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Does Venture Capital Require an Active Stock Market?

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Abstract

The United States has both an active venture capital industry and well-developed stock markets. Japan and Germany have neither. We argue here that this is no accident -- that venture capital can flourish especially -- and perhaps *only* -- if the venture capitalist can exit from a successful portfolio company through an initial public offering (IPO), which requires an active stock market. Understanding the link between the stock market and the venture capital market requires understanding the contractual arrangements between entrepreneurs and venture capital providers especially the importance of exit by venture capitalists and the opportunity, present only if IPO exit is possible, for the venture capitalist and the entrepreneur to enter into an implicit contract over control, in which a successful entrepreneur can reacquire control from the venture capitalist by using an IPO as the means of exit.

* This paper is a shortened version of Bernard S. Black & Ronald J. Gilson, "Venture capital and the structure of capital markets: Banks versus stock markets", 47 Journal of Financial Economics 243-277 (1998). Please see the full article for literature citations.

1. Introduction

The United States has comparatively small banks that play a limited role in the governance of large corporations, and a well developed stock market with frequent initial public offerings (IPOs). In contrast, Japanese main banks and German universal banks are larger in size relative to Japanese and German firms, and play a larger role in monitoring large firms. Neither country has an active IPO market.

Advocates of bank-centered capital markets, such as these in Japan and Germany, claim that this structure fosters patient capital markets and long-term planning, while a stock market-centered capital market is said to encourage short-term expectations by investors and responsive short-term strategies by managers. Advocates of stock market-centered systems stress the adaptive features of a market for corporate control which are lacking in bank-centered systems, and the lack of empirical evidence of short-termism.

In this article, we extend the debate about the relative efficiency of bank- and stock market-centered capital markets by explaining a second systematic difference between the two systems: the existence of a much stronger venture capital industry in stock market-centered systems. We define "venture capital," consistent with American understanding, as investment by specialized organizations ("venture capital funds") in high-growth, high-risk, often high-technology firms that need equity capital to finance product development or growth. We exclude "buyout" financing that enables a mature firm's managers to acquire the firm from its current owners, even though in Europe, so-called "venture capital" firms often provide such financing.

Other countries have openly envied the U.S. venture capital market and have unsuccessfully sought to replicate it. We offer an explanation for this failure: We argue that a well developed stock market that permits venture capitalists to exit through an initial public offering (IPO) is critical to the existence of a vibrant venture capital market.

Understanding the link between the stock market and the venture capital market requires that we understand the implicit and explicit contractual arrangements both between venture capital funds and their investors, and between venture capital funds and entrepreneurs. We offer an

explanation for two characteristics of the United States venture capital market. First, we explain the importance of *exit* -- why venture capitalists seek to liquidate their portfolio company investments in the near to moderate term, rather than becoming long-term investors in portfolio companies. Second, we explain the importance of the *form* of exit: why the potential for exit from a successful start-up *through an IPO* allows venture capitalists to enter into implicit contracts with entrepreneurs concerning future control of startup firms, in a way not available in a bank-centered capital market. The implicit contract over future control that is permitted by the availability of exit through an IPO helps to explain the greater success of venture capital in countries with stock market-centered capital markets.

2. Venture capital in the United States and Germany

In this section, we compare the venture capital industries in the United States and Germany in order to motivate our theory that a strong stock market is a precondition to a substantial venture capital industry. The United States has a much more fully developed venture capital market than Germany. The differences are of both size and substance. The United States has a larger number of venture capital funds and the funds themselves are larger relative to each country's economy. United States funds invest heavily in early-stage ventures and high-technology industries, while German venture capital provides primarily later-stage financing in lower-technology industries.

The United States venture capital market is quite large, with over 600 active venture capital funds. New investment in venture capital funds in 1996 was \$6.5 billion (Figure 1). In 1996, 276 venture-capital-backed firms went public, achieving a combined market capitalization of \$58 billion, and raising proceeds of \$12 billion.

Table 1. VC-backed IPOs, Public Acquisitions, and Private Acquisitions

Number of initial public offerings of venture-capital-backed companies and number of sales of venture-capital-backed companies, between 1984 and 1996.

Year	VC-backed IPOs	Exits via Acquisitions		
		of Private Companies	of Already Public Companies	Total
1984	53	59	27	86
1985	47	83	18	101
1986	98	90	30	120
1987	81	113	27	140
1988	36	106	29	135
1989	39	101	45	146
1990	42	76	33	109
1991	127	65	19	84
1992	160	90	4	94
1993	172	78	14	92
1994	143	99	no data	no data
1995	183	98	no data	no data
1996	276	94	no data	no data

Source: Venture Capital Journal

Figure 1 shows the annual variation in the number of venture-capital-backed IPOs, as well as the amount of new capital committed to venture capital funds. Figure 1 suggests a correlation between the availability of exit through IPO (proxied by the number of venture-capital-backed IPOs) and investor willingness to invest in venture capital funds (measured by new capital commitments), with perhaps a one-year lag between a change in the number of IPOs and a resulting change in the amount of capital committed. This correlation is consistent with our theory about the link between the stock market and the venture capital market. Regression analysis confirms that there is a statistically significant correlation between the number of venture-capital-backed IPOs in year X and capital contributions in year $X+1$.

Figure 1. Venture-capital-backed IPOs and new capital commitments to venture capital funds

Number of initial public offerings of venture-capital-backed companies (left-hand scale), and amount of new capital commitments to venture capital funds (right-hand scale), between 1978 and 1996.

[FIGURE 1 HERE]

Source: Venture Capital Journal and Venture Capital Yearbook

United States venture capital funds obtain capital from a range of sources, but pension funds are the largest contributor (Table 2). In Germany, on the other hand, banks are the principal investors in venture capital funds.

Table 2
United States and Germany
Capital Raised by Venture Capital Funds By Type of Investor

Percentage of capital raised by venture capital funds in the United States and Germany, by type of investor, for 1992-1995.

	1992	1993	1994	1995
United States				
Corporations	3%	8%	9%	2%
Private individuals & families	11	8	9	17
Government agencies	--	--	--	--
Pension funds	42	59	46	38
Banks and insurance companies	15	11	9	18
Endowments and foundations	18	11	21	22
Other	11	4	2	3
Total	100%	100%	100%	100%
Germany				
Corporations	7%	9%	8%	10%
Private individuals & families	6	7	8	5
Government agencies	4	6	7	8
Pension funds	---	---	---	9
Banks	53	52	55	59
Insurance companies	10	12	12	6
Endowments and foundations	---	---	---	---
Other	17	14	10	2
Total	100%	100%	100%	100%

Sources: European Venture Capital Association Yearbook; Bundesverband Deutsche Kapitalbeteiligungsgesellschaften Jahrbuch [German Venture Capital Association Yearbook]; Venture Capital Yearbook

Seed, startup and other early stage investments accounted for about 37% of new capital invested by venture capital funds in 1994 (Table 3). Later-stage expansion financing represented another 45% of 1994 investments. However, most expansion financing goes to companies that received early-stage financing. Thus, the bulk of venture capital investments go to firms that receive venture capital financing very early in their life. Moreover, most investments go to technology-based companies; in 1994, 68% of new investments went to these companies (Venture Economics, 1995).

Table 3
United States and Germany
Venture Capital Disbursements by Stage of Financing

Percentage of capital disbursed by venture capital funds in the United States and Germany, by nature of investment, for 1992-1995.

	1992	1993	1994	1995
United States				
Seed	3%	7%	4%	
Startup	8	7	15	
Other early stage	13	10	18	
Expansion	55	54	45	
LBO/Acquisition	7	6	6	
Other	14	16	12	
Total	100%	100%	100%	
Germany				
Seed	1%	1%	2%	2%
Startup	6	7	8	6
Expansion	45	66	54	65
LBO/Acquisition	24	25	36	18
Other	25	---	---	8
Total	100%	100%	100%	100%

Sources: European Venture Capital Association Yearbook (1995); Bundesverband Deutsche Kapitalbeteiligungsgesellschaften Jahrbuch [German Venture Capital Association Yearbook] (various years through 1996); Venture Capital Yearbook (various years through 1997).

Mature firms which began with venture capital backing assume macroeconomic significance in the U.S. economy. They play a major role in several rapidly growing sectors where the United States is recognized as a world leader, including biotechnology (for example, Genentech and Biogen); personal computers and workstations (for example, Apple, Compaq, and Sun Microsystems); many personal computer components and related devices such as hard drives and routers (for example, Seagate Technologies, Connor Peripherals, and Cisco Systems); personal computer software (for example, Lotus Development and Harvard Graphics); and semiconductors (for example, Intel and Advanced Micro Devices).

The German venture capital industry is a pale shadow of its American counterpart. Only 85 venture capital organizations existed at the end of 1994, with DM 8.3 billion (\$5.5 billion) in cumulative capital commitments and annual investments of under \$400 million. Venture capital

investments were .01% of German GDP in 1994; one-sixth of the U.S. level. German venture capital funds rarely make early-stage investments or invest in high-technology industries. In 1994, only 8% of German venture capital investments went to startup companies (Table 3), and only 11% were technology-related.

In Germany, exit by the venture capitalist through an IPO in the German stock market is largely unavailable. Venture capital funds exit principally through the company repurchasing the venture capital fund's shares (a strategy not available to the rapidly growing firms that receive venture capital financing in the United States), or by selling the company (Table 4).

Table 4
Exits by German Venture Capital Funds, 1995

Type of exit from portfolio companies by German venture capital funds for 1995.

Exit Type	Number of Firms
Buyback by portfolio company	166
Sale of portfolio company	74
Block sale of venture capital fund's stake	8
Initial Public Offering (IPOs on foreign stock markets)	12 (11)
Other	4
Total	264

Source: German Venture Capital Association Yearbook

In sum, the United States and Germany illustrate the pattern we seek to explain: the United States possesses a dynamic venture capital industry, centered on early stage investments in high-technology companies; Germany lacks a comparable industry.

3. The importance of exit by the venture capital fund

The first step in understanding the link between the stock market and the venture capital market involves the importance of exit by the venture capital fund from its investments. We develop below an informal theory for why exit from successful investments is critical both for the

relationship between a venture capital fund and its portfolio companies, and for the relationship between the fund and its capital providers.

3.1. Exit from the venture capital fund - portfolio company relationship

Venture capitalists provide more than just money to their portfolio companies. They also provide management assistance, intensive monitoring of performance, and reputational capital -- the venture capitalist's ability to give the portfolio company credibility with third parties.

Management assistance: Venture capital fund partners are experienced at developing startup companies and possess market knowledge based on other portfolio investments in the same and related industries. They can assist a management-thin early-stage company in locating and recruiting the management and technical personnel it needs as its business grows, and can help the company through the predictable problems that high-technology firms face in moving from prototype development to production, marketing, and distribution. Venture capitalists' industry knowledge and experience with prior startup firms helps them locate managers for new startups.

Intensive monitoring and control: Venture capital funds have both strong incentives to monitor entrepreneurs' performance, deriving from equity ownership and strong control levers, disproportionate to the size of their equity investment. One control lever results from the staged timing of venture capital investment. The initial investment is typically too small to allow the portfolio company to carry out its business plan. The venture capitalist will decide later whether to provide the additional funding that the portfolio company needs. The contract between a venture capital fund and a portfolio company provide other control levers. The venture capitalist typically receives convertible debt or convertible preferred stock that carries the same voting rights as if it had already been converted into common stock, plus greater board representation -- often an absolute majority of the board -- than if board representation were proportional to voting power. Board control lets the venture capitalist replace the entrepreneur as chief executive officer if necessary. Even where the venture capitalist lacks board control, the investor rights agreement gives the venture capital provider veto power over significant operating decisions by the portfolio

company. We discuss below the reputation market necessary to prevent the venture capitalist from misusing this power.

Reputational capital: Much like an investment bank underwriting an initial public offering, the venture capital fund acts as a reputational intermediary. Venture capital financing enhances the portfolio company's credibility with third parties. Talented managers are more likely to work for a venture capital-backed company, because the venture capitalist's participation provides a credible signal about the company's likelihood of success. Suppliers will be more willing to risk committing capacity and extending trade credit to a company if a venture capitalist both vouches for and monitors its management and technical progress. Customers will likewise take more seriously the company's promise of future product delivery. Later on, the venture capitalist's reputation helps to attract a high quality underwriter for an IPO of the portfolio company's stock. The venture capital fund's proffer of its reputation to third parties who have dealings with a portfolio company is credible because the fund is a repeat player, and has put its money where its mouth is by investing in the portfolio company.

Economies of scope in venture financing: The management assistance, monitoring, and service as a reputational intermediary that a venture capitalist provides share a significant economy of scope with its provision of capital. This scope economy arises from a number of sources. The portfolio company must evaluate the quality of the venture capital fund's proffered management assistance and monitoring. Similarly, potential employees, suppliers, and customers must evaluate the fund's explicit and implicit representations concerning the portfolio company's future. Combining financial and nonfinancial contributions enhances the credibility of the information that the venture capitalist provides to third parties and bonds the venture capitalist's promise to provide nonfinancial assistance to the portfolio company. Combining financial and nonfinancial contributions also lets investors in a venture capital fund evaluate the fund's nonfinancial contributions by measuring its return on investment.

The venture capitalist's non-capital inputs have special value to early-stage companies. As the portfolio company's management gains experience, proves its skill, and establishes its own reputation, its need for the venture capital provider's management experience, monitoring, and service as a reputational intermediary declines. Thus, at some point, the venture capital provider's nonfinancial contributions can be more profitably devoted to a new round of early-stage companies. But because the economies of scope discussed above link financial and nonfinancial contributions, recycling these capitalist's nonfinancial contributions also requires the venture capitalist to exit and recycle its financial contribution from successful companies to early-stage companies.

3.2. The exit and reinvestment cycle for venture capital funds and capital providers

Exit is also efficient for the relationship between a venture capital fund and the investors in the fund. Exit responds to three contracting problems in the venture capitalist - capital provider relationship. First, capital providers need a way to evaluate venture capitalists' skill, in order to decide to which managers to commit new funds. Second, capital providers need to evaluate the risks and returns on venture capital investments relative to other investments, in order to decide whether and how much to invest in venture capital. Third, capital providers need to be able to withdraw funds from less successful managers. Exit by venture capital funds from specific portfolio investments provides a benchmark that lets capital providers evaluate both the skill of different venture capitalists and the profitability of venture capital relative to other investments. At the same time, payment of the exit proceeds to capital providers lets the capital providers recycle funds from less successful to more successful venture capital managers.

Conventional limited partnership agreements between venture capital funds and capital providers reflect the efficiency of exit for this relationship. The limited partnership agreement typically sets a maximum 7-10 year term for the partnership, after which the partnership must be liquidated and the proceeds distributed to the limited partners. During this term, the proceeds from investments in particular firms are distributed to limited partners as realized. Moreover, venture capital funds have strong incentives to exit from their investments well before the partnership

period ends. A fund's performance record, based on completed investments, is the fund's principal tool for persuading capital providers to invest in new limited partnerships.

The explicit contract between capital providers and the venture capitalist, requiring liquidation of each limited partnership, is complemented by an implicit contract in which capital providers reinvest in future limited partnerships sponsored by successful venture capital funds. The expectation of reinvestment makes it feasible for venture capital funds to invest in infrastructure and expertise that will outlive any one limited partnership. Figure 2 illustrates the explicit and implicit contracts between venture capitalists and their investors.

Figure 2. Implicit and explicit contracts between venture capitalists and outside investors

[INSERT FIGURE 2 HERE]

The efficiency of exit for the venture capital fund - capital provider relationship complements its efficiency properties for the portfolio firm - venture capital fund relationship. Taken together, they provide a strong rationale for exit from individual portfolio investments as a central component of a viable venture capital industry.

4. The availability of exit by IPO: Implicit contracting over future control

The analysis above establishes the importance of exit to the venture capital market. But it does not yet differentiate between stock market-centered and bank-centered capital markets. A stock market makes available one special type of exit -- an initial public offering. But another exit strategy is available to venture capital funds in both bank-centered and stock-market centered capital markets: the portfolio company can be sold to a larger company. Indeed, even in the United States, venture capitalists often exit through sale of the portfolio company rather than through an IPO (Table 1).

Exit through sale of the portfolio company is likely to be the most efficient form of exit in some cases. For example, innovation may be better accomplished in small firms while production and marketing may be better accomplished in large firms. In this circumstance, selling a startup

company to another firm with manufacturing or marketing expertise can produce synergy gains, which can be partly captured by the startup firm through a higher exit price.

In other cases, an IPO may be the most efficient form of exit. The potential for an IPO to provide a higher-valued exit than sale of the company must be considered plausible, given the frequency with which this exit option is used in the United States. Viewed *ex ante*, venture capital financing of firms for which exit through IPO will (or might turn out to) maximize exit price could promise a higher expected return in a stock-market-centered capital market; where an IPO exit is feasible, than in a bank-centered capital market. But this extra exit option should affect investment decisions only at the margin. It cannot explain the dramatic differences between the venture capital industries in the United States and Germany.

Thus, we are only part of the way towards a theory that explains the observed link between venture capital markets and stock markets. What remains to be shown is that the potential for exit through IPO, *even if exit often occurs through the portfolio company's sale*, is critical to an active venture capital market. This part shows that the potential for exit through IPO allows the venture capital provider and the entrepreneur to enter into an implicit contract over future control of the portfolio company in a manner that is not readily duplicable in a bank-centered system.

4.1. The contracting framework

The relevant time to assess the influence of an IPO's availability on venture capital contracting is when the entrepreneur and venture capital provider contract over the initial investment, not when exit occurs. We seek here to explain three elements of venture capital contracting: (1) the entrepreneur's preference that the venture capital fund exit through an IPO if feasible; (2) how this preference for exit via IPO is expressed in a self-enforcing implicit contract over future control; and (3) how this implicit contract provides the entrepreneur with incentives that are not easily duplicated if sale of the portfolio company is the only exit option. Because the incentive properties of this contract go to the heart of the entrepreneurial process, its availability in a stock-market-centered capital market links the venture capital market and the stock market.

Our model requires three noncontroversial assumptions: (i) the entrepreneur places substantial private value on control over the company she starts; (ii) it is not feasible for an untested entrepreneur to retain control at the time of the initial venture capital financing; and (iii) it is feasible for a successful entrepreneur to reacquire control from the venture capitalist when the venture capitalist exits. We discuss each assumption below.

A private value for control is a standard feature in venture capital contracting models. Moreover, for entrepreneurs, the assumption appears to be descriptively accurate. The failure rate for startup companies is high. Without a large private value for control, many potential entrepreneurs won't leave a secure job to start a new company. Yet entrepreneurs cannot demand control when they seek venture financing. The typical entrepreneur has not previously run a startup company. Venture capitalists insist on retaining control to protect themselves against the risk that the entrepreneur won't run the firm successfully or will extract private benefits from the firm instead of maximizing its value to investors.

The situation changes once a startup firm has succeeded. The entrepreneur has proved her management skill and provided some evidence that she can be trusted with other peoples' money. Returning control to the entrepreneur could now maximize firm value. Even if not, the value lost may be less than the entrepreneur's private value of control. The opportunity to regain control also provides an incentive, beyond mere wealth, for the entrepreneur to devote the effort needed for success. But how can the venture capitalist commit, *ex ante*, to transfer control back to the entrepreneur, contingent on a concept as nebulous as "success"?

4.2. The entrepreneur's incentive contract

When the entrepreneur sells an interest in her company to a venture capital fund, the venture capitalist receives both an equity interest in the firm's value and significant control rights, both explicit (for example, the right to remove the chief executive officer) and implicit (for example, the right to decide whether the firm can continue in business through staged funding). In return, the company and the entrepreneur get three things. The portfolio company receives capital plus nonfinancial contributions including information, monitoring, and enhanced credibility with

third parties. This explicit contract is illustrated in Figure 3. In addition, the entrepreneur receives an implicit incentive contract denominated in control. This incentive contract depends on the availability of an IPO exit strategy.

Figure 3. Implicit and explicit contracts between venture capitalist and entrepreneur

[INSERT FIGURE 3 HERE]

An IPO exit is available only if the portfolio company is successful. When an IPO occurs, the entrepreneur receives cash to the extent that she sells shares in the offering, plus increased liquidity for unsold shares. In addition, the entrepreneur reassumes much of the control originally ceded to the venture capitalist. The venture capitalist's percentage stake is reduced by its sale of shares, in the IPO or thereafter, by the venture capitalist's in-kind distribution of shares to its investors, and by the company's sale of new shares in the IPO. The now-public firm also no longer depends on the venture capitalist for future funding. Three years after the IPO, only 12% of lead venture capitalists retain 5% or more of the portfolio company's shares. The venture capitalist has both less incentive to monitor and less need, because some monitoring will now be undertaken by stock market analysts.

In addition, the fund loses its special control rights, including board membership and veto power over business decisions. Typically, the convertible securities held by the venture capital fund are converted into common stock at the time of the IPO; the negative covenants contained in the investor rights agreement also terminate on an IPO. Control becomes vested in the entrepreneur, who may hold a controlling stock interest and, even if not, retains the broad discretion enjoyed by chief executives of companies without a controlling shareholder. The opportunity to acquire control through an IPO exit gives the entrepreneur a powerful incentive beyond purely financial gains from the value of her shares in the firm. In effect, the prospect of an

IPO exit gives the entrepreneur something of a call option on control, contingent on the firm's success.

In contrast, if the venture capital provider exits through sale of the portfolio company to another company, control passes to the acquirer, even if the entrepreneur remains in charge of day-to-day management. Thus, if an IPO exit is not available, the entrepreneur cannot be given the incentive of a call option on control exercisable in the event of success.

4.3. Feasibility of the implicit contract over control; superiority to an explicit contract

It remains to demonstrate the feasibility of the implicit incentive contract over control and its superiority to an explicit contract. The feasibility problem is to specify a self-enforcing implicit contract whose terms are clear and whose breach by the venture capital provider would be observable and punished by the market. Consider the following stylized implicit contract: The entrepreneur will be deemed sufficiently successful to exercise her call option on control, and the venture capital provider will exit through an IPO, *if* a reputable investment banker will underwrite a firm-commitment IPO. The need to specify the conditions under which the entrepreneur can exercise the call option on control is met by delegating the performance assessment to a third party. The investment banker's internal standards for companies it is willing to take public, made credible by its willingness to commit its own capital and reputation to the offering, establish the conditions for exercise of the entrepreneur's call option.

The requirement that the venture capitalist's breach of the implicit contract be observable and punishable by the market, is also met. The universe of portfolio companies that merit a public offering is limited, as is the number of venture capital providers. Both sides of the market are relatively concentrated, both numerically and geographically. Moreover, venture capital funds typically specialize in portfolio companies geographically proximate to the fund's office. Proximity facilitates the emergence and maintenance of a reputation market. A claim by an entrepreneur that a venture capital provider declined to allow a portfolio company to go public when a reputable investment banker was available would quickly circulate through the community

and hurt the venture capitalist in the competition to be lead venture investor in other companies in the future.

The viability of reputation market constraints on venture capitalist behavior is confirmed by another aspect of the venture capitalist-entrepreneur relationship. The venture capitalist's staged capital commitment, coupled with the right of first refusal with respect to future financing typically given to the venture capitalist, permits the venture capitalist to act opportunistically. What can the entrepreneur do if the venture capitalist offers to provide the second-stage financing that the entrepreneur needs to continue at an unfair price? The original venture capitalist's right of first refusal presents a serious barrier to obtaining financing elsewhere: who would offer financing when the offer will succeed only when a better informed party -- the original investor -- believes the offer is too generously priced? A reputation market can police this risk of opportunism.

An implicit contract over control is likely to be preferable to an explicit contract. Creating an explicit state-contingent contract that specifies the control consequences of the full range of possible states of the world over the four- to ten-year average term of a venture investment, without creating perverse incentives, would be a severe challenge to the parties' predictive powers and drafting capabilities. Moreover, the venture capitalist will be willing to cede control only at the time of exit, not before. A mechanical formula cannot ensure that a reputable underwriter will be willing to take the portfolio company public. Thus, a supposedly explicit contract, defining when the entrepreneur has the right to reacquire control through an IPO, cannot easily be enforced. Such a contract would be substantially implicit in fact, even if explicit in form.

Finally, an implicit/explicit dichotomy oversimplifies the real world. Some elements of the contract over control are explicit, while others are left implicit. For example, cessation of the venture capital fund's special control rights at the time of an IPO is explicit, while the triggering event -- the IPO -- is left implicit. And conversion of the venture capitalist's convertible securities into common stock is sometimes explicitly required if the portfolio company achieves defined financial milestones, even without an IPO.

4.4. Consistency with empirical evidence

In our model, successful entrepreneurs often prefer exit by IPO, and have the implicit right to demand this form of exit not only when it maximizes firm value compared to a sale of the firm, but also when the entrepreneur's private value of control outweighs the entrepreneur's loss in share value. Thus, our model predicts that the venture capitalist's successful exits will take place disproportionately through IPO. If so, IPO exits will be more profitable than exits through sale of the portfolio company, by more than can plausibly be explained by the different values available through these different forms of exit.

This prediction is confirmed. U.S. venture capital funds earn an average 60% annual return on investment in IPO exits, compared to 15% in acquisition exits; IPO exits are much more profitable in Canada as well. It is not plausible that these large differences could arise if the venture capitalist chose in each case the exit that maximized share price. Our theory is also consistent with the evidence discussed above of a correlation in the United States between frequency of IPO exit and new capital contributions to venture capital funds.

5. Evidence from other countries

Our theory, because it links the venture market to the availability of IPO exit, predicts that development of a strong venture capital market will be impaired in countries where exit through IPO is not a viable option. This section offers an informal test of this theory: Does it predict the success of venture capital in countries with different types of capital markets? We discussed on Germany and the United States above; we survey several other countries below.

Japan. The limited quantitative data on venture capital in Japan is consistent with our theory: Japan, with its bank-centered capital market, has relatively little venture capital. In 1995, there were only 121 venture capital funds, of which more than half were affiliated with banks and run by the parent bank's employees. The employees of bank-affiliated funds commonly rotate through jobs in the bank's venture capital affiliate and then return to the parent bank. Thus, they are unlikely to develop the special skills needed to evaluate high-technology investments. Another 25 Japanese venture capital funds were run by securities firms or insurance companies.

Unlike American venture capital funds, which primarily provide equity financing, Japanese funds provide funds mostly through loans. Japanese venture capital firms rarely invest in high-technology firms. Instead, they concentrate on manufacturing and services, including such mundane investments as small shops and restaurants.

Great Britain and Ireland. Our theory predicts that Great Britain, with its active stock market, should have comparatively strong venture capital. This prediction is supported by the evidence. British GDP is only about two-thirds of Germany's, yet its venture capital industry is almost five times larger, measured by cumulative capital committed. New capital commitments are comparable to the United States as a percentage of GDP. Ireland, with its easy access to the London stock market, also has high venture capital as a percentage of GDP. Britain and Ireland are the clear European leaders in venture capital, with everyone else far behind (Table 5).

Table 5
New Capital Committed to European Venture Capital Funds, 1993-1994
(percent of GDP)

New capital commitments to venture capital funds, as percent of national GNP, for various European countries between 1993 and 1994.

Country	Year		Average: 1993-1994
	1993	1994	
Great Britain	.09	.27	.18
Ireland	.04	.25	.15
France	.06	.07	.06
Sweden	.06	.06	.06
Portugal	.06	.07	.06
Netherlands	.04	.07	.05
Belgium	.04	.03	0.04
Denmark	.01	.08	0.04
Norway	.05	.03	0.04
Switzerland	.03	.02	.03
Iceland	.06	0.00	0.03
Finland	.01	.04	.02
Italy	.02	.02	0.02
Spain	.03	.01	.02
Germany	.01	.01	.01
Austria	0.00	0.00	0.00

Source: European Venture Capital Association

Canada. Canada has a relatively open market, both for domestic IPOs and for IPOs into the nearby U.S. market. Consistent with our theory, Canada has a relatively active venture capital industry. Canadian venture capital funds play a large role in early-stage financing of high-technology Canadian firms. In 1994, private independent funds had C\$1.8 billion under management, and all Canadian venture capital firms had C\$4.5 billion under management. The latter figure is comparable to the United States after adjusting for the size of the economy. Moreover, 25% of new capital went to early-stage financing -- a figure similar to that for the United States. In Canada, as in the United States, IPO exit is common and the highest-return exits are through IPOs.

Israel. Israel offers an interesting case study of how an existing venture capital industry can adapt when the option of a domestic IPO is taken away through regulation. The Israeli economy has grown rapidly during the 1990s, partly in response to deregulation of a formerly heavily government-controlled economy. High-technology startups, often financed by venture capital funds, have been an important element in this growth.

In the early 1990s, Israeli high-technology firms often went public on the Tel Aviv Stock Exchange at a very early stage. After a stock price crash in early 1994, the Tel Aviv Stock Exchange limited IPOs by early-stage companies. Israeli venture capital funds continued to flourish by shifting their IPOs to the NASDAQ market. Of 16 IPOs of venture capital-backed Israeli companies from 1993 through early 1996, 14 were on NASDAQ, one on the British "AIM" small-firm market, and one on the Tel Aviv Stock Exchange. As of March 31, 1997, 62 Israeli companies had listed securities on NASDAQ, including 22 in 1996 alone; most were high-tech companies.

6. Alternative explanations for intercountry variations in venture capital

We have developed in this paper an informal theory, based on the stock market's role in providing contracting options not available in a bank-centered capital market, that may partially explain cross-country variations in venture capital. In this section, we evaluate briefly several alternative explanations for different levels of venture capital activity in different countries. None of the alternative explanations appears able to fully displace the account of cross-national differences offered here.

6.1. Institutional but not functional differences

Different methods of organizing capital markets do not necessarily dictate corresponding functional or performance differences. For example, Japanese and German companies change top management in response to poor earnings and stock price performance about as often and as quickly as United States companies, despite the three countries' different corporate governance institutions. The same functional equivalence argument can be made with respect to differences in

how successful economies finance entrepreneurial activities. If other financing methods yield the same performance as the United States' venture capital market, then the institutional differences are historically interesting but not functionally significant.

Anecdotal evidence makes us skeptical about functional equivalence. The United States has become a world leader in industries, notably biotechnology, computer-related high technology, and computer software, in which the venture capital market figures centrally. Moreover, in both Europe and the United States, large pharmaceutical companies are responding to biotechnology entrepreneurship not by funding the entrepreneurs directly, but instead by providing later-stage financing and partnering arrangements to entrepreneurial companies, mostly U.S.-based and originally financed through U.S. venture capital. The result is not functional equivalence but specialization: Different activities are allocated to different countries on the basis of differences in their venture capital markets.

6.2. The role of pension fund financing of venture capital

In both Japan and Germany, pension funds do not invest in venture capital. In Germany, corporate pension obligations are typically unfunded, so large private pension plans do not exist. Japan's corporate pension plans are barred by law from investing in venture capital. In the United States, in contrast, the Department of Labor in 1979 explicitly sanctioned pension fund investment in venture capital. As shown in Table 2, pension plans now provide over 40% of total investment in U.S. venture capital funds.

In our judgment, differences in pension fund size and regulation can explain only part of the cross-national differences in venture capital. Funded pension obligations, as in the United States, as opposed to unfunded pension obligations in Germany, dictate only who makes employee pension investments, not the investments themselves. A company with an unfunded pension plan, in effect, incurs an unsecured debt -- its promise to pay pensions when workers retire. The company can invest the funds thus made available in any way it chooses, including in venture capital. German firms could also voluntarily fund their pension obligations, as many American

firms did even before ERISA established minimum funding requirements in 1973. The pension plan could then invest in venture capital, if it so chose.

More generally, money is the ultimate fungible commodity, and venture capital commitments are less than 1% of total business investment even in the U.S. If there were attractive profits to be made from venture capital investing, it seems likely that funds would be available from other sources, even if not from pension plans.

6.3. Differences in labor market regulation

Germany and many other Western European countries impose substantial restrictions on layoffs, especially severance payment obligations. These rules impose costs on startup businesses and thus could discourage their formation. Variations in labor market restrictions correlate with observed national variations in venture capital. Germany has strong layoff protections and little venture capital. Japan has few formal restrictions on layoffs, but large firms' common practice of hiring only recent college graduates and promising them lifetime employment reduces labor market mobility. In contrast, the United States and Britain have more flexible labor markets and more active venture capital markets.

Labor market regulation and practices could well affect the vitality of venture capital, but seem unlikely to fully displace our explanation. Consider Germany as an example. Severance obligations build over time; they are much less burdensome for a startup firm that fails after a few years of operation than for a mature firm that closes a plant that has operated for decades. Moreover, unpaid severance obligations are of little significance if a firm goes bankrupt -- they merely expand the pool of unsecured claims on the firm's assets.

Moreover, labor market restrictions map imperfectly onto national patterns in venture capital activity. Canada has moderately strong labor market restrictions; Ireland and Israel have restrictions comparable to West Germany's. Yet these countries also have strong venture capital.

6.4. Cultural differences in entrepreneurship

A final explanation is cultural. Germans and Japanese could be less entrepreneurial and less willing to risk failure than Americans, leading to lesser demand for venture capital services. Cultural explanations for different patterns of economic activity are hard to evaluate. They can be partly tautological. In economically successful countries like Germany and Japan, culture and economic institutions are likely to evolve in mutually supportive ways. Because both are endogenously determined, observing that cultural institutions support existing economic patterns tells us nothing about causation.

However, there is some reason for skepticism about claims of large cultural differences in willingness to take risks. People in all countries found large numbers of businesses, most of which fail. The empirical regularity to be explained is *not* why the Germans and Japanese do not start risky new businesses, but why they do not start many *high-technology* businesses, with few tangible assets on which a bank can rely for partial return of its investment. The success of immigrant entrepreneurs in countries with strong venture capital (for example, Russian immigrants in Israel and Asian immigrants in the United States) suggests that entrepreneurs will emerge if the institutional infrastructure needed to support them is available. After all, Russia and India are also not known for their cultural support of entrepreneurship.

7. Implications for venture capital in bank-centered capital markets

Exploring the implications of the link between venture capital markets and stock markets is more complicated than the simple admonition that bank-centered capital markets should create a stock market. That straightforward approach has been tried before and failed. For example, France and Germany created special stock exchange segments for newer, smaller companies during the 1980s that, by the mid-1990s, had been closed or marginalized. Nonetheless, efforts are underway to try again to create stock markets that cater to small high-technology companies including the Alternative Investment Market of the London Stock Exchange; Euro NM, a consortium of the French 'Le Nouveau Marche', the German 'Neur Market', and the Belgian New Market; and EASDAQ, an exchange explicitly patterned after the U.S. NASDAQ and of which the

NASD is a part owner. This flurry of stock market creation, with the explicit goal of enhancing European venture capital, suggests that there may be value in exploring the normative implications of the stock market-venture capital market link.

In our view, it is not merely a stock market that is missing in bank-centered systems. The secondary institutions that have developed in bank-centered systems, including the banks' conservative approach to lending and investing, are less conducive to entrepreneurial activity than the secondary institutions of stock market-centered capital markets. Experienced venture capitalists who can assess the prospects of new ventures and provide the nonfinancial contributions that venture capitalists supply in the United States are absent, as are investment bankers experienced in taking early-stage companies public. Neither institution will develop quickly. A strong venture capital market thus reflects a path-dependent equilibrium among of a number of interdependent institutions.

For example, Germany today faces a chicken and egg problem: a venture capital market requires a stock market, but a stock market requires a supply of entrepreneurs and deals which, in turn, require a venture capital market. In addition, German entrepreneurs who care about future control of their company must trust venture capitalists to return control to them some years hence and must further trust that the stock market window will be open when they are ready to go public. The institutional design issue is how to simultaneously create both a set of mutually dependent institutions and the trust that these institutions will work as expected when called upon.

Our analysis suggests an approach to creating a vigorous venture capital market: avoid the need to create multiple new institutions by piggybacking on another country's institutions. Most obviously, in the increasingly global capital market, other countries could follow Israel's lead in relying on the United States stock market and its supporting infrastructure. For example, a German company that maintains accounting records in a fashion consistent with U.S. standards -- less of a burden when done from the beginning than if implemented by a conversion, as when Daimler-Benz listed its shares on the New York Stock Exchange -- confronts no regulatory barrier to listing on NASDAQ, the exchange most suitable to venture-capital-backed IPOs. With

NASDAQ comes its institutional infrastructure. For example, both Hambrecht & Quist and Robertson, Stephens & Co., leading investment bankers for venture-capital-backed IPOs in the United States, are opening European offices and holding conferences to introduce American venture capital funds to European entrepreneurs. Silicon Valley law firms are also actively recruiting European IPO candidates.

This institutional infrastructure, can shorten the shadow of the past and, over time, induce the development of local institutions. For example, in the near term, foreign venture capitalists will likely find it profitable to hire and train locals to help them find investment opportunities. In the medium term, some of these people, once trained, can form their own firms and compete with their former employers.

8. Conclusion

In this paper. we have examined one path-dependent consequence of the difference between stock market-centered and bank-centered capital markets: the link between an active stock market and a strong venture capital market. We have shown that economies of scope among financial and nonfinancial contributions by venture capital providers, plus venture capital investors' need for a quantitative measure of venture capital funds' skill, can explain the importance of an exit strategy. Moreover, the potential for exit through an IPO allows the venture capitalist and the entrepreneur to contract implicitly over control, in a manner that is not easily duplicable in a bank-centered capital market. Finally, we have suggested that the best strategy for overcoming path dependent barriers to a venture capital market in bank-centered systems is to piggyback on the institutional infrastructure of stock-market-centered systems.

Figure 1
Venture Capital-backed IPOs and New Venture
Capital Commitments

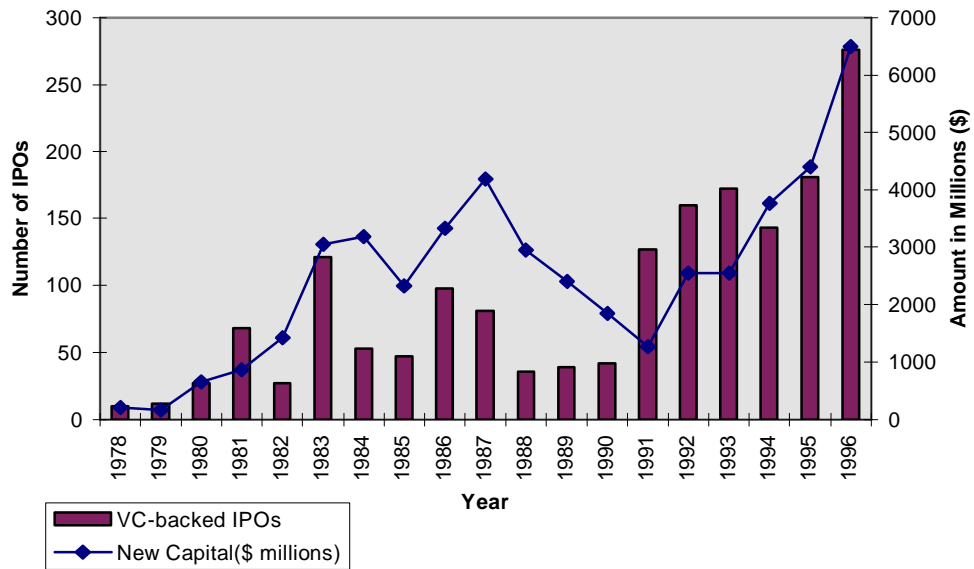


Figure 2
Implicit and Explicit Contracts
Between Venture Capitalists and Outside Investors

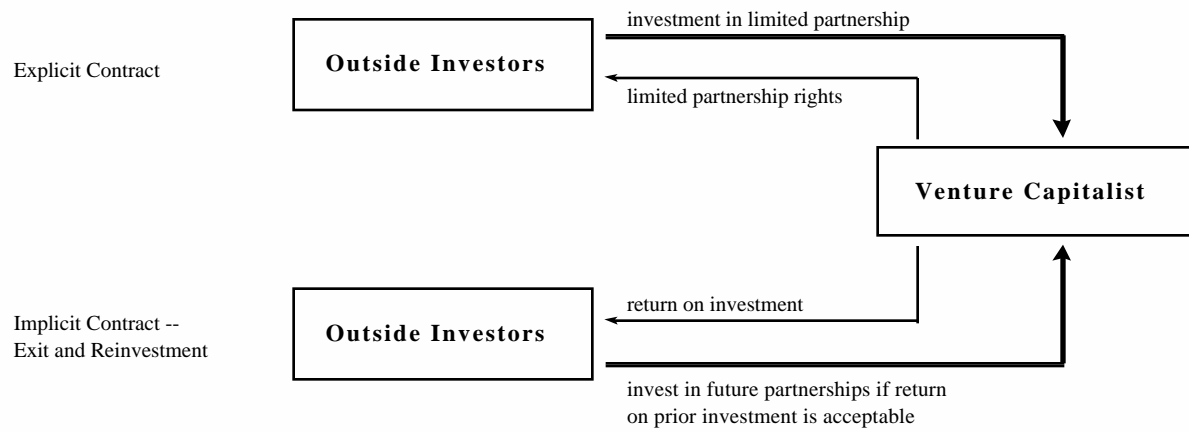


Figure 3
Implicit and Explicit Contracts
Between Venture Capitalist and Entrepreneur

