Evidence on the Venture Capitalist Investment Process:

Contracting, Screening, and Monitoring

by

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I. Introduction

There is a large academic literature on the principal-agent problem in financial contracting.[1] This literature focuses on the conflicts of interest between an agent – an entrepreneur with a venture that needs financing – and a principal – an investor with the funds to finance the venture. Theory has identified a number of ways that the investor / principal can mitigate these conflicts. First, the investor can engage in information collection before deciding whether to invest, in order to screen out ex ante unprofitable projects and bad entrepreneurs. Second, the investor can structure financial contracts, i.e. the allocation of cash flow and control rights, between the entrepreneur and investor to provide incentives for the entrepreneur to behave appropriately. And third, the investor can engage in information collection and monitoring once the project is under way.

Despite the large volume of theory, empirical work has lagged behind in comparing the contracts and actions of real world principals to their counterparts in financial contracting theory. In this paper, we describe recent empirical work and its relation to theory for one prominent class of such principals – venture capitalists (VCs). In our view, VCs are real world entities that closely approximate the investors of theory. VCs invest in entrepreneurs who need financing to fund a promising project or company. VCs have strong incentives to maximize value, but, at the same time, receive few or no private benefits of control. Although they are intermediaries, VCs typically receive at least 20% of the profits on their portfolios.[2]

In addition to being interesting from a theoretical perspective, VC actions and contracts of are interesting from a practical perspective. VCs have been extremely prominent (despite the

[1] For a recent summary, see Hart (2001).
[2] See Hart (2001) and Gompers and Lerner (1999).

"tech crash") in the last several years: (1) they have been associated with a number of the prominent corporate successes like Cisco, eBay, and Yahoo; (2) they have generated substantial returns and wealth for their investors; (3) the amount of venture capital raised and invested has increased markedly in the last ten years, particularly in the United States and Europe;[3] and (4) policy-makers have tried to encourage more investment in start-ups and innovation.

In this paper, we describe recent empirical work – both ours and that of others – on the three things that VCs do – contracting, screening, and monitoring. Unlike previous empirical work that has relied largely on surveys, our work (and much of the work we describe) relies on detailed information collected from actual VC financings. We describe our data in section II. We then present a description of our work on contracting in section III. In sections IV and V, we discuss recent work on screening and monitoring. We proceed in this order because the screening and monitoring discussions assume an understanding of contracting.

II. Data

The data we use in our papers are taken from 213 VC investments in 119 portfolio companies by 14 VC firms. Each VC firm provided the contractual agreements governing each financing round. The VC firm also provided (if available) the company's business plan, internal analyses evaluating the investment, and information on subsequent performance.

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[3] For example, see Botazzi and Da Rin (2001) and Christofidis and Debande (2001).

III. Contracting

In Kaplan and Strömberg (forthcoming), we compare the characteristics of real world financial contracts to their counterparts in financial contracting theory.[4] We do so by conducting a detailed study of the 213 actual contracts between VCs and entrepreneurs.

We obtain the following findings:

First, a key feature of VC financings is that they allow VCs to separately allocate cash flow rights, voting rights, board rights, liquidation rights, and other control rights. We explicitly measure and report the allocation of these rights. Table 1 summarizes several of our results for cash flow rights and control rights. The separation is apparent, for example, in that VCs control roughly 50% of the cash flow rights on average, but have a majority of board seats in only 25% of the investments.

Second, while convertible securities are used most frequently, VCs also implement the same set of rights using combinations of multiple classes of common stock and straight preferred stock. We also point out that VCs use a variant of convertible preferred called participating preferred in roughly 40% of the financings. Participating preferred, under most circumstances, behaves like a position of straight preferred stock and common stock rather than like a position of convertible preferred. Hence, the VC claim corresponds in most cases to a holding of (zero-coupon) debt and voting equity.

For example, assume a VC pays $10 million for a convertible preferred that converts into one million shares. Assume, also, there are one million other shares outstanding. Now, assume the company is sold for $30 million. If the preferred does not have participation rights, the VC will convert its preferred into one million shares; each share will be worth $15 – $30 million

[4] For earlier, related work, see Sahlman (1990), Gompers (1998), and Black and Gilson (1998).

divided by 2 million total shares; and the VC will end up with $15 million. If the preferred has participation rights, the VC gets the first $10 million; each common share will be worth $10 as the remaining $20 million is shared among the two million shares; and the VC ends up with $20 million – $10 million from the preferred and $10 million from the common. This is the same payoff the VC would receive if it owned straight preferred and common.

Third, cash flow rights, voting rights, control rights, and future financings are frequently contingent on observable measures of financial and non-financial performance. As is evident in table 1, these state contingencies are more common in the early stages of the VC-entrepreneur relationships (first VC rounds) and in earlier stage investments.

Fourth, voting rights, board rights and liquidation rights are allocated such that if the company performs poorly, the VCs obtain full control. As company performance improves, the entrepreneur retains / obtains more control rights. If the company performs very well, the VCs retain their cash flow rights, but relinquish most of their control and liquidation rights. Ex ante, the investors are likely to be in control in more states of the world for early stage ventures that have not yet started to generate revenues, while previously successful entrepreneurs get to retain more control in their new ventures.

Fifth, we find that it is typical for VCs to include non-compete and vesting provisions that make it more expensive for the entrepreneur to leave the firm, thus mitigating the potential hold-up problem between the entrepreneur and the investor. Vesting provisions are more common in early stage financings where it is more likely that the hold-up problem is more severe.

Finally, we find that cash flow incentives, control rights, and contingencies implemented in these contracts are used more as complements than as substitutes. Ventures in which the VCs

have voting and board majority are also more likely to have the entrepreneur's equity claim as well as the release of committed funds being contingent on performance milestones.

Our results have the following implications:

First, cash flow rights matter in a way that is consistent with the principal-agent theories of Holmström (1979), Harris and Raviv (1979), Lazear (1986), and others. VCs change the entrepreneur's equity compensation function, making it more sensitive to performance when incentive and asymmetric information problems are more severe.

Second, the allocation of control rights between the VC and the entrepreneur is a central feature of the financial contracts. This strongly suggests that despite the prevalence of contingent contracting, contracts are inherently incomplete. This finding gives support to the incomplete contracting approach pioneered by Grossman and Hart (1986) and Hart and Moore (1990 and 1998).

Third, cash flow rights and control rights can be separated and made contingent on observable and verifiable measures of performance. This is most supportive of theories that predict shifts of control to investors in different states, such as Aghion and Bolton (1992) and Dewatripont and Tirole (1994).

Fourth, the widespread use of non-compete and vesting provisions indicates that VCs care about the hold-up problem explored in Hart and Moore (1994).

Finally, we think our results suggest fruitful avenues for future theoretical research

IV. Screening

Before making an investment and designing the financial contracts, VCs spend a significant amount of time and effort evaluating and screening the investment opportunity. Kaplan and Strömberg (2002) focus empirically on this information collection and evaluation.

To help the VC partnership evaluate an investment in a company, it is common for the individual VC who is sponsoring the investment to prepare a detailed investment analysis or memorandum for the other partners. We analyze the investment memoranda from eleven VC partnerships for investments in 67 portfolio companies. We complement our analysis with information from the company business plans, as well as data on the financial contracts from Kaplan and Strömberg (forthcoming).

First, we describe the VC analyses. These analyses include a set of investment theses or rationales for making the investment and a discussion of the concomitant risks. Consistent with academic and practitioner accounts, VCs explicitly consider the attractiveness of the opportunity – the market size, the strategy, the technology, customer adoption, and competition – the management team, and the deal terms. VCs also explicitly delineate the risks involved in the investments. The risks typically relate to the same characteristics that the VCs evaluate for attractiveness.

Table 2 summarizes the investment theses or rationales and the investment risks. Two observations are worth making about the table. First, many of the same considerations appear as both rationales / positive and as risks / negatives indicating that there is a great deal of variation in the VC analyses. Second, management risk is one of the most common sources of uncertainty that the VC identifies. It is present in more that 60% of the sample investments. This sometimes

reflects a concern with the founder's incentives, e.g. that the founder seems to show a lack of focus or have a difficult personality. More often, however, the concern is less about undesirable characteristics of the founders and more about the management team being incomplete in some sense. It is very common that a VC identifies a need to complete the management team with experienced executives.

We then consider how the assessments in the VCs' analyses interact with the design of the financial contracts. We focus on the risks or uncertainties identified by the VCs in each transaction, dividing them into risks that are: (1) associated with external uncertainty – the relevant information is external to the firm and, we argue it is more likely that the VC and the entrepreneur are equally informed; (2) associated with internal uncertainty – the relevant information is internal to the firm and, we argue it is more likely that the VC is less informed than the entrepreneur; and (3) associated with complexity. Greater external and internal risks are associated with more VC ownership, more VC control, and more contingent compensation. Greater internal risk is also associated with more contingent financing. Greater complexity is associated with less contingent compensation.

Finally, we examine the relation between the ultimate investment outcome / performance and the VC's initial analysis of the company. On the margin, one might expect there to be no relation because the contracts (and valuations) would adjust to differences in quality and risk. However, if VCs have some monopoly power, if some investments are infra-marginal, or if VCs, too, are learning, a relation could exist. We find evidence suggesting that the VC's initial appraisal of the management team is related to subsequent performance. Portfolio companies with strong management teams are more likely to go public.

These results confirm that VCs expend a great deal of time and effort in evaluating and screening transactions. This is consistent with anecdotal accounts that the scarcest commodity a VC has is time not capital.[5] This suggests that theoretical models can benefit by including investor costs of evaluating potential investments[6] and by assuming that investors are particularly well-informed.[7]

V. Monitoring

Finally, several recent papers focus on post-investment information collection, monitoring, and other actions by the VC. Anecdotal accounts stress an important role for VCs in monitoring management, finding management, and providing advice.[8]

Lerner (1995) finds that VCs are more likely to join or be added to the boards of private companies in periods when the chief executive officer (CEO) of the company changes. He interprets this as evidence of VC monitoring.

Hellman and Puri (2000) study a hand-collected sample of 173 start-up firms from California's Silicon Valley. They find that venture capital is associated with a significant reduction in the time to bring a product to market. They provide some evidence that this association holds after controlling for VC ability to select more successful company.

Hellman and Puri (2002) study another aspect of the same data set. They find that VC-financed firms are more likely and faster to professionalize by adopting stock option plans and hire a vice president of sales. They also find VC-financed firms are more likely and faster to bring in CEOs from outside the firm.

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[5] For example, see Gladstone (1988) or Quindlen (2000).
[6] See Casamatta (2000), Dessein (2001), and Inderst and Muller (2002).
[7] See Garmaise (1999).
[8] For example, see Gorman and Sahlman (1989) or Quindlen (2000).

Hsu (2002) studies start-ups that receive multiple financing offers from VCs. He finds that the acceptance of an offer is not related to the valuation placed on the company by the VCs. He also finds some evidence that the valuations are negatively related to measures of VC prominence. This is consistent with entrepreneurs believing that the value-added by VCs is important.

The four studies described in the previous paragraphs find indirect evidence of post-financing VC actions. Kaplan and Strömberg (2002) complement these studies by presenting direct evidence on VC actions or monitoring. We rely on the investment analyses at the time of the initial investment that describe actions that the VC took before investing and that the VC expects to undertake conditional on investing. In addition, for a subset of the portfolio companies, we describe subsequent status reports on the investments. These reports summarize undertaken and anticipated monitoring actions.

Our primary finding is to confirm that VCs play a large role in shaping and recruiting the senior management team. In 16% of the investments, the VC plays a role in shaping the management team before investing; in 43%, the VC explicitly expects to play a role after investing. In more than half, therefore, the VC has played or expects to play such a role. Sometimes this involves replacing a founding manager, but more often it is an issue of strengthening and broadening the existing management team by hiring experienced executives. Moreover, in more than a third of the investments, the VC expects to be active in other areas, such as developing a business plan, assisting with acquisitions, facilitating strategic relationships with other companies, or designing employee compensation. Table 3 summarizes these findings.

Because the investment memoranda vary in the amount of detail they provide and because they only mention the monitoring actions that are expected *ex ante*, these numbers

almost certainly understate the VCs' monitoring and support activities. Still, there seem to be limits to the extent to which VCs are willing to monitor and support their portfolio companies. The risks of high monitoring costs or involvement costs are particularly interesting. In about 20% of the investments, the VC was worried that the investment might require too much time. In two cases, this involved the VC becoming chairman of the company. This indicates that while VCs regularly play a monitoring and advisory role, they do not intend to become too involved in the company.

Overall, these studies corroborate the anecdotal evidence that VCs exert effort in monitoring and aiding the companies in which they invest. In addition to actions traditionally associated with investor monitoring, such as replacing management after poor performance, there is substantial evidence of VCs assisting the founders in running and professionalizing the business, what Hellman & Puri (2002) term the supporting role of venture capital. From a theoretical perspective, these studies suggest that certain types of investors (such as VCs) should be modeled as exerting costly effort to improve outcomes.[9]

VI. Implications and Conclusion

The empirical studies of venture capitalists indicate that venture capitalists attempt to mitigate principal-agent conflicts in the three ways suggested by theory – through sophisticated contracting, pre-investment screening, and post-investment monitoring and advising. The evidence also suggests that contracting, screening, and monitoring are closely interrelated. In the screening process, the VCs identify areas where they can add value through monitoring and support. In the contracting stage, the VCs allocate rights in order to facilitate monitoring and

[9] See Repullo and Suarez (1999), Casamatta (2000,) and Inderst and Muller (2002) for theoretical treatments along these lines.

minimize the impact of the identified risk factors, e.g. by allocating more control to investors when management is weak, or make founder cash flow rights and release of funds contingent on management actions. Also, the allocations of equity to VCs provide incentives to engage in costly support activities that increase the upside value of the venture, rather than just minimizing potential losses. There is room for future empirical research to study these activities in greater detail both for VCs and for other intermediaries such as banks.

The empirical studies also suggest two avenues for additional theoretical research. First, such research can better illuminate the rationales behind the actual contracts that are written. Understanding the interaction and complementarity between different types of cash flow, control and liquidation rights seems particularly relevant. Dewatripont and Tirole (1994) and Hart (2001) are important first steps. Second, such research should take into account the fact that VCs exert costly effort both in pre-investment screening and post-investment monitoring / advising, and that these activities affect the design of the financial contracts.

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Table 1
Venture Capitalist Cash-Flow and Control Rights (Kaplan and Strömberg, forthcoming)

Post-round allocations of rights for 213 investments in 119 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. VC allocations are aggregated over all claims from VCs present in a particular round. Best case occurs if management meets all performance and vesting milestones or contingencies. Worst case occurs if management does not meet performance milestones and stock and options do not vest. Asterisks indicate significant differences compared to the total sample using a Mann-Whitney test at: 1% ***; 5% **, and 10% * levels.

Mean
(Median)

	Total sample (N = 213)			First VC rounds only (N=98)			Pre-revenue rounds only (N=79)		
A. Cash-flow rights	Best case	Worst case	Difference	Best case	Worst case	Difference	Best case	Worst case	Difference
% VC equity	46.7 (47.3)	55.5 (57.5)	-8.8 (-4.2)	40.4 *** (41.0)	53.0 * (50.5)	-12.6 *** (-8.0)	51.3*** (50.0)	65.0*** (66.6)	-13.7*** (-8.9)
B. Control rights	Best case	Worst case	Control Switch % of cases	Best case	Worst case	Control Switch % of cases	Best case	Worst case	Control Switch % of cases
VC has majority of votes, % of cases	52.8	68.9	17.8	40.8***	61.2***	24.5**	60.8*	83.5***	22.7
VC has majority of board seats, % of cases	25.4	35.8	10.4	11.6***	27.4**	15.8**	28.2	37.2	9.0
Automatic conversion price / round price	3.6 (3.0)	-	-	4.4*** (3.0)	-	-	4.3*** (3.2)	-	-

Table 2
Ranking of Rationales and Risks in Venture Capitalist Analyses (from Kaplan and Strömberg 2002)

Explicitly mentioned rationales for investing and investment risks according to venture capitalist analyses for investments in 67 portfolio companies by 11 venture capital partnerships. Investments were made between 1987 and 1999.

Top 10 Investment Rationales	*% of cases mentioned*	Top 10 Investment Risks	*% of cases mentioned*
1. Large market size and growth	68.7	1. Weak / incomplete management	61.2
2. Strong management team	59.7	2. Risky business strategy / model	50.7
3. Attractive business strategy / model	53.7	3. Risky competitive position	40.3
4. Attractive product / technology	40.3	4. Product / technology risk	31.3
5. Favorable competitive position	32.8	5. Uncertain market size / growth	31.3
6. Customer adoption likely	29.9	6. Uncertain customer adoption	22.4
7. Favorable performance to date	26.9	7. High valuation	19.4
8. Low valuation	20.9	8. Costly to monitor investment	14.9
9. Limited downside / funds at risk	19.4	9. Large downside / funds at risk	13.4
10. Good fit in VC portfolio	17.9	10. Unfavorable performance to date	7.3

Table 3
Venture Capitalist Monitoring and Support (Kaplan and Strömberg 2002)

Venture capitalist (VC) actions before investment and anticipated at the time of investment for for investments in 67 portfolio companies by 11 venture capital partnerships. Investments were made between 1987 and 1999.

	Number (%) of companies	
Management		
VC active in recruiting or changing management team before investing	11	(16%)
VC expects to be active in recruiting or changing management team after investing	29	(43%)
Any of the above	34	(51%)
Strategy / Business Model		
VC explicitly active in shaping strategy / business model before investing	6	(9%)
VC explicitly expects to be active in shaping strategy / business model after investing	20	(30%)
Any of the above	23	(34%)

Examples:

Design employee compensation
Arrange vendor financing agreements
Install information and internal accounting systems
Have company exit non-core businesses
Implement currency hedging program.
Hire market research firm to help with new store locations
Assist with development of marketing plan
Assist with mergers and acquisitions
Develop business plan, budget, financial forecasts
Monitor R&D and product management efforts
Refine pricing model and work on major account strategy
Assist technical service team
Leverage VC strategic relationships