each firm are also included to control for firm fixed-effects. Coefficients on the firm dummies are omitted. The regressions for whether the venture organization raised a fund or not are logit. The conditional regressions for size of the venture fund are ordinary least squares estimates. [t-statistics are in brackets.]

	Dependent Variable			
	Model 1		Model 2	
	Logit	***OLS***	***Logit***	***OLS***
Independent Variables	Was fund raised?	If so, logarithm of fund size (1994 $s)	Was fund raised?	If so, logarithm of fund size (1994 $s)
Years since raising last fund	-1.1056	-2.903	-1.3034	2.343
	[-18.80]	[-1.02]	[-22.83]	[0.89]
Square of the number of years since raising last fund	0.1069	0.1526	0.1141	-0.2100
	[16.91]	[0.54]	[18.74]	[-0.79]
Age of the venture organization (years)	-0.2772	4.8364		
	[-11.23]	[3.18]		
Total venture capital raised during previous ten years for venture organization (millions of 1994 $s)			-0.0049	0.1660
			[-7.10]	[6.41]
Value of equity held in firms brought public this year (millions of 1994 $s)	0.0049	0.0128	0.0056	-0.0764
	[2.03]	[0.10]	[2.22]	[-0.59]
Value of equity held in firms brought public in the previous year (millions of 1994 $s)	0.0138	0.2905	0.213	-0.1417
	[3.06]	[1.38]	[4.09]	[-0.65]
Total value of firms brought public in previous year (millions of 1994 $s)	4.1xE-06	-0.0001	-5.0xE-06	0.0004
	[0.38]	[-0.21]	[-0.48]	[0.55]
Real GDP growth in the previous year	-0.0315	-1.875	-0.0037	-2.012
	[-1.42]	[-1.42]	[-0.16]	[-1.57]
T-bill return in previous year	-0.0160	-1.727	0.1154	-1.782
	[-0.43]	[-0.77]	[3.33]	[-0.93]
Return on the CRSP value weighted index in the previous year	0.0009	-0.1847	0.0061	-0.1959
	[0.28]	[-0.80]	[1.94]	[-0.89]
Capital gains tax rate	0.0007	-1.153	0.0039	-1.506
	[0.06]	[-1.92]	[0.36]	[-2.45]
Was ERISA's prudent man rule clarified?	2.047	0.7768	0.0967	10.22
	[5.75]	[0.04]	[0.35]	[0.67]
Constant	1.434	127.15	1.155	127.60
	[1.62]	[2.77]	[1.26]	[2.89]
Log Likelihood/ Adjusted R^2	-1903.6	0.212	-1939.5	0.252
p-value of χ^2/ F-statistic	0.000	0.000	0.000	0.000
Number of observations	5323	1117	5323	1117

Table 9

Summaries of venture capital commitments by stage focus. The sample is all funds raised by independent venture organizations included in the Venture Economics Venture Intelligence database.

	Funds that have a stated focus on early-stage firms	Funds that do not have a stated focus on early-stage firms	Significance of the difference between early and non-early
Size of the fund (millions of 1994 $)	$41.98 [$24.66]	$56.95 [$35.88]	0.000 [0.000]
Amount of venture capital raised by organization in previous funds	$92.20 [$39.54]	$87.58 [$26.64]	0.714 [0.000]
Organization age (years)	4.38 [3.08]	3.77 [0.58]	0.140 [0.002]
Date of fund closing	August 1985 [June 1985]	August 1983 [May 1984]	0.000 [0.000]
Fraction of funds raised on west coast	38.3%	30.3%	0.017
Fraction of funds raised on east coast	32.2%	43.6%	0.001

Table 10

Regressions for stage focus of the fund. The sample is all funds raised by independent venture organizations included in the Venture Economics Venture Intelligence database. The dependent variable is a dummy variable that equals one if the fund raised explicitly stated a focus on early-stage investments. Independent variables include the age of the venture organization, the total amount of venture capital raised by the organization in the past ten years in constant 1994 dollars, a dummy variable that equals one if the firm was located on the West Coast, a dummy variable that equals one if the Department of Labor clarified the prudent man rule and allowed pension investment in venture capital (equals one for all years after 1978), and the highest marginal capital gains tax rate effective in that year. All regressions are logit estimates. [t-statistics are in brackets.]

	Dependent Variable			
	Did the fund raise state a focus on early-stage investments?			
Size of the fund (millions of 1994 $s)	-0.0057 [-2.82]	-0.0035 [-1.40]		
Age of the venture organization	0.0118 [0.75]		0.0018 [0.13]	
Total venture capital raised during previous ten years for this venture organization		0.0247 [1.62]		-3.24xE-07 [-0.71]
Was the fund located on the West Coast?	0.4026 [2.35]	0.4619 [2.70]	0.2280 [1.44]	0.2786 [1.79]
Was ERISA's prudent man rule clarified?	0.7659 [1.78]	0.9025 [2.11]	1.829 [4.39]	1.871 [4.52]
Capital gains tax rate	0.0208 [1.36]	0.0247 [1.62]	0.0395 [2.70]	0.0404 [2.80]
Constant	-2.244 [-3.14]	-2.502 [-3.49]	-4.333 [-6.25]	-4.401 [-6.39]
Log Likelihood	-455.3	-461.9	-557.4	-571.8
p-value of χ^2 statistic	0.002	0.001	0.000	0.000
Number of observations	818	843	1236	1283