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FINANCIAL CONTRACTING THEORY MEETS THE REAL WORLD: AN EMPIRICAL ANALYSIS OF VENTURE CAPITAL CONTRACTS

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ABSTRACT

In this paper, we compare the characteristics of real world financial contracts to their counterparts in financial contracting theory. We do so by conducting a detailed study of actual contracts between venture capitalists (VCs) and entrepreneurs. We consider VCs to be the real world entities who most closely approximate the investors of theory. (1) The distinguishing characteristic 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. (2) While convertible securities are used most frequently, VCs also implement a similar allocation of rights using combinations of multiple classes of common stock and straight preferred stock. (3) Cash flow rights, voting rights, control rights, and future financings are frequently contingent on observable measures of financial and non-financial performance. (4) 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. The entrepreneur's cashflow rights also increase with firm performance. (5) It is common for VCs to include non-compete and vesting provisions aimed at mitigating the potential hold-up problem between the entrepreneur and the investor. We interpret our results in relation to existing financial contracting theories. The contracts we observe are most consistent with the theoretical work of Aghion and Bolton (1992) and Dewatripont and Tirole (1994). They also are consistent with screening theories.

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1. Introduction.

There is a large academic literature in financial contracting theory. The papers in this literature often begin with a situation in which an investor negotiates with an entrepreneur over the financing of a project or company. These theoretical papers typically make a number of different assumptions concerning the nature of these negotiations. These assumptions concern observability of actions, contractibility of actions, the ability to renegotiate, and the nature of information and uncertainty. Given the assumptions and the models, the papers then generate predictions. For example, a key assumption in Hart and Moore (1998) is that firm output is observable by outsiders, but not verifiable. As a result, it is not possible to write contracts on output.

Despite the large volume of theory, relatively little empirical work exists that compares the characteristics of real world financial contracts to their counterparts in financial contracting theory. In this paper, we attempt to inform theory by conducting a detailed study of actual contracts between venture capitalists and entrepreneurs. Venture capitalists (VCs) are real world entities who most closely approximate the investors of theory. VCs have strong incentives to maximize value, but, at the same time, receive few or no private benefits of control. In describing these contracts, we consider the appropriateness of different assumptions and predictions in financial contracting theory.

In this paper, we study detailed information on 200 venture capital investments in 118 portfolio companies by fourteen venture capital firms.[1] For each portfolio company investment, the VC firm provided the contractual agreements governing each financing round in which the

[1] We use the terms venture capital firm and venture capital partnership interchangeably.

firm participated. The VC firm also provided (if available) the company's business plan, internal analyses evaluating the investment, and information on subsequent performance.

We describe the contracts between the portfolio companies / entrepreneurs and the VCs in great detail. We then consider how well these contracts are described by the assumptions and predictions embodied in five different types of financial contracting theories. The theories interpret financial contracts as the solution to conflicts of interest or agency problems between investors and the entrepreneur.[2] A conflict exists because the entrepreneur must transfer a portion of the profits generated by the project back to external investors in return for their financing. The entrepreneur will not take the optimal action because he does not get all the monetary benefits from taking that action, while alternative actions give other benefits to the entrepreneur. The different financial contracting theories assume different types of conflicts of interest in choice of actions. These include: (1) not exerting the optimal amount of costly effort; (2) taking actions that yield private benefits rather than monetary benefits; (3) spending resources on perks or stealing; (4) holding up investors by threatening to leave the project.

The traditional principal-agency approach, pioneered by Holmstrom (1979), assumes that the agent's effort is unobservable to the principal. The optimal incentive contract ensures that the agent puts in enough effort by making the agent's compensation dependent on the outcome of the signals. In the context of a financing problem, the signal is typically output or profits. Harris and Raviv (1979) show that with a risk-neutral principal and agent, and no wealth constraints, the optimal financing contract is to give a fixed payment to the investor and make the manager the residual claimant. These theories stress the importance of providing monetary incentives or *cash flow rights* to the entrepreneur. Ownership is relevant only as it affects pure cash-flow rights.

The control theories change the assumptions in the traditional principal-agent models by assuming that actions are indeed observable, but not verifiable. Output and monetary benefits are contractible. As a result, *control rights* that determine who chooses which action to take will be important. The control theories build on the incomplete contracting literature, pioneered by Grossman and Hart (1986). Two important papers that take this approach to security design are Aghion and Bolton (1992) and Dewatripont and Tirole (1994).

In Aghion and Bolton (1992), the project yields both monetary benefits, i.e. profits, that are verifiable and can be transferred to outside investors, and private benefits or actions that are non-verifiable and only go to the entrepreneur. The magnitude of these benefits, in turn, depends on what (non-verifiable) action that is taken with respect to the project. This introduces a conflict of interest. Aghion and Bolton show that it is optimal to give the investor control in the worst states of the world where profits are likely to be low. Aghion and Bolton (1992) point out that a debt contract that transfers control to investors in default states has this feature.

Dewatripont and Tirole (1994) build on Aghion and Bolton (1992) by focusing on the optimal correlation between control rights and cash flow rights. They show that the party in control should look more and more like a debtholder (because debtholders prefer less risk) when things get worse, while more control should be transferred to the entrepreneur or to an equityholder (because equityholders prefer more risk) as performance improves.

A different set of control theories that we call "stealing theories" make the assumption that which cash flows are either not observable or not verifiable. These papers include Hart and Moore (1998), Gale and Hellwig (1982), Bolton and Scharfstein (1990), and Fluck (1998). The optimal financial claim in these models is a debt-like claim in which (1) the entrepreneur promises a fixed payment to the investor; and (2) the investor takes control of the project and

[2] Extensive theoretical overviews can be found in Allen and Winton (1995) and in Harris and Raviv (1992).

liquidates the assets if the payment is not made. *Liquidation rights*, therefore, are crucial in these models.

A fourth set of theories, beginning with Hart and Moore (1994), relax the stealing assumption and develop a model that has an intuition similar to those of the stealing theories. Hart and Moore (1994) focus on the inalienability of human capital. They assume that (1) the firm's value with the entrepreneur exceeds its liquidation value and (2) the entrepreneur / manager cannot commit not to leave firm. Because the firm is worth less without him, the entrepreneur can threaten to leave the firm unless any promised payment is negotiated down closer to the liquidation value. The optimal contract calls for a debt security, where control is transferred to the investor if the promised payment is not fulfilled, in which case the firm is liquidated. The size of the promised debt payment is limited by the liquidation value of the assets and by the relative bargaining power of the investor.

Whereas the models described above analyze general financial contracts, a number of other papers focus specifically on venture capital contracts. These include Admati and Pfliederer (1994), Berglof (1994), Cornelli and Yosha (1998), Garmaise (1998), Hellman (1998), and Repullo and Suarez (1999). Most of these theories try to explain the use of convertible securities in venture capital financings (based on the results in Sahlman (1990)).

The models described above are largely agency / moral hazard models. Lazear (1986) shows that in a traditional principal-agent framework, contracts also can be used as a screening device if the ability of the entrepreneur / manager is uncertain. By setting the agent's compensation as increasing function of performance, the venture capitalist discourages less able agents from accepting the contract.

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**. We believe our measurements are more comprehensive and substantially more detailed than those in any previous work.

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 note that VCs use a variant of convertible preferred called participating preferred in roughly 40% of the financings. Participating preferred, under most circumstances, behaves more like a position of straight preferred stock and common stock than a position of convertible preferred.

Third, cash flow rights, voting rights, control rights, and future financings are frequently contingent on observable measures of financial and non-financial performance. These state contingencies are more common in first VC financings and early stage financings.

Fourth, these 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.

Fifth, we find that it is common for VCs to include non-compete and vesting provisions aimed at 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.

Our results have the following implications:

First, cash flow rights matter in a way that is consistent with the principal-agent models.

Second, control rights matter, strongly suggesting that contracts are incomplete.

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 bad states – Aghion and Bolton (1992) and Dewatripont and Tirole (1994).

Finally, we think our results suggest fruitful avenues for future theoretical research. In particular, our results indicate that the allocations of cash flow, control and liquidation rights shift gradually with performance and are interrelated. In many theoretical models, these rights are all-or-nothing and are not interrelated.

In comparing financial contracting theories to real world contracts, we believe this paper breaks new ground. In describing venture capital contracts, our paper extends previous work by Sahlman (1990), Gompers (1998), and Black and Gilson (1998).

Sahlman (1990) describes the basic deal structures used in venture capital investments and the economic rationales for them. His is the first detailed discussion of these issues that we are aware of. We extend Sahlman (1990) in several ways. First, Sahlman bases his analysis on forty stock-purchase agreements from a broad range of VCs. His analysis, however, is almost entirely qualitative. He does not present any systematic description and analysis of those agreements. Second, Sahlman focuses on the typical set of terms and does not report or analyze the broad range of terms and contingencies. This is particularly important for considering the

appropriateness of the assumptions and predictions of the theories that distinguish between cash flow rights, control rights, and liquidation rights.[3]

The data and approach in this paper are perhaps most closely related to those in Gompers (1998). His paper is similar to ours in that he describes aspects of venture capital contracts. He also concludes that the covenants in the contracts allocate control rights independently of cash flow rights. Our paper differs, however, in a number of respects. First, Gompers' had access to only a subset of the contracts and information that we have analyzed. He does not analyze data on ownership (cash flow rights), voting rights, liquidation rights, or descriptions of the underlying businesses (from the business plans). Second, Gompers selected his sample to consist entirely of investments in convertible preferred stock, therefore, eliminating some of the important variation that we find.

Black and Gilson (1998) consider explanations for the greater vitality of the venture capital market in stock market- versus bank-centered capital markets. In so doing, they describe different aspects of venture capital contracts. They make the argument, which we confirm as important, that automatic conversion provisions provide important non-monetary incentives to entrepreneurs because they transfer control from the VC to the entrepreneur if the entrepreneur performs well. Like Sahlman (1990), however, they do not present any systematic evidence on the contracts themselves.

The paper proceeds as follows. Section 2 describes our sample. Section 3 describes the venture capital contracts. Section 4 describes the assumptions and predictions of a number of prominent financial contracting theories and discusses our results in relation to them. Section 5

[3] Because much of the new financial contracting theory had yet to be written, it is not surprising that Sahlman (1990) did not address these issues.

presents some cross-sectional results that further describe the contracts and attempt to distinguish among theories. Section 6 summarizes and discusses our results.

2. Sample

We analyze 200 VC investments in 118 portfolio companies by fourteen venture capital partnerships.

2.1 Description

To obtain this sample, we asked each VC to provide detailed information on as many of their portfolio company investments as they were willing to provide. For each of these companies, we asked the VC to provide the term sheet as well as the stock purchase and security purchase agreements for each financing round in which they participated. These documents typically include the financing terms, the firm's equity ownership – investors, founders, management, etc. – and any contingencies to future financing. We also asked the VC to provide (if available) the portfolio company's business plan at the time of the financing, the VC's internal analysis of the investment, and the subsequent portfolio company financial performance. Finally, we also requested that the VC provide the private placement memoranda / offering documents for the funds that they have managed over the sample period.

Table 1 presents summary information for our sample. As mentioned above, panel A indicates that we have 200 investments in 118 portfolio companies by fourteen VC firms. Seventy-three of these investments are pre-revenue (which we will refer to as early stage) rounds. I.e., the firms receiving financing either did not have revenues or were not yet operating. The remaining investments are later stage rounds in which the firms had revenues and were

already operating. We have contractual documents for all 200 investments; some internal VC description of the investment for ninety-three investments; and business plans for ninety-three investments. As a result, we do not have complete information for all 200 investments. The sample sizes in our results will vary according to the availability of the relevant information.

Panel B shows that 159 of the financing rounds were completed between 1996 and 1999. We view the young age of the sample as positive for two reasons. First, our findings will reflect current practice in venture capital financing. Second, it is unlikely that the VCs selected many of these the companies based on the final outcome because the final outcome of most of the investments was unresolved when the VCs provided the companies to us.

Panel C shows that the portfolio companies were provided by fourteen venture capital firms with no more than twenty-two companies from any one VC.

Panel D indicates the amounts of the sample financings. The VCs committed a median of $4.8 million in equity in each financing round. (This amount is the total for all VCs investing in the round.) The VCs actually disbursed a median $3.8 million at the time the round closed.

Panel E presents the geographical distribution of the portfolio companies in our sample. The distribution is fairly uniform across California (29%), the Midwest (20%), the Northeast (26%), and elsewhere. Relative to the venture capital industry as a whole, this represents a slight undersampling of California firms and an oversampling of Midwest firms. According to Venture Economics[4], 41% of overall VC investments were in California firms and only 14% in Midwest firms.

Panel F presents the industry distribution of the portfolio companies in our sample. Consistent with the venture capital industry, the greatest percentage of companies, 36%, are in

[4] Venture Economics maintains an extensive database on venture capital investments in portfolio companies. These figures are for the period between 1996 and 1999.

the information technology and software industries. An additional 13% are in telecommunications. Both of these industries include a number of internet related investments. This concentration is roughly consistent with the industry distributions reported in Venture Economics.

Before we present our results, it is worth pointing out that while we have a great deal of data, we do not have complete data on every financing round. As a result, the number of observations will vary from analysis to analysis.

2.2 Sample selection issues

In this section, we discuss potential selection issues concerning our sample. Our sample of portfolio companies and financings is not a random sample in that we obtained the data from fourteen venture capital firms with whom we have a relationship.

We do not believe that this selection is of much concern to our results because we are not attempting to measure performance. Rather, we are attempting to characterize what contracts look like in general and, perhaps more importantly, what contracts are possible.

It is worth emphasizing that the contracts represent financings by more than the fourteen VC firms that provided data. The 118 companies in our current sample received VC financing from over 90 additional VC firms either in the financing round in our sample or in other financing rounds. A total of over 100 different VC firms, therefore, invested under the terms of the contracts in our sample. This suggests that the financings in our sample are likely to be representative of VC contracts in general.

The more likely bias in our sample is that we have selected VC firms that are better than average and that the contracts in our sample may be above average in some sense. If this is so,

we believe this strengthens our results because we are more likely to have identified sophisticated, value maximizing principals.

3. Results

In this section, we describe the contracts between the portfolio companies / entrepreneurs and the VCs in great detail. We first describe the securities issued. We then describe how these contracts allocate cash-flow rights, voting rights, board rights, and liquidation rights. Last, we consider in more detail the contingencies involved in allocating those rights.

In the analysis, we distinguish between early stage financings and later stage financings. We consider a financing to be early stage if the company is pre-revenue – does not have any revenue – at the time of the financing. Later stage or post-revenue rounds are financing rounds that are completed when the company has revenue. This distinction is an interesting one because uncertainty about viability, inalienability, and verifiability of the company should be greater in early stage than in later stage rounds. This will be important in distinguishing among financial contracting theories. In our sample, 77 of the 194 rounds we can classify are pre-revenue.

We also distinguish whether a round is the first one in which the company utilizes VC funding. This distinction is an interesting one because asymmetric information between the VC and the founders should be greater in the first VC round than in subsequent rounds. Again, this will be important in distinguishing among financial contracting theories. In our sample, 88 of the 200 rounds represent the first round in which a venture capitalist invested.

3.1 Securities

Panel G of table 1 reports the types of securities used in the 200 financing rounds. Consistent with Sahlman (1990) and Gompers (1998), convertible preferred stock is the most commonly used security, appearing in 189 of 200 financing rounds. Panel G also indicates, however, that VC financings (1) do not always use convertible preferred stock; and (2) frequently include securities in addition to convertible preferred stock. Seven of the 200 financing rounds do not use any form of convertible security. Instead, they use multiple classes of common stock or a combination of straight preferred and common stock.

Panel G also reports that in 72 of the financings, the VCs use a variant of convertible preferred called participating preferred. Upon the liquidation or exit of a participating convertible preferred, investors receive both the principal amount of the preferred – as they would in an investment of straight preferred – and they receive common stock. As a result, participating convertible preferred is better categorized as a position of straight preferred stock and common stock. than as a position of convertible preferred.[5] In some instances, the participating preferred does not receive a return of principal if the company return is sufficiently high.

While the VC financings utilize different types of securities, the financings are similar in that they allow for different allocations of cash flow, voting, board, and liquidation rights. For example, in the financings that use multiple classes of common stock, the VCs receive a different class of common stock than the founders who receive two or more classes of common stock. The VC class of common stock has voting, board, and liquidation rights that are different from those of the founders' classes of common stock. The cash flow rights of the classes of common

[5] Gompers (1998) describes participation provisions and refers to them as superpriority provisions.

stock also differ in that the founders' stock classes vest under different conditions than the VC class (which vests immediately). Hence our focus is on the allocation of different rights rather than on the use of a particular security.

3.2 Cash flow rights

Table 2 presents our results on cash flow rights. By cash flow rights, we mean the fraction of a portfolio company's equity value that different investors and management have a claim to. Measuring cash flow rights is not trivial, however, because many of the cash flow rights accorded to founders and management are contingent either on subsequent performance (through performance vesting) or on remaining with the company (through time vesting).

Table 2, therefore, present three measures of cash flow rights. The first – minimum VC ownership – measures cash flow rights under the assumption that management meets all performance and time vesting milestones or contingencies. The second – maximum founders and employees vesting – measures cash flow rights under the assumption that all non-performance / time-vesting stock and options vest. The third – maximum VC ownership – measures cash flow rights if management does not meet any performance or time vesting milestones. Under each of the three measures, VC%, founders% and other% are, respectively, the percentage of cash flow rights owned by the venture capitalists, the founders, and others. Founders include the founding management team. Others include employees and previous non-VC investors.

The ownership numbers are imperfect because we do not always have complete information on the vesting terms for issued options. When we do not have such information, we

assume that the issued options are vested. This means that our results surely understate the true extent of state contingent cash flow rights.

Panel A indicates that the VC controls roughly half the cash flow rights on average; founders roughly 30%; and others, roughly 20%. These suggest that substantial equity ownership on the part of founders / managers is desirable. On the other hand, it also indicates that founders / managers give up a large fraction of ownership.

Table 2 also indicates that there are meaningful state-contingencies built into the cash flow rights. The VC stake is a median of 3.5% lower (average of 8.1%) lower under full vesting and good performance compared to the minimum vesting, bad performance state. For early-stage companies, the average and median are 11.9% and 6.1%, respectively. The state-contingency (i.e. the use of performance benchmarks and vesting) is significantly higher (at the 1% level) in earlier stage, pre-revenue financings compared to later stage, post-revenue ones. State-contingencies are also greater in first VC rounds compared to subsequent ones.

3.3 Voting rights

Table 3 reports post-round voting rights. Voting rights measure the percentage of votes that investors and management have to effect corporate decisions. Most decisions are based on majority rule. As such, voting rights provide one measure of control rights. Board rights, described in the next section, provide another.

In table 3, minimum (maximum) VC votes represents the minimum (maximum) votes the venture capitalists control based on subsequent management performance and stock vesting milestones or contingencies. % VC, % Founder, and % Neither control are, respectively, the percentage of instances in which voting control is held by the venture capitalists, the founders, or

neither. Switch in control indicates the percentage of instances in which voting control can switch based on subsequent performance.

Table 3 indicates that VCs have a voting majority in 56% of all financings in the minimum contingency case. Panel B shows that VCs control a majority of votes in 66% of the early stage financings (in the minimum contingency case) versus 49% for later stage financings. Panel C indicates that VCs control a majority of the votes in 44% of first VC rounds and 65% of subsequent VC rounds. In the maximum VC vote contingency cases, VCs control a voting majority in 71% of the financings with greater percentages in the early stage rounds.

Importantly, our results indicate that state-contingent control rights (i.e. not only in case of default on a debt payment) exist. In 17.5% of the financings, we see voting control switching depending on state-contingencies. This state-contingency result as well as those that follow are important in light of several of the financial contracting theories we describe in section 4. State-contingent voting control is more likely in early stage rounds and first VC rounds.

3.4 Board rights

Board rights and board seats also have an effect on the rights to control corporate decisions. While they tend to be related to voting rights, they need not be identical. We distinguish between normal board rights that reflect the board rights or composition at the completion of the financing from adverse state board rights that reflect board rights or composition if the portfolio company performs poorly or reaches an adverse state.

We distinguish between three kinds of board members – VCs, founders, and outsiders. VC seats are board seats that are reserved for or controlled by venture capitalists. Founder seats are board seats that are reserved for or controlled by the founders / entrepreneurs. Outsider seats

are board seats that are to be filled by individuals mutually agreed upon by the VCs and the founders / entrepreneurs.

Table 4 reports the board results. The boards have an average of 6.1 members and a median of 6 members. These boards are appreciably smaller than those of public companies.[6] Overall, the VC has the majority of the board seats in 26% of the cases, the founders in 12% of the cases, and neither in 62% of the cases. Interestingly, the VCs are less likely to have board control than they are to have voting control. VC board control is less common for early-stage financings compared to later stage. State-contingent board provisions (i.e. the VC gets full control of the board in the bad state) are present in 15% of the cases. This provides another important example of state-contingent control rights.

VC board control does not tend to differ much across early versus later stage rounds. VC board control does tend to increase, however, with subsequent VC rounds. This is not surprising given that new VCs often invest in each round and request a board seat as a condition of the investment.

3.5 Liquidation rights

Much of the theoretical security design literature stresses the importance of liquidation rights. In these models, an investor's ability to liquidate, or threaten to liquidate, the firm's assets if the firm defaults is the main way for an investor to ensure repayment. In this subsection and in table 5, we describe the liquidation rights in VC financings.

[6] For example, see Yermack (1998) or Gertner and Kaplan (1996).

First, it is clear that VCs have claims that in liquidation are senior to the common stock claims of the founders. This is true in all but one of the sample financings. In that financing, the VC firm bought common stock.

Second, the claims of the VCs in liquidation are typically at least as large as the original investments. Panel A of table 5 indicates that this is true in 98% of the financings.

Even though most of the financings give liquidation claims to the venture capitalists, there are some cross-sectional differences in how strong these are for different deals. One common way of making the liquidation rights stronger is by giving the investor cumulative preferred dividends. Even though these are dividends, and strictly speaking do not have to be paid out, they will accumulate and be added to the liquidation claim. Cumulative preferred dividends are present in 46% of our financings.

Optional redemption and put provisions also are commonly used to strengthen the liquidation rights of the venture capitalist's investment. These provisions give the venture capitalist the right after some period time to demand that the firm redeems the venture capitalists claim, typically at liquidation value (or occasionally, at the maximum of the liquidation value and "fair market value"). This is very similar to the right to repayment of principal at the maturity of a debt claim. Without this provision, the liquidation right loses much of its bite because there are no other contracted payments to the venture capitalist that the firm could default on. Panel C indicates that optional redemption or put provisions are present in 84% of our financings. The maturity of these provisions is typically five years.

3.6 Contingencies

As mentioned earlier, different theories make different assumptions concerning what it is and is not possible to write contracts on. For example, it is common among some financial contracting theorists – e.g., Hart and Moore (1998) – to assume that the entrepreneur and outside investors can observe firm output, but they cannot write contracts on that output because output cannot be verified in court.

In this section, we report the extent to which contracts between venture capitalists and entrepreneurs are written contingent on subsequent output, performance, or actions. We also detail the types of output that such contracts are written on.

Table 6 reports specific examples of contingencies in the VC financings in our sample. Panel A shows that 41 of the financing rounds (roughly 20%) include provisions that are contingent on subsequent financial performance. In one financing round, the VCs contractually obtain voting control from the entrepreneur if the firm's EBIT -- earnings before interest and taxes -- falls below a mutually agreed upon amount. In another financing round, VCs obtain board control if a firm's net worth falls below a threshold. Net worth, in this instance, is a measure of a company's cumulative cash flow. These examples indicate that VCs are able to write (and presumably enforce) contracts in which control rights are contingent on subsequent output **quite independently of cash flow rights**.

Panel B shows that 25 of the financing rounds (12.5%) include contingencies based on subsequent non-financial performance. In one instance, share vesting is contingent on product functionality or performance. In several others, vesting is contingent on FDA or patent approvals. The disbursal of committed funding also can be contingent on non-financial

performance. For example, one financing was contingent on successfully completing clinical tests.

Panel C reports that 28 of the financing rounds (14%) include contingencies based on certain actions being taken. For example, in different rounds, the disbursal of committed funding is contingent on hiring new executives, developing new facilities, and completing a new business plan. Presumably, these actions are both observable and verifiable.

Finally, panel D indicates that contingencies based on the sale of securities are included in almost ten percent of the financings. In particular, ownership and vesting are commonly linked to a subsequent initial public offering or sale of the company.

Overall, table 6 generates two strong results. First, investors (VCs) commonly write (and presumably enforce) contracts in which control rights are contingent on subsequent measures of financial and non-financial performance or output. Second, there is a great deal of variation in the contingencies in these contracts. The contingencies appear to be related to the performance measure that is most important to the investors and the company.

Table 7 quantifies the qualitative information on contingencies in table 6. Panel A indicates that contingencies based on subsequent financial or non-financial performance, actions, or sales of securities are used in 36.5 percent of the financings.

Table 7 also indicates that 15% of the sample financings themselves are partially contingent on the attainment of some milestone. In these financings, the VCs provide only a portion of the total funding commitment at the closing or signing of the financing. Additional funding is provided contingent on subsequent performance and actions. In two financings, the VC provided only 5% of its total commitment at closing with the rest being contingent. This was

more common in early stage than in later stage financings and more common in first VC rounds than in subsequent rounds.

3.7 Other terms

VC financings include a number of additional terms and conditions. Bartlett (1995) and Levin (1998) detail many of these. In this section, we describe several of the terms and conditions that we believe are relevant to the financial contracting theories.

3.7.1 Automatic conversion

It is common for securities in venture capital financings to include automatic conversion provisions. Under these provisions, the security held by the venture capitalists – convertible preferred stock, convertible debt, or a class of common stock – automatically converts into common stock under certain conditions. These conditions generally, although not exclusively, relate to an initial public offering (IPO) and require the IPO to exceed a designated common stock price, dollar amount of proceeds, and / or market capitalization for the company.

As Black and Gilson (1998) are the first to argue, the effect of these provisions is to require the venture capitalists to give up the superior control, voting, board, and liquidation rights associated with their securities if the portfolio company attains a desired level of performance.[7] Upon superior performance, the VCs retain only those rights associated with their ownership of common stock. If the company does not deliver that performance, the VCs retain their superior control rights. This provides the entrepreneur an incentive to increase the value of the firm over and above the monetary incentive.

[7] Gompers (1998) also discusses the automatic conversion provision.

Panel A of table 8 indicates that an automatic conversion provision was present in almost 94% of the financing rounds. Panel A also shows that the financings in rounds that included an automatic conversion provision required that the company complete an IPO at an IPO stock price a median 3.0 times greater than the stock price of the financing round. The ratio is significantly higher in early stage rounds – 4.0 times – than in later stage rounds – 2.7 times.

It is worth noting that at the median ratio of 3.0 times, the VCs are not willing to give up any control unless they triple their money. Over a four-year horizon, this works out to a return of 31% per year.

3.7.2 Antidilution protection

Venture capital financings also frequently include antidilution protection which protects the venture capitalist against future financing rounds at a lower valuation than the valuation of the current protected round. In the extreme case, known as full ratchet antidilution protection, the protected security obtains a claim to enough additional common shares to effectively reduce the price of the protected issue to that of the new issue. In a convertible issue, this is accomplished by decreasing the conversion price on the protected issue to the same conversion price or common stock price of the new issue. The other common type of antidilution protection is the weighted average ratchet. Under a weighted average ratchet, the reduction in the conversion price (or common stock price) of the protected issue is a function of the number of shares issued and the conversion price of the new issue.

Panel B of table 8 indicates that the financings in almost 95% of the rounds receive antidilution protection. Almost 76% of the financings utilize the weighted average method rather than the full ratchet method.

3.7.3 Vesting and non-compete clauses

The inalienability of human capital theories of Hart and Moore (1994) assume that the entrepreneur cannot contractually commit to stay with the firm. Even though it is not possible to write enforceable contracts that force the entrepreneur to stay with a firm, there are contractual provisions that make it more costly for the entrepreneur to leave. In real-world contracts, two methods are commonly used to make it costly for the entrepreneur to leave the firm.

First, the entrepreneur's shares can vest over time. This means that the company receives or can buy back any unvested shares for some low value if the entrepreneur leaves. The earlier the entrepreneur leaves, the more shares are still unvested. Second, the VCs can require the entrepreneur to sign a non-compete contract with the firm that prohibits him from working for another firm in the same industry for some period of time in case he leaves. Both of these provisions improve the bargaining power of the VCs if the entrepreneur tries to hold up the VC.

Table 8 shows that the VC financings in our sample commonly utilize both founder vesting and non-compete clauses. Founder vesting is used in almost 42% of financing rounds. Such vesting is significantly more frequently in early stage financings than in later stage ones with vesting present in almost 55% of pre-revenue financings, but in only 33% of post-revenue financings. Non-compete clauses are used in approximately 70% of the portfolio companies.

3.8 Evolution of Contracts over Time and Rounds

The analyses in the previous sections assume in some sense that each financing round is independent. This is, of course, not the case. Accordingly, in table 9, we report cash flow rights, voting rights, board rights, liquidation rights, and other terms as a function of the financing

round. We distinguish between first round financings in which future financing is contingent on performance (ex ante staging) and those that are not.

Table 9 indicates that founders' cash flow, voting, and board rights decline over financing rounds while VC rights increase.[8] The most notable pattern involves voting rights. Founders relinquish voting control by the second VC round in all but 11.5% of the financing rounds. Analogously, the VCs obtain explicit voting control in over 60% of the second VC rounds.

The increase in VC cash flow and control rights over financing rounds is consistent with the VC demanding more and more equity and control as compensation for providing additional funds to the venture. Interestingly, the allocation of cash-flow and voting rights in the ex-ante staging contracts are very similar to later stage rounds, although the allocations are more sensitive to performance.

3.9 Summary

We make several general observations concerning the descriptive results in this section..

First, VC financings allow VCs to separately allocate cash flow rights, voting rights, board rights, liquidation rights, and other control rights.

Second, while VCs use convertible securities most frequently, they also implement the same allocation of rights using combinations of multiple classes of common stock and straight preferred stock. Furthermore, participating convertible preferred is used frequently. This is significant because participating preferred is the equivalent of a position of preferred stock and common stock rather than a position of convertible preferred.

[8] We do not report liquidation rights because they remain roughly constant across rounds.

Third, we find that cash flow rights, voting rights, control rights, and future financings are frequently contingent on observable measures of financial and non-financial performance. These state contingent rights are more common in first VC and early stage financings.

Fourth, rights are allocated such that if the company performs poorly, the VCs obtain full control. As company performance improves, the entrepreneur retains / obtains more cash flow rights and control rights. If the company performs very well, the VCs relinquish most of their control and liquidation rights. This occurs when the VC's investment automatically converts into common stock.

Fifth, we find that it is common for VCs to include non-compete and vesting provisions aimed at mitigating the potential hold-up problem between the entrepreneur and the investor. The vesting provisions are more common in early stage financings where it is more likely that the hold-up problem is more severe.

Finally, there is a tendency for VCs to use greater state-contingencies in early stage financings and in first venture capital financings.

4. Relation of Results to Financial Contracting Theories

In this section, we interpret our results in relation to the financial contracting theories described in the introduction. We do so by examining the extent to which the contract provisions we have examined are consistent with the assumptions and predictions of the theories.

4.1 The "traditional" principal agent problem

The traditional principal-agent models assume that actions or efforts of the entrepreneur are unobservable. However, signals – i.e., firm performance – are correlated with those actions

or efforts. These signals can be contracted on. The division of cash-flow rights is designed to affect the pay-performance sensitivity of the entrepreneur. In general (in the absence of risk-aversion), the investor will want to maximize this pay-performance sensitivity, which can be achieved by giving the entrepreneur a substantial part of the firm's equity. Moreover, it is in the investor's interest to make the entrepreneur's compensation contingent on as many verifiable signals correlated with effort as possible. Also, the larger the incentive conflict between the investor and entrepreneur, the higher the pay-performance sensitivity should be.

Our results are clearly consistent with the theoretical assumptions in that cash flow rights are contingent on a number of performance-based results, both financial and non-financial. On the other hand, we do find that some actions or efforts are observable and are contracted on.

Our results also are consistent with some of the predictions. In all our financings, the entrepreneur gets a substantial fraction of equity in the firm. Furthermore, the entrepreneur's equity stake increases with firm performance. This sensitivity is greater in early stage firms where observability problems presumably are the largest. Moreover, the contracts often condition the entrepreneur's equity compensation on a multitude of signals, both financial and non-financial.

It is clear, however, that the traditional principal agent models do not completely explain the contracts we observe because the principal agent models make no predictions about the allocation of control rights. In the contracts we study, control rights are important and separate from cash flow rights.

4.2 "Control theories": cash-flow verifiable but not actions

The control theories make assumptions and predictions concerning cash flow rights that are consistent with those made in traditional principal agent models. Higher pay-performance sensitivity increases the weight entrepreneurs put on monetary benefits rather than private benefits.

At the same time, control rights are central to the theories of Aghion and Bolton (1992) and Dewatripont and Tirole (1994). Because giving up control rights is costly for the entrepreneur in terms of private benefits, the entrepreneur will try to avoid doing so as much as possible. As the external financing capacity of the project increases (e.g. the later the stage, the higher the verifiable monetary benefits, etc.), these theories predict a movement from more investor control to more entrepreneur control. Moreover, if the entrepreneur has to give up control rights, he will do so first in the states where control rights are most valuable to the investor. Finally, to the extent that actions are contractible, the entrepreneur will find it useful to precommit to take certain actions.

The extensive use and contracting on control rights in our sample is broadly consistent with the assumptions and predictions of these theories. Allocating state-contingent voting and board control rights is a common feature in these contracts. This state-contingent contracting is much more elaborate than the control rights inherent in ordinary debt contracts that only give liquidation rights in case of default on a promised payment. As shown in Table 6, control can be made contingent on financial performance relative to projections or cumulative cash-flow, or on non-financial events such as the termination of the manager, quite independently of the division of cash-flow rights.

Hence, our results provide empirical support to the incomplete contracting approach pioneered by Grossman and Hart (1986). The control theories, however, do not fully explain VC financings. In particular, the shift of control in these theories is all-or-nothing and is determined by whether performance does or does not exceed a certain level. In practice, control shifts along a number of dimensions –voting rights, board rights, liquidation rights, redemption rights, etc. – and shifts at different levels of performance.[9] At extreme poor performance, VCs get liquidation rights in default. For "normal" performance, VCs and the entrepreneur share voting rights and board rights, although they shift toward the entrepreneur as performance goals are met. Finally, for extremely good performance, the VC relinquishes all special control rights (generally through automatic conversion at an IPO).

4.3 "Stealing theories": cash flows neither observable nor verifiable

The "stealing" theories of Hart and Moore (1998), Gale and Hellwig (1982), and others are less successful in our data. First, these theories do not explain the division of residual cash-flow rights in VC financings. Because they assume the entrepreneur can expropriate all the residual cash-flow of the firm, these models implicitly assume that the entrepreneur owns all the equity. Second, these models assume that it is not possible to write contracts on profits or other measures of financial performance is assumed impossible in these models. Third, the only control rights that matter in these theories are liquidation rights.

In all our financings, investors accept claims with equity features -- such as convertibles, warrants or common stock – that promise residual cash-flow rights in the future. More importantly, contracts are frequently written contingent on both financial and non-financial

[9] Dewatripont and Tirole (1994) come closest to capturing this in that control shifts to different parties as performance changes.

measures of performance. Finally, in these theories, the only verifiable signal to contract on is default on promised payments. While these theories are consistent with the use of ordinary debt contracts, they do not explain the rich state-contingent contracting that we find in venture capital contracts.

In the models of outside equity financing in Myers (forthcoming) and Fluck (1998), the liquidation right is replaced by the right to fire management, which will occur if dividends are too low. Here it is essential, then, that outside equity investors have this right, which in turn implies that they need to hold a majority of the votes. Moreover, in these models, the firm has to pay out dividends. Both of these assumptions are frequently violated in our venture capital financings. For a significant fraction of our observations, 43% of our cases, the venture capitalist lacks voting control. Moreover, very few of our firms are required to pay cash dividends. Hence, these theories do not seem to be able to explain the structure of our venture capital financings.

There is, however, an important sense in which the "stealing theories" are successful. Our results indicate that liquidation rights are allocated to VCs. If the company is liquidated, the liquidation proceeds go to the VCs ahead of the entrepreneur. Furthermore, the VCs do have some power to liquidate through redemption rights, explicitly through ex ante staging and, implicitly through the ability to not fund a subsequent round.

4.4 Inalienability of human capital

The inalienability of human capital theories of Hart and Moore (1994) assume that the entrepreneur cannot contractually commit to stay with the firm. Because the firm is worth more

with the entrepreneur than without him, this leads to a hold-up problem where the entrepreneur will threaten to leave the venture unless the investor's claim is written down.

Our results suggest that this is an important issue. Venture capitalists frequently use contractual remedies, such as non-compete clauses and time vesting of founder shares to make it more costly for the entrepreneur / manager to leave.[10] Both of these provisions improve the bargaining power of the VCs versus the entrepreneur in any subsequent renegotiation because the entrepreneur has relatively more to lose.

Furthermore, vesting provisions also are more common in early stage firms. These provisions explicitly make it more costly for the entrepreneur the earlier he leaves. This is consistent with Hart and Moore (1994) if the entrepreneur is more crucial for the firm's operations in the earlier stage. As time passes, and the firm becomes less and less dependent on the specific skills of the original founder, more and more of the founder's shares vest. This scheme also gives some protection to the entrepreneur from being completely held up by the venture capitalist at the point when the entrepreneur is no longer needed to run the business.

4.5 Venture Capital-Specific Theories

The venture capital-specific theories are arguably less successful overall in explaining our results. Among these theories, the predictions in Hellman (1998) are the most consistent with our results.

Berglof (1994) predicts that control rights will be allocated based on firm performance. At the same time, however, he also predicts that cash flow rights will not be allocated based on

[10] The vesting provisions also provide an incentive for the entrepreneur to exert effort and succeed. It is very costly to the entrepreneur if he is fired by the VC before his shares have vested.

firm performance and that the entrepreneur receives private benefits not cash flow rights. These latter two predictions are clearly at odds with the data.

Similarly, the key prediction in Cornelli and Yosha (1998) that the cash flow rights allocated to VCs upon conversion increase with the signal of firm performance is contradicted by our data. In our data, VC cash flow rights (as a fraction of all rights) decline with firm performance.

The assumptions and predictions in Repullo and Suarez (1998) meet with mixed success in our data. Repullo and Suarez correctly predict that entrepreneurs and venture capitalists will both have equity ownership and, therefore, share the cash flow rights of the company. They also predict a contract that looks somewhat like convertible preferred for start-up financings. However, they predict that later stage financings will be done with all common stock. Our results indicate that financings at all stages – early and later – utilize convertible preferred stock or multiple classes of common stock. We also question their assumption that the VCs primarily add value in the expansion stage rather than the start-up stage.

Garmaise (1998) develops a model in which venture capitalists who have privately observed signals about a project bid for the entrepreneur's venture using different contract provisions. The optimal strategy for the venture capitalist involves offering to take a debt claim when the private signal is low, and an equity claim when the private signal is high. Because we do not observe VCs offering straight debt contracts or straight equity contracts, our results do not appear consistent with Garmaise's model.

In Hellman (1998), the optimal financing contract calls for: (1) giving the entrepreneur all equity compensation to increase his effort and decrease his resistance towards replacement; and (2) giving the venture capitalist control if the benefits from replacing the entrepreneur are high

enough. Although entrepreneurs do not receive all equity compensation, it is safe to say that the larger part of their compensation comes from the upside associated with their equity stake. Furthermore, it is common in our data for the VCs to have voting control at the close of the financing. This is consistent with Hellman if the expected benefits of replacing the entrepreneur are higher in early stage deals.

While Hellman (1998) is consistent with some of our findings, the model fails to capture the contingent nature of control rights in our results. In Hellman (1998), control rights are set at the beginning and do not shift as a function of performance.

4.6 Screening Models.

It also is apparent venture capital contracts perform important screening functions. Lazear (1986) provides the most relevant theoretical treatment of these issues. Prendergast (1999) also describes and summarizes these models. For example, those provisions that make cash flow rights contingent on performance not only motivate entrepreneurs to provide effort, but also discourage entrepreneurs with bad projects from accepting the contract.

Similarly, anti-dilution provisions also penalize entrepreneurs with bad projects or bad skills because the current VC investment will be re-priced downward if a future financing is completed at a lower price.

The use of participating convertible preferred compared to straight convertible preferred also provides a screening function. Assume that a VC places a particular distribution of values on an entrepreneur's company. Assume next that the VC offers a convertible preferred contract and a participating convertible preferred contract to the entrepreneur with the same expected payout to the VC. Because the VC obtains a return of principal in the participating preferred

contract, the participating preferred will require a lower percentage ownership than the convertible preferred for the same expected value to the VC. Now take the entrepreneur's perspective. All else equal, entrepreneurs who know or believe they will succeed will prefer the participating preferred over the convertible preferred. Thus, participating preferred is potentially useful in screening entrepreneurs who are better or more optimistic.

5. Cross-sectional Tests and Relationships

In this section, we report the results of cross-sectional tests. We investigate how the contracts vary as a function of different proxies for the severity of the agency problem between the VC and the entrepreneur as well as for information differences between them. We then interpret these results in relation to the predictions of the different theories.

5.1 Dependent variables

The potential conflicts of interest between the entrepreneur and the VC should depend on the degree of uncertainty about the project's economic viability. This uncertainty should be higher at the early stages of a project's life, when the quality and value of the project are still highly uncertain. To capture this, we use the "Pre-revenue venture" variable, taking the value of one if the company had no revenues at the time of financing, and zero otherwise.

We expect this variable to be related to the agency problem for a number of reasons. At the early stage in the project's life, the input of the entrepreneur is arguably more crucial to the project's success. Hence, providing incentives to the entrepreneur to "work on the right things" becomes crucial. Also, asymmetric information problems are also likely to be higher, in particular regarding the viability of the business idea and the entrepreneur's skills. Similarly,

when the uncertainty about the project viability is higher, the VCs are more likely to find themselves in the situation where they want to shut down the project or replace the management team, leading to potential conflicts with the entrepreneur.

The VC may have prior information on the quality of the founders which reduces the likelihood of adverse selection and the uncertainty of the venture. To measure this, we form a dummy variable, "repeat entrepreneur", taking the value of one if the founders had previously founded a company that was either taken public or was acquired by another public company before the financing round, and zero otherwise. We use the company business plan and the VC analysis to obtain this information. This variable may also capture the degree to which the entrepreneur is financially constrained. It is likely that a previously successful entrepreneur will have acquired some wealth that can be invested in the project, reducing the need for VC financing.

The extent to which the VC needs to protect itself from agency problems, and the required stake that the VC needs to be allocated to invest in the venture, will also in general depend on the amount of funds the VC invests in the project. Including the dollar amount invested by the VCs directly as a dependent variable would be problematic, however. First, it is an endogenous variable, since the amount invested by the VC in a particular round potentially will be lower when agency problems are more severe.[11] Second, the financing amount should be measured in relation to the total financing need of the project and the expected future cash flow which are difficult to determine.

Instead, we try to capture this effect by including the financing round number, which is correlated with the accumulated financing provided by the VC, but suffers less from endogeneity

[11] Results in Gompers (1995) suggest that this is likely to be the case.

and normalization problems. One potential problem with this variable, however, is that it might also capture the degree of uncertainty about the project in a similar way to "Pre-revenue venture".

To control for possible effects of industry, geographical location, and the identity of the particular VC firm, we also include dummy variables for these in some of our specifications.

5.2 Determinants of cash-flow right allocations

The allocation of cash-flow rights to the entrepreneur will affect the pay-performance sensitivity of the entrepreneurs' claims. The classical principal agent theories predict that pay-performance sensitivity should be higher when agency problems are more severe (i.e. when the return to managerial effort is high, see e.g. Prendergast (1999)).

Table 10 examines the cross-sectional determinants of pay-performance sensitivity using two different measures. The first measure is simply the share of equity allocated to the entrepreneur. This measure is essentially the pay-performance measure introduced by Jensen and Murphy (1990) and applied to venture-capital financed IPO firms by Baker and Gompers (1999). The cross-sectional results in table 10 using this measure are quite weak. If anything, the results go against the predictions of theory since the founders' equity stake is lower for pre-revenue ventures and higher for successful entrepreneurs (even though the coefficients are not significant in all specifications).

The problem with this as a measure of pay-performance sensitivity is that it is very much related to the overall value of the venture relative to the amount of funding the VC is providing. When uncertainty and agency problems are high, the VC will require more cash-flow rights in return for the financing provided, driving down the founders' equity stake. The significantly

negative effect of the round of VC investment is consistent with this interpretation. For each financing round, the VC puts more funds into the venture and requires a higher equity stake. This suggests that the founder equity stake is not a useful measure of incentive provision for entrepreneurial firms.

Even if the VC demands a large equity stake, it can still increase the pay-performance sensitivity for the entrepreneur by making the allocation more state-contingent. This is addressed by our second measure of pay-performance sensitivity, the difference in the founder equity stake between the best and the worst case state. In the second set of regressions in table 10, the founders' equity percentage is significantly more sensitive to performance for pre-revenue ventures. In addition, the equity percentage of previously successful entrepreneurs is somewhat less sensitive to performance, although the relationship is not statistically significant when location, industry, and VC firm controls are included, or when we restrict the sample to first VC financings.

Overall, these results support the prediction of the classical principal agent theories. They also are consistent with a screening model (e.g. along the lines of Lazear (1986)) where pay-performance sensitivity is used to screen out bad entrepreneurs, since more able entrepreneurs will benefit more from state-contingent cash-flow allocations.

5.3 Determinants of control right allocations

The incomplete contracting theories of Aghion and Bolton (1992) and others focus on the allocation of control between the investor and the entrepreneur. Aghion and Bolton (1992) show that as the external financing capacity of the project increases (e.g. the later the stage, the higher the verifiable monetary benefits, etc.), control moves from more investor control to more

entrepreneur control. In particular, for projects with high external financing capacity (i.e. small agency problems or small required investment) the entrepreneur always should have control. As external financing capacity decreases there should be state-contingent control. Finally, for projects with low external financing capacity, the investor should always be allocated control.

Table 11 tests this prediction using two measures of control -- voting control and board majority. Panel A estimates an ordered logit regression of voting control on our proxies for agency problems. The dependent variable takes the value of zero if the entrepreneur always controls a majority of the votes, one if the VC has voting control only in the worse state, and two if the VC always has voting control.

Panel A of table 11 shows that the pre-revenue variable is significantly positively related to VC control in all of the specifications. The repeat entrepreneur variable is negatively related to VC control, significantly so in two of the regressions. Finally, the amount of VC funding, as measured by the round of financing, is strongly positively related to VC control. These results are generally consistent with the predictions in Aghion and Bolton (1992).

In panel B, we repeat the exercise using board rights as our measure of control. Here we define the VC control variable as zero if the founders control a majority of the board seats, one if neither the VC nor the founders have board control, and two if the VC controls the board. Here the results are similar, but not as strong as for voting rights.[12]

[12] We had to exclude industry and VC fixed effects because of collinearity problems. In particular, one VC firm (with more than 10 deals) had no case where the VCs had board majority. Similarly, in one industry (retail) there were no cases where the VCs had a board majority.

5.4 Determinants of liquidation rights and claims

Most of the financial contracting theories predict that the investor should have a senior claim compared to the entrepreneur. The other important characteristic of liquidation rights is the ability to liquidate the firm when performance is bad. According to the "Stealing Theories", the investor's ability to liquidate when a contracted payment has not been met is critical to be able to recoup the investment. Table 5 showed that the VC is almost always senior to the entrepreneur in liquidation, while contracted payments are largely absent from the contracts, with the exception of redemption rights.

Table 12 investigates the cross-sectional determinants of liquidation rights. Because liquidation rights typically do not change over time, we restrict attention to the first financing round available for each company only to avoid "double-counting" of observations.

First, redemption rights are unrelated to the pre-revenue variable, but are significantly less likely to be present when the entrepreneur has previously founded a successful venture. Second, cumulative preferred dividends are negatively related to the repeat entrepreneur variable and insignificantly related to the pre-revenue dummy.[13] This provides some evidence that redemption clauses and cumulative preferred dividends are used when the adverse selection problem with respect to the entrepreneur is more severe.

Third, the presence of participating preferred stock cannot be explained by either of our two proxies for agency problems. Both the pre-revenue and the repeat entrepreneur dummy are generally insignificant.

To sum up, our results for liquidation rights are not incredibly strong. While the presence of redemption rights and cumulative dividends does seems somewhat related to agency problems

[13] The repeat entrepreneur dummy is significant in all specifications, except when location dummies are included. On the other hand, the location dummies are not jointly significant.

as measured by the repeat entrepreneur variable, the use of participating preferred stock does not. Also, the pre-revenue variable that was critical in explaining the use of cash-flow incentives and the allocation of control rights does not at all relate to the liquidation rights.

5.5 Determinants of contingencies / contracting space

The results in table 6 showed that VCs contract on a number of different measures of financial and non-financial performance, all presumably observable and verifiable. As noted earlier, this result is at odds with the strong contracting assumptions made in Hart and Moore (1998) and others. On the other hand, a large fraction of the contracts in our sample do not include any performance contingencies.

In this section, we consider the potential determinants of such contingencies. One possibility is that state-contingencies are less appropriate for more uncertain environments where it is more difficult to define and verify future contingencies.

This interpretation, however, does not get much support in the data. In the first three columns of table 13, the dependent variable takes the value of one if there is any contingent contracting in the deal (on cash-flow, control, liquidation rights, or future financings) and zero otherwise. The degree of contingent contracting is unrelated to whether the venture has revenues or not. Instead, the extent of contingent contracting is related to the round of VC investment. Contingent contracting is significantly more common in earlier financing rounds and somewhat more common for entrepreneurs without a previous record of success (when the degree of uncertainty should be higher). This suggests that the use of contingent contracts is more closely related to VC screening of companies and entrepreneurs.

In the last two columns of panel A, contingencies are divided into those based on financial and non-financial performance. Contingent contracting on non-financial performance is more common in earlier stage financings. This suggests that VCs find other observable and verifiable signals when financial measures are unavailable.

5.6 Determinants of ex-ante staging

Table 14 examines the presence of ex-ante staging in the initial VC financing contracts. In an ex-ante staged deal, part of the VC's committed funding is released at a later date contingent on explicit financial or non-financial performance milestones. These provisions can be interpreted as another type of liquidation right. By giving the VC the ability to withhold the rest of the financing if performance is unsatisfactory, the VC essentially gets the right to liquidate the venture in the bad state of the world.

Most VC financings are at least implicitly staged, in the sense that even when all the funding in the initial round is released immediately, it is understood that future financing rounds will be needed to support the firm until the IPO. Hence, the same mechanism is present implicitly in most VC financings. The ex-ante staging, however, makes this liquidation right stronger and more explicitly related to performance.

Table 14 looks at two different measures: logit regressions on a dummy variable indicating ex-ante staging, as well as tobit regressions on the fraction of future committed financing to total financing committed. The results are very similar for both measures and mimic the results for liquidation rights. While the pre-revenue venture variable is not significant, the repeat entrepreneur dummy is negatively related to ex-ante staging and generally significant. Again, the ability to withhold part of the VC financing is used more when the uncertainty about

the entrepreneur's type is higher. Table 14 also indicates significant differences across industries.[14]

5.7. Complementarity and substitutability of contract provisions

So far, we have examined the different contractual rights and provisions one at a time. One important finding, however, is that VCs use several different governance mechanisms, such as pay-performance compensation, board and voting control, and liquidation rights, simultaneously in their contracts. This section takes an exploratory step in examining the interaction between these rights. Here, theoretical predictions are largely absent because financial contracting models typically focus on one mechanism in isolation.[15] We restrict the comparison to initial financing rounds in order to "purge" the comparison from effects due to the evolution of the contracts over time documented in table 9.

Table 15 considers contracting provisions for the initial VC investments in our sample along three different dimensions – the degree of VC voting control[16], the extent of pay-performance sensitivity in the founder's equity stake, and whether the next financing round is specified in the contract and contingent on performance. Similar patterns emerge in all three panels.

First, panel A shows that voting control and board control are significantly positively correlated. Hence, these two control mechanisms seem to be complementary. They also are strongly positively related to the amount of equity that the VC holds in the firm. Despite the fact that they are separately contracted upon and not perfectly correlated, cash-flow rights and control

[14] This result should be interpreted cautiously because collinearity precluded VC dummies from being included directly in the regressions. In a separate analysis, VC firm effects were significant (in a Kruskal-Wallis chi-square test).

[15] Notable exceptions are Dewatripont and Tirole (1994) and Hellmann (1998).

rights largely go together. Also, when VCs have control, they are more reluctant to relinquish it. The stock price (relative to the current price) at which the automatic conversion provision is significantly higher when VCs have control.

Second, panel A shows that the performance sensitivity of the founder's equity claim is positively related to the degree of VC control in general, and state-contingent control in particular. When the VC has voting control, roughly one-third of the founders' equity stake is contingent on performance versus only three percent when the founders always have voting control. The results are similar for board control and founder vesting provisions. Founders' pay-performance incentives and VC control, therefore, seem to be more complements than substitutes.

Third, the relationship between liquidation rights and the other rights is less clear-cut. Cumulative dividends and redemption clauses are largely independent of control rights, while the use of participating preferred stock is more common the higher the degree of VC voting control. On the other hand, both redemption rights and cumulative dividends are significantly positively related to founders' pay-performance sensitivity, while participating preferred is not related.

Fourth, panel A shows that the use of explicit contracting on different measures of performance is positively related to VC control, and in particular to voting control. The use of any contingencies occurs in 57.5% of the financings in which the VCs always have a voting majority, but in only 28% of the financings in which the founders control the majority of the votes. The differences are even greater for contracts with contracting on financial or non-financial performance. Hence, the contracting space seems to be larger when VCs are in control compared to when the entrepreneur is in control.

[16] The results are similar for board control. We do not present them due to space considerations.

Finally, panel C shows that the allocation of rights is strongly related to the presence of ex-ante staged financing. In financing rounds with ex-ante (contingent) staging: VCs are much more likely to have voting and board control; founders have more contingent pay-performance sensitivities; vesting provisions are more common; automatic conversion prices are a larger multiple of the stock price of the round; and default board provisions and full ratchet anti-dilution protection are more common.

To sum up, to the extent the different governance mechanisms are related, they are more complements than substitutes.

6. Discussion and Conclusion

In this paper, we have compared the characteristics of real world financial contracts to their counterparts in financial contracting theory by conducting a detailed study of actual contracts between venture capitalists (VCs) and entrepreneurs.

6.1 Findings

Our main findings include:

(1) The distinguishing characteristic 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.

(2) While convertible securities are used most frequently, VCs also implement a similar allocation of rights using combinations of multiple classes of common stock and straight preferred stock. Also, participating convertible preferred is effectively straight preferred and common stock.

(3) Cash flow rights, voting rights, control rights, and future financings are frequently contingent on observable measures of financial and non-financial performance. These state contingencies are somewhat more common in first VC and early stage financings.

(4) 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. The entrepreneur's cash flow rights also increase with firm performance.

(5) It is common for VCs to include non-compete and vesting provisions aimed at mitigating the potential hold-up problem between the entrepreneur and the investor. The vesting provisions are somewhat more common in early stage financings where it is more likely that the hold-up problem is more severe.

(6) Cash flow incentives, control rights, and contingencies implemented in these contracts are used more as complements than as substitutes.

6.2 Implications for theory

Many of the theories we consider explain different aspects of the results we find. However, several theories stand out. First, our results are most consistent with the control theories – such as Aghion and Bolton (1992) and Dewatripont and Tirole (1994). These control theories make predictions concerning cash flow rights that are similar to those made in traditional principal agent models – e.g., higher pay-performance sensitivity increases the weight entrepreneurs put on monetary benefits rather than private benefits. At the same time, these theories emphasize control rights that are contingent on measures of performance. The extensive use of and contracting on control rights in our sample is broadly consistent with these theories.

Second, inalienability of human capital appears to be important as argued in Hart and Moore (1994). However, contractual remedies exist to mitigate the problems associated with inalienability. Also, these theories do not explain residual cash flow and control rights.

Third, various aspects of VC contracts clearly have the effect of helping VCs screen good entrepreneurs and companies from bad ones.

Finally, no one theory explains the multi-dimensional nature of the allocation of control rights we observe in these financings. Control rights are allocated across a number of dimensions – voting rights, board rights, liquidation rights. In addition, we find that those different control rights shift from VC to entrepreneur at different levels of performance. At very low levels of performance, the VC has the right to liquidate. At low levels of performance, the VC will typically have voting control and board control. As performance improves, the entrepreneur gains more cash flow rights as well as voting and board rights. As performance reaches a high level – i.e., a successful initial public offering – the VC's investment automatically converts into common stock and the VC relinquishes all the special control rights associated with its initial investment.

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Table 1
Summary Information

Summary information for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. Pre-revenue stage rounds are financing rounds for companies that had no revenues before the financing. Pre-profit stage rounds are financing rounds for companies that did not have positive profits before the financing. Business plan is the plan provided by the portfolio company at the time of the financing. Total financing committed is the total amount of equity financing committed to by the venture capitalists at the time of the financing round. Total financing provided is the total amount of equity financing provided to the portfolio company at the closing of the financing.

A.:	Portfolio Companies	Financing Rounds
Number of observations	118	200
First venture capital round	88	88
Pre-revenue stage rounds (N=194)	53	77
Pre-profit stage rounds (N=186)	94	158

B.: **Year round financed**:

	Pre-1992	1992	1993	1994	1995	1996	1997	1998	1999
# rounds	12	2	3	11	13	48	50	58	3
# 1st VC round	5	1	1	6	4	26	18	27	2

C.: **VC Firm**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
# portfolio companies in current draft	9	19	3	22	9	6	4	2	10	4	11	10	8	1	118

D.: **Financing Amounts**	Mean	Median	N
Total financing committed ($ millions)	7.1	4.8	197
Total financing committed pre-revenue rounds ($ millions)	7.8	5.0	76
Total financing committed post-revenue rounds ($ millions)	6.6	4.1	116
Total financing provided ($ millions)	5.3	3.8	197
Total financing provided pre-revenue rounds ($ millions)	4.7	4.0	76
Total financing provided post-revenue rounds ($ millions)	5.7	3.3	116

E. **Geographical Distribution of Companies**

	California	Midwest	Northeast	Other
Companies	34	24	31	29
Financing rounds	53	35	63	49

F. Industry Distribution of Companies

	Biotech	IT/Software	Telecom	Healthcare	Retail	Other
Companies	17	43	15	14	11	18
Financing rounds	31	73	16	19	22	39

G. Securities

	Financing rounds
Convertible preferred stock	159
Convertible debt	4
Convertible preferred stock and convertible debt	4
Multiple classes of common stock	3
Convertible preferred stock and common stock	16
Convertible debt and common stock	1
Straight preferred stock and common stock	3
Convertible preferred stock and straight preferred stock	6
Convertible preferred stock, straight preferred stock, and common stock	4
Convertible preferred is participating	72
Common stock	1
Any of the above plus warrants	39

Table 2
Post-round cash flow rights

Post-round cash flow rights for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. Minimum VC ownership if management meets all performance and vesting milestones or contingencies. Max founders and employees vesting occurs if non-performance based management stock and options vest. Maximum VC ownership occurs if management does not meet performance milestones and stock and options do not vest. VC%, founders% and other% are, respectively, the percentage of cash flow rights owned by the venture capitalists, the founders, and others. Others include employees and previous investors. Pre-revenue rounds differ from post-revenue rounds at the: 1% ***; 5% **, and 10% * levels.

	Minimum VC ownership contingency		Max founder and employee vesting cont.		Maximum VC ownership		Difference, Min. and max. VC own.	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
A. All rounds, N=199								
VC %	47.6	47.9	48.7	49.2	55.7	57.5	-8.1	-3.5
Founders %	30.8	29.3	29.8	27.1	24.2	20.1	6.6	0.0
Others %	21.6	20.0	21.5	20.0	20.0	16.9	1.5	0.0
B. Early vs. later stage ventures:								
Pre-revenue rounds, N=76								
VC %	53.0	55.2***	54.5	55.2***	64.9	65.9***	-11.9	-6.1***
Founders %	28.8	28.5	27.4	27.1	19.5	14.8***	9.3	3.3***
Others %	18.2	17.7***	18.1	17.7***	15.5	11.6***	2.6	0.2
Post-revenue rounds, N=117								
VC %	44.2	45.4	45.1	45.9	49.6	51.4	-5.4	-2.2
Founders %	32.0	28.7	31.1	27.1	27.8	23.0	4.2	0.0
Others %	23.8	22.4	23.7	22.4	22.6	20.7	1.2	0.0
C. First vs. subsequent investments:								
First VC rounds, N=90								
VC %	41.7	42.7***	43.5	44.5***	53.0	51.6**	-11.3	-6.2***
Founders %	38.6	37.2***	36.9	37.3***	29.7	27.2***	8.9	2.7*
Others %	19.7	17.9*	19.5	17.6**	17.3	12.5***	2.4	0.0
Subsequent VC rounds, N=109								
VC %	52.5	55.2	53.0	56.5	58.0	60.9	-5.5	-2.3
Founders%	24.4	19.6	23.9	19.6	19.7	16.4	4.7	0.0
Others %	23.1	21.4	23.1	21.4	22.3	19.3	0.8	0.0

Table 3
Post-round voting rights

Post-round voting rights for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. Minimum (maximum) VC votes represents the minimum (maximum) votes the venture capitalists control based on subsequent management performance and vesting milestones or contingencies. % VC, % Founder and % Neither control are, respectively, the percentage of instances in which voting control is held by the venture capitalists, the founders, or neither. Switch in control indicates the percentage of instances in which voting control can switch based on performance. Pre-revenue rounds differ from post-revenue rounds at the: 1% ***; 5% **, and 10% * levels.

	Minimum VC votes contingency	Maximum VC votes contingency	Switch in control
A. All rounds, N=199			
% VC control	55.8	70.8	17.5
% Founder control	23.1	11.6	
% Neither control	21.1	17.6	
B. Early vs. later stage ventures:			
Pre-revenue rounds, N=76			
% VC control	65.8**	86.8***	20.8
% Founder control	14.5**	3.9***	
% Neither control	19.7	9.2***	
Post-revenue rounds, N=127			
% VC control	48.7	59.0	14.5
% Founder control	28.2	17.1	
% Neither control	23.1	23.9	
C. First vs. subsequent investments:			
First VC rounds, N=90			
% VC control	44.4***	64.4*	24.4**
% Founder control	37.8***	21.1***	
% Neither control	17.8	14.4	
Subsequent VC rounds, N=109			
% VC control	65.1	76.1	11.8
% Founder control	11.0	3.7	
% Neither control	23.8	20.2	

Table 4
Post-round board representation.

Post-round board representation for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. Normal board is the board at the completion of the financing. Adverse state board is the board that will result if the portfolio company performs poorly or reaches an adverse state. VC seats are board seats that are reserved for venture capitalists. Founder seats are board seats that are reserved for or controlled by the founders / entrepreneurs. Outsider seats are board seats that are to be filled by individuals mutually agreed upon by the VCs and the founders / entrepreneurs. Pre-revenue rounds differ from post-revenue rounds at the: 1% ***; 5% **, and 10% * levels.

	Normal board		Adverse state board	
	Mean	Median	Mean	Median
A. All rounds, N=190				
Number of board seats	6.1	6.0	6.4	6.0
% VC seats	41.4	40.0	45.8	42.9
% Founder seats	34.7	33.3	32.6	33.3
% Outsider seats	23.7	20.0	21.5	20.0
% VC board majority	25.8		35.8	
% Founder majority	12.1		11.0	
% neither board majority	62.1		53.2	
% of cases with adverse state board provisions		15.3%		
B. Early vs. later stage ventures:				
Pre-revenue rounds, N=75				
Number of board seats	6.1	6.0	6.2	6.0
% VC seats	43.2	40.0	47.4	42.9
% Founder seats	34.5	33.3	32.0	33.3
% Outsider seats	21.9	20.0	20.5	20.0
% VC board majority	28.0		36.0	
% Founder majority	6.7*		5.3**	
% neither board majority	65.3		58.7	
% of cases with adverse state board provisions		14.7%		
Post-revenue rounds, N=110				
Number of board seats	6.2	6.0	6.5	6.0
% VC seats	40.3	40.0	45.1	40.0
% Founder seats	33.3	34.7	32.9	33.3
% Outsider seats	25.0	20.0	22.1	20.0
% VC board majority	24.5		36.4	
% Founder majority	16.4		15.4	
% neither board majority	59.1		48.2	
% of cases with adverse state board provisions		16.4%		

C. First vs. subsequent investments:

First VC rounds, N=88

	Normal board		Adverse state board	
	Mean	Median	Mean	Median
Number of board seats	5.8	5.0***	6.0	5.0***
% VC seats	37.4	40.0***	42.5	40.0**
% Founder seats	38.0	40.0***	35.6	40.0**
% Outsider seats	24.6	20.0	21.9	20.0
% VC board majority	11.4***		26.1**	
% Founder majority	18.2**		15.9**	
% neither board majority	70.5**		58.0	
% of cases with adverse state board provisions		17.0%		

Subsequent VC rounds, N=102

Number of board seats	6.4	6.0	6.7	7.0
% VC seats	44.9	43.7	48.7	50.0
% Founder seats	31.9	33.3	30.1	28.6
% Outsider seats	23.0	20.0	21.2	19.1
% VC board majority	38.2		44.1	
% Founder majority	6.9		6.9	
% neither board majority	54.9		49.0	
% of cases with adverse state board provisions		13.7%		

Table 5
Post-round liquidation rights

Post-round liquidation rights for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1986 and 1999. Liquidation rights are the proceeds accruing to the party upon a liquidation or bankruptcy. Pre-revenue rounds differ from post-revenue rounds at the: 1% ***; 5% **, and 10% * levels.

Panel A: VC liquidation rights

1. All rounds, N=180

	Number of rounds	Fraction of total	Mean	Median
VC liquidation rights < investment		2.2%		
VC liquidation rights = investment		23.3%		
VC liquidation rights > investment		74.4%		
Cumulative accruing dividend		46.2%		
Dividend rate			8.0%	8.0%
Participating preferred stock		39.4%		
Common/Conv. plus straight preferred		7.0%		
Other cases with liq. rights > inv.		11.1%		

2. Early vs. later stage ventures:

Pre-revenue rounds, N=72

VC liquidation rights < investment		2.8%		
VC liquidation rights = investment		26.4%		
VC liquidation rights > investment		70.8%		
Cumulative accruing dividend		38.9%**		
Dividend rate			7.7%	8.0%
Participating preferred stock		41.7%		
Common/Conv. plus straight preferred		10.4%		
Other cases with liq. rights > inv.		2.8%***		

Post-revenue rounds, N=103

VC liquidation rights < investment		1.0%		
VC liquidation rights = investment		21.4%		
VC liquidation rights > investment		77.7%		
Cumulative accruing dividend		52.4%		
Dividend rate			8.2%	8.0%
Participating preferred stock		37.9%		
Common/Conv. plus straight preferred		5.1%		
Other cases with liq. rights > inv.		17.5%		

3. First vs. subsequent investments:

First VC rounds, N=80

VC liquidation rights < investment	1.2%		
VC liquidation rights = investment	25.0%		
VC liquidation rights > investment	73.8%		
Cumulative accruing dividend	51.2%		
Dividend rate		8.0%	8.0%
Participating preferred stock	30.0%**		
Common/Conv. plus straight preferred	11.1%**		
Other cases with liq. rights > inv.	10.0%		

Subsequent VC rounds, N=100

VC liquidation rights < investment	3.0%		
VC liquidation rights = investment	22.0%		
VC liquidation rights > investment	75.0%		
Cumulative accruing dividend	42.2%		
Dividend rate		8.1%	8.0%
Participating preferred stock	47.0%		
Common/Conv. plus straight preferred	3.6%		
Other cases with liq. rights > inv.	12.0%		

Panel B: VC seniority

1. All rounds, N=194

	Mean	Median
Claims senior to VC / VC Cumul. Investment	0.035	0.000
Claims senior or at par with VC / VC Cumul. investment	0.193	0.008

2. Early vs. later stage ventures:

Pre-revenue rounds, N=76

	Mean	Median
Claims senior to VC / VC Cumul. investment	0.020	0.000
Claims senior or at par with VC / VC Cumul. investment	0.085	0.000*

Post-revenue rounds, N=114

	Mean	Median
Claims senior to VC / Cumul. investment	0.045	0.000
Claims senior or at par with VC / Cumul. investment	0.270	0.031

3. First vs. subsequent investments:

First VC rounds, N=87

	Mean	Median
Claims senior to VC / VC Cumul. investment	0.053	0.000
Claims senior or at par with VC / VC Cumul. investment	0.169	0.000*

Subsequent VC rounds, N=108

	Mean	Median
Claims senior to VC / Cumul. investment	0.020	0.000
Claims senior or at par with VC / Cumul. investment	0.212	0.017

Panel C: Redemption rights

1. All rounds, N=186	**Fraction of total**	**Mean**	**Median**
Redemption / put rights	84.3%		
Maturity		4.8	5.0
Redemption including cumul. div.	45.5%		
Redemption at FMV	9.7%		
Other redemption > face value	13.0%		
2. Early vs. later stage ventures:			
Pre-revenue rounds, N=71			
Redemption / put rights	80.3%		
Maturity		4.9	5.0
Redemption including cumul. div.	39.1%		
Redemption at FMV	8.4%		
Other redemption > face value	2.8%***		
Post-revenue rounds, N=109			
Redemption / put rights	88.1%		
Maturity		4.8	5.0
Redemption including cumul. div.	51.0%		
Redemption at FMV	11.0%		
Other redemption > face value	19.3%		
3. First vs. subsequent investments:			
First VC rounds, N=81			
Redemption / put rights	87.7%		
Maturity		5.4	5.0
Redemption including cumul. div.	50.6%		
Redemption at FMV	16.0%**		
Other redemption > face value	8.6%		
Subsequent VC rounds, N=104			
Redemption / put rights	81.7%		
Maturity		4.4	5.0***
Redemption including cumul. div.	41.4%		
Redemption at FMV	4.8%		
Other redemption > face value	16.3%		

Table 6
Contingencies and the contracting space

Contingencies for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. Table measures extent to which venture capital contracts include contingencies based on observable and verifiable characteristics or states.

Type of contingency	Number of rounds	Examples
A. Contract contingent on financial measures of performance	41	• Employee shares vest if revenue goal attained. • VC can only vote for all owned shares if realized EBIT below threshold value, in which case VC gets voting control. • VC dividend on preferred shares, payable in common stock, is suspended if revenue and operating profit goals attained. • If net worth below threshold, VC will get 3 more board seats. • Exercise price on warrants is fraction of net worth: 50% of net worth/share for first 3 years, then 100% of net worth/share. • VC warrants expire if revenue goal attained. • Committed round of financing contingent on no material deviation from business plan.
B. Contract contingent on non-financial measures of performance	25	• Committed round of financing contingent on no material deviation from non-financial aspects of business plan. • Employee shares vest when company secures threshold number of customers who have purchased the product and give positive feedback. • Employee shares vest with release of second major version of the product that incorporates significant new functionality. • Founder shares vest contingent on FDA approval of new drug. • Founder shares vest contingent on new corporate partnership found. • Founder shares vest contingent on approved patents. • Founder loses voting right for shares if terminated for cause. • Committed funding paid out when new clinical tests completed. • Committed funding paid out when new strategic partnership completed.
C. Contract contingent on certain actions being taken	28	• Committed funding paid out subject to new business plan for entering new markets completed and approved by board • Vesting of shares contingent on hiring new key executives. • Committed funding paid out subject to hiring new key executives or CEO • Committed funding paid out subject to developing new facilities.
D. Contract contingent on sale of securities	19 (excl.* which are standard)	• Founder ownership increasing non-linear function of share price obtained in sale or IPO. • Founder vesting accelerates upon sale or IPO of certain minimum value.* • Cumulative dividend (in cash or stock) suspended upon sale or IPO of certain minimum value* • Conversion price of VC convertibles higher if company completes sale of new securities where proceeds exceed minimum amount. • VC warrants expire if company manages to raise alternative funds where proceeds and price of securities exceed threshold. • VC warrants expire upon IPO of minimum value. • Committed funding paid out when new vendor financing agreements secured • Committed funding paid out when new construction loans secured • VC dividend on preferred shares, payable in common stock, is suspended if company manages to raise certain amount of new funding above minimum price per share.

Table 7
Contingencies

Contingencies for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. Table measures extent to which venture capital contracts include contingencies based on observable and verifiable characteristics or states. Financing contingent on future performance occurs if the financing round is staged. I.e., some of the funding committed in the round will be funded contingent on meeting certain milestones. Examples of the different classes of contract provisions can be found in table 6. Pre-revenue rounds differ from post-revenue rounds at the: 1% ***; 5% **, and 10% * levels.

	Number of rounds	**% of total**	**Number of rounds**	**% of total**	**Number of rounds**	**% of total**
	A. All rounds, N=199		**B. Stage**			
			Pre-revenue rounds, N=77		Post-revenue rounds, N=116	
State-contingent contracting on:						
Financial measures of performance	41	20.6	11	14.3*	30	25.9
Non-financial measures of performance	25	12.6	16	20.8***	9	7.8
Certain actions being taken	28	14.1	14	18.2	14	12.1
Sale of securities, raising new funds	19	9.5	6	7.8	13	11.2
Any of the above	73	36.5	24	31.2	49	41.9
Financing contingent on future performance	30	15.0	16	20.8*	13	11.1
			C. First vs. subsequent investments:			
			First VC rounds, N=90		Subsequent VC rounds, N=109	
State-contingent contracting on:						
Financial measures of performance			23	25.8*	18	16.4
Non-financial measures of performance			14	15.7	11	10.0
Certain actions being taken			15	16.9	13	11.8
Sale of securities, raising new funds			10	11.2	9	8.2
Any of the above			40	44.4**	33	30.0
Financing contingent on future performance			21	23.3***	9	8.2

Table 8
Other Terms

Other terms for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. Terms include extent to which venture capital contracts include (1) automatic conversion provisions; (2) antidilution protection; (3) time-vesting of founder shares and (4) non-compete clauses for the founder. Conversion price is the IPO or sale price per share of common stock at which the venture capital securities automatically convert into common stock. Round price is the price per share of common stock at which the securities issued in the current round convert or are priced. If a company subsequently issues equity at a lower price per share than the current round: under a full ratchet provision, the conversion price on the current round drops to the new issue price; under a weighted-average provision, the conversion price of the current round declines to a value between the current round and the new issue price. Seed and start-up rounds differ from later stage rounds at the: 1% ***; 5% **, and 10% * levels.

1. Early vs. later stage ventures:

		All Rounds				Pre-revenue				Post-revenue			
		Number	%	Mean	Med.	Number	%	Mean	Med.	Number	%	Mean	Med.
		N=196				**N=76**				**N=114**			
A.	Automatic Conversion Provision												
	Included	184	93.9%			73	96.0%			106	93.0%		
	Conversion price / round price			4.5	3.0			6.0	4.0***			3.6	3.0
				(N=164)				*(N=65)*				(*N=96)*	
		N=175				**N=69**				**N=103**			
B.	Antidilution Protection	166	94.8%			66	95.6%			97	94.2%		
	Full ratchet	34	19.4%			12	17.4%			21	20.4%		
	Weighted average ratchet	132	75.4%			54	78.3%			76	73.8%		
		N=198				**N=77**				**N=115**			
C.	Founder vesting	83	41.9%			42	54.5%***			38	33.0%		

		All Firms			Pre-revenue			Post-revenue		
		Number	%		Number	%		Number	%	
		N=84			**N=41**			**N=40**		
D.	Non-compete clauses	59	70.2%		29	70.7%		28	70.0%	
	Non-compete clauses, excluding California firms	43	75.4%	(N=57)	19	76.0%	(N=25)	23	74.2%	(N=31)

2. First vs. subsequent investments:

		All Rounds				First VC round				Subsequent VC round			
		Number	%	Mean	Med.	Number	%	Mean	Med.	Number	%	Mean	Med.
		N=196				**N=87**				**N=109**			
A.	Automatic Conversion Provision												
	Included	184	93.9%			79	90.8%			105	96.3%		
	Conversion price / round price			4.5	3.0			6.4	3.0***			3.1	2.7
				(N=164)				*(N=65)*				(*N=92)*	
		N=175				**N=84**				**N=102**			
B.	Antidilution Protection	166	94.8%			76	91.6%*			90	97.8%		
	Full ratchet	34	19.4%			20	24.1%			14	15.2%		
	Weighted average ratchet	132	75.4%			56	67.5%**			76	82.6%		
		N=198				**N=90**				**N=108**			
C.	Founder vesting	83	41.9%			42	46.7%			41	38.0%		

Table 9
Evolution of the contracts over time

Contract terms by financing round for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999.

	(1) Round 1 Cont. financing (N=34)		(2) Round 1 No cont. financing (N=53)		(3) Round 2 (N=53)		(4) Round 3 (N=27)		(5) Round 4 (N=16)		KW Chi-sq. statistic columns (1)-(5)	KW Chi-sq. statistic columns (2)-(5)
	Mn.	**Med.**	**Mn.**	**Med.**	**Mn.**	**Med.**	**Mn.**	**Med.**	**Mn.**	**Med.**		
Financing:												
$ financing up front	3.9	3.0	3.9	3.0	5.7	5.0	7.9	6.1	6.6	4.3	6.22	4.24
$ financing committed	12.5	6.8	3.9	3.0	6.5	5.6	8.5	6.6	6.7	4.3	14.54***	9.43**
% future committed fin.	51.5	50.0	0.0	0.0	13.0	0.0	8.2	0.0	2.3	0.0	71.31***	5.50
% Contingent future fin.	100.0		0.0		24.5		22.2		12.5		69.26***	5.40
Cash-flow incentives:												
Fndr best case eq., %	31.2	32.5	43.9	42.0	27.6	25.0	23.6	20.0	20.6	15.0	36.13***	36.39***
Fndr worst case eq., %	21.2	14.0	35.5	39.0	22.3	20.5	19.7	18.0	16.6	13.5	18.31***	17.23***
Fndr best - worst case, %	10.2	5.0	8.3	0.0	5.2	0.0	3.7	0.0	3.9	0.0	10.64**	3.18
Fndr (best - worst) / best, %	38.5	38.8	19.9	0.0	21.8	6.2	11.0	0.0	7.5	0.0	12.84**	3.96
Voting control (% of cases)												
VC control good state	63.9		30.2		61.5		63.0		75.0		13.64***	12.41***
VC control bad state	77.8		54.7		75.0		70.4		81.2		5.33	4.42
Fndr control good state	19.4		49.1		11.5		7.4		6.2		16.21***	16.03***
Fndr control bad state	5.6		30.2		3.8		3.7		0.0		7.93*	7.46*
Switch in control	19.4		28.3		15.1		7.4		6.2		3.39	3.36
Board control (% of cases)												
VC control	17.1		5.8		28.3		34.6		56.2		11.66**	11.22**
Founder control	8.6		25.0		8.7		7.7		6.2		3.13	2.85
Neither control	74.3		69.2		63.0		57.7		37.5		5.20	3.82
Automatic conv. price / stock price	10.3	5.0	3.8	3.0	3.6	3.0	2.6	2.1	2.5	2.1	27.22***	13.80***
Contingent contracting:												
Any contingencies	63.9		32.1		37.7		25.9		18.8		10.70**	1.64
Cont. financial performance	34.3		20.8		20.8		7.4		12.5		3.67	1.27
Cont. non-financial perf.	31.4		5.7		13.2		11.1		6.2		4.63	0.52

Table 10
Determinants of cash-flow incentives

Linear regression of percentage point difference in founder cash-flow rights between best and worst case scenario on various independent variables for 200 investments in 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. VC dummies include dummies for the 8 venture capital partnerships with more than 10 observations in our sample. T-statistics are in parentheses and are calculated using White (1980) robust standard errors. Asterisks indicate statistical significance at the 1% ***; 5% **, and 10% * levels.

	% Founder CF rights in max state	**% Founder CF rights in max state**	**% Founder CF rights in max state**	**% Founder CF rights in max state** *First-VC rounds only*	**Max - min % founder CF rights**	**Max - min % founder CF rights**	**Max - min % founder CF rights**	**Max - min % founder CF rights** *First-VC rounds only*
Constant	44.06***				6.05***			
	(13.32)				(2.92)			
Pre-revenue venture	-6.57**	-4.54	-0.14	1.17	5.49***	7.05***	8.70***	13.37***
	(-2.35)	(-1.43)	(-0.04)	(0.24)	(2.60)	(2.84)	(3.61)	(3.17)
Repeat entrepreneur	4.29	6.18	5.96*	2.67	-3.34*	-3.36	-0.32	-0.34
	(1.31)	(1.62)	(1.73)	(0.36)	(-1.71)	(-1.41)	(-0.14)	(-0.06)
Round of VC investment	-5.14***	-5.42***	-4.96***		-0.47	-0.28	-0.67	
	(-5.54)	(-4.82)	(-5.55)		(-0.66)	(-0.32)	(-1.03)	
California		-3.50		-1.37		-3.56		-1.70
		(-0.78)		(-0.22)		(-1.32)		(-0.37)
Midwest		1.68		5.91		-2.15		1.60
		(0.35)		(0.87)		(-0.70)		(0.39)
Northeast		1.92		-2.84		3.95		0.65
		(0.40)		(-0.40)		(1.27)		(0.15)
Biotech		40.90		32.91		5.16		2.17
		(6.98)		(4.01)		(1.42)		(0.36)
IT/Software		46.79		41.29		8.14		0.89
		(9.60)		(6.86)		(2.82)		(0.29)
Telecom		42.96		36.22		6.40		-0.50
		(5.83)		(3.40)		(1.83)		(-0.10)
Healthcare		36.28		22.47		2.78		-2.53
		(4.33)		(3.36)		(1.27)		(-0.65)
Retail		44.68		39.60		6.53		11.83
		(7.85)		(4.08)		(1.38)		(1.74)
Other industries		42.68		39.22		-0.91		0.34
		(6.33)		(4.20)		(-0.22)		(0.10)
VC-firm dummies	N	N	Y	N	N	N	Y	N
Number of observations	167	167	167	75	167	167	167	75
Adj. R-squared	0.14	*(0.78)*	*(0.79*)	*(0.83)*	0.05	*(0.27)*	*(0.45)*	*(0.39)*
Wald test, location dummies		F = 1.21 P = 0.30		F = 0.96 P = 0.39		F = 1.95 P = 0.14		F = 0.17 P = 0.84
Wald test, industry dummies		F = 0.62 P = 0.69		F = 2.11 P = 0.08		F = 1.64 P = 0.15		F = 0.90 P = 0.48
Wald test, VC dummies			F = 2.30** P = 0.02				F = 3.49*** P = 0.00	

Table 11
Determinants of control allocation

A. Determinants of voting control

Ordered logit regressions of degree of VC voting control on various independent variables for 201 investments in 118 portfolio companies by 14 venture capital partnerships. The dependent variable takes the value of 0 if the VCs never have control, 1 if the VCs have control only in the bad state, and 2 if the VCs always have control. Investments were made between 1987 and 1999. Z-statistics are in parentheses. Asterisks indicate statistical significance at the 1% ***; 5% **, and 10% * levels.

	Degree of VC voting control	**Degree of VC voting Control**	**Degree of VC voting control**	**Degree of VC voting control** *First-VC rounds only*
Pre-revenue venture	1.33***	1.39***	0.87**	1.73***
	(3.69)	(3.27)	(2.00)	(2.91)
Repeat entrepreneur	-0.61	-0.99**	-1.33**	0.35
	(-1.52)	(-2.07)	(-2.44)	(0.44)
Round of VC investment	0.45***	0.68***	0.54***	
	(3.21)	(4.20)	(3.41)	
California		-0.92		-2.20**
		(-1.58)		(-2.59)
Midwest		-1.87***		-2.23**
		(-3.03)		(-2.56)
Northeast		-1.49***		-1.40*
		(-2.74)		(-1.75)
Biotech		0.97		0.19
		(1.50)		(0.18)
IT/Software		0.49		0.19
		(0.90)		(0.83)
Telecom		2.25***		2.28*
		(2.59)		(1.90)
Healthcare		2.17**		2.23*
		(2.56)		(1.93)
Retail		0.83		0.05
		(1.23)		(0.04)
VC-firm dummies	N	N	Y	N
Number of observations	167	167	167	75
Pseudo R-squared	0.07	0.16	0.15	0.20
Wald test, location dummies		F=11.07** P=0.01		F=8.33** P=0.04
Wald test, industry dummies		F=12.00** P=0.03		F=8.98 P=0.11
Wald test, VC dummies			F=22.08*** P=0.00	

B. Determinants of board control

Ordered logit regressions of degree of VC board control on various independent variables for 201 investments in 118 portfolio companies by 14 venture capital partnerships. The dependent variable takes the value of 0 if the founder has board majority, 1 if the neither the VCs or the founder has board majority, and 2 if the VCs have board majority. Investments were made between 1987 and 1999. Asterisks indicate statistical significance at the 1% ***; 5% **, and 10% * levels.

	Degree of VC board control	**Degree of VC board Control**	**Degree of VC board Control** *First-VC rounds only*
Pre-revenue venture	0.68*	0.68*	0.94*
	(1.93)	(1.89)	(1.69)
Repeat entrepreneur	-0.10	0.12	0.42
	(-0.24)	(0.27)	(0.51)
Round of VC investment	0.49***	0.49***	
	(3.88)	(3.74)	
California		0.22	0.09
		(0.45)	(0.12)
Midwest		1.23	0.80
		(2.34)	(1.09)
Northeast		0.58	0.50
		(1.24)	(0.66)
Number of observations	159	159	73
Pseudo R-squared	0.06	0.08	0.04
Wald test, location dummies		F=6.23* P=0.10	F=1.49 P=0.68

Note: Industry and VC fixed effects were excluded because of collinearity problems. In particular, one of our VC firms (with more than 10 deals) had no case where the VCs had board majority. Similarly, in one of our industries (retail) there were no cases where the VCs had board majority and in two more industries (telecom and healthcare) there were only one case of founder board majority.

Table 12
Determinants of liquidation rights

Probit regressions on different measures of VC liquidation rights for 118 portfolio companies by 14 venture capital partnerships. Investments were made between 1987 and 1999. T-values are in parentheses and are calculated using White (1980) robust standard errors. Asterisks indicate statistical significance at the 1% ***; 5% **, and 10% * levels.

A. Regression results

	VC redemption rights	VC cumul. dividend	VC cumul. dividend	VC cumul. dividend	VC partic. preferred Claim	VC partic. preferred claim	VC partic. preferred claim
Constant	2.29***	0.34	2.63***	1.98**	-0.78***	0.12	-1.80***
	(4.54)	(1.08)	(2.88)	(2.52)	(-2.58)	(0.13)	(-2.81)
Pre-revenue venture	-0.11	-0.12	-0.53	-0.46	0.43	0.55	0.41
	(-0.17)	(-0.27)	(-0.86)	(-0.79)	(1.00)	(0.95)	(0.79)
Repeat entrepren.	-1.77***	-1.22**	-1.10	-1.45**	0.40	1.25*	0.46
	(-2.77)	(-2.07)	(-1.54)	(-2.06)	(0.75)	(1.78)	(0.59)
California			-1.44*			-0.91	
			(-1.94)			(-1.20)	
Midwest			-0.71			-0.27	
			(-0.99)			(-0.35)	
Northeast			-0.86			-2.73***	
			(-1.11)			(-3.00)	
Biotech			-0.81	-0.93		-1.36	
			(-0.72)	(-0.83)		(-1.31)	
IT/Software			-2.76***	-2.95***		-1.07	
			(-2.73)	(-3.19)		(-1.19)	
Telecom			-0.48	-0.67		0.14	
			(-0.40)	(-0.66)		(0.14)	
Healthcare			-0.82	-0.74		3.34	
			(-0.80)	(-0.70)		(2.74)	
Retail			-1.29	-1.28		0.07	
			(-1.27)	(-1.26)		(0.06)	
VC firm Dummies	N	N	N	N	N	N	Y
Wald test, location dummies			F=3.95 P=0.27			F=10.27** P=0.02	
Wald test, industry dummies			F=12.29** P=0.03	F=16.00*** P=0.01		F=19.85*** P=0.00	
Wald test, VC firm dummies							F=13.31 P=0.10
Number of observations	91	88	88	88	100	100	100
Pseudo R-squared	0.10	0.04	0.23	0.20	0.01	0.28	0.16

B. Differences across VC firms

VC firm no	1	2	3	4	5	6	7	8	9	10	11	12	13	14	All CA VCs	All Non-CA VCs
Number portfolio companies of firm	22	18	10	9	8	9	11	10	6	4	4	3	2	1	96	22
Fraction of deals with redemp. rights	0.95	0.88	0.78	0.78	0.75	0.44	0.91	0.90	1.00	1.00	0.75	1.00	0.50	1.00	0.88	0.62***
Fraction of deals with cumul. div.	0.55	0.44	0.50	0.50	0.50	0.11	0.89	0.70	0.00	0.50	0.00	0.33	0.00	0.00	0.53	0.25**
Fraction of deals with partic. pref.	0.32	0.33	0.40	0.40	0.25	0.56	0.27	0.90	0.17	0.50	0.25	0.00	0.50	0.00	0.36	0.45

C. Differences across location and industry

	Calif.	Midwest	North east	Other Loc.	*KW-Test, location*	Biotech	IT/ Softw.	Telecom	Health	Retail	Oth. Ind.	*KW-Test industry*
Number portfolio companies	34	24	31	28		17	43	15	14	11	18	
Fraction of deals with redemp. rights	0.70	1.00	0.73	0.96	χ^2=5.63 P=0.13	0.75	0.86	0.79	0.86	0.80	0.88	χ^2=0.68 P=0.98
Fraction of deals with cumul. div.	0.25	0.57	0.46	0.67	χ^2=7.72* P=0.05	0.50	0.23	0.57	0.64	0.54	0.71	χ^2=10.76 P=0.06
Fraction of deals with particip. preferred	0.35	0.42	0.23	0.57	χ^2=5.41 P=0.14	0.24	0.26	0.53	0.93	0.36	0.28	χ^2=17.18 P=0.00

Table 13
Determinants of contingencies

Logit regressions of use of contingencies as a function of various independent variables for 201 investments in 118 portfolio companies by 14 venture capital partnerships. Contingencies are based on financial performance, non-financial performance, action, or future financing. Investments were made between 1987 and 1999. T-statistics are in parentheses and are calculated using White (1980) robust standard errors. Asterisks indicate statistical significance at the 1% ***; 5% **, and 10% * levels.

	Any contingencies	**Any contingencies**	**Any contingencies** *First-VC rounds only*	**Cont. on financial performance**	**Cont. on non-financial performance**
Constant	0.28	1.69	1.40	-0.69	-1.84***
	(0.73)	(2.25)	(1.73)	(-1.53)	(-3.88)
Pre-revenue venture	-0.31	-0.51	-0.19	-0.40	1.21**
	(-0.90)	(-1.15)	(-0.30)	(-0.95)	(2.49)
Repeat entrepreneur	-0.86*	-0.26	0.06	-1.47*	-0.90
	(-1.85)	(-0.44)	(0.06)	(-1.89)	(-1.28)
Round of VC investment	-0.27*	-0.40***		-0.17	-0.21
	(-1.89)	(2.62)		(-0.95)	(-1.33)
California		-0.74	-1.54*		
		(-1.20)	(-1.72)		
Midwest		0.64	0.26		
		(1.12)	(0.35)		
Northeast		-0.16	-0.28		
		(-0.32)	(-0.38)		
Biotech		-1.30**	-2.12**		
		(-2.02)	(-2.04)		
IT/Software		-2.04***	-1.94**		
		(-3.41)	(-2.14)		
Telecom		-0.70	-0.07		
		(-0.94)	(-0.06)		
Healthcare		0.11	0.53		
		(0.15)	(0.48)		
Retail		-0.96	-1.33		
		(-1.42)	(-1.17)		
Number of observations	168	168	75	168	168
Pseudo R-squared	0.04	0.17	0.23	0.05	0.08
Wald test, location dummies		F=4.90 P=0.18	F=3.96 P=0.26		
Wald test, industry dummies		F=18.94*** P=0.00	F=13.68** P=0.02		

Table 14
Determinants of ex-ante staging

Logit regressions of use of committed future financing and tobit regressions of fraction of committed future financing to total financing committed as a function of various independent variables for 201 investments in 118 portfolio companies by 14 venture capital partnerships. Contingencies are based on financial performance, non-financial performance, action, or future financing. Investments were made between 1987 and 1999. T-statistics are in parentheses. Logit standard errors are corrected for heteroskedasticity according to White (1980). Asterisks indicate statistical significance at the 1% ***; 5% **, and 10% * levels.

	Committed future financing	**Committed future financing**	**Committed future financing** *First-VC rounds only*	**Committed future financing** *First-VC rounds only*	**Percent of financing committed**	**Percent of financing committed**	**Percent of financing committed** *First-VC rounds only*	**Percent of financing committed** *First-VC rounds only*
Constant	0.05	-0.17	-0.27	0.39	9.39	-5.84	-7.69	15.35
	(0.13)	(-0.23)	(-0.74)	(0.49)	(0.67)	(-0.29)	(-0.60)	(0.78)
Pre-revenue venture	0.23	-0.01	0.35	0.04	9.38	4.06	14.68	4.64
	(0.61)	(-0.01)	(0.66)	(0.05)	(0.74)	(0.35)	(0.90)	(0.34)
Repeat entrepreneur	-1.50**	-1.74**	-2.32*	-2.42	-49.51***	-40.34**	-73.16**	-44.97*
	(-2.44)	(-2.32)	(-1.95)	(-1.38)	(-2.64)	(-2.46)	(-2.35)	(-1.82)
Round of VC investment	-0.34**	-0.21			-16.84***	-8.19*		
	(-2.30)	(-1.31)			(-3.00)	(-1.70)		
California		-0.14		-1.33		-14.41		-46.54**
		(-0.24)		(-1.49)		(-0.88)		(-2.24)
Midwest		0.33		-0.57		8.43		-15.90
		(0.54)		(-0.66)		(0.54)		(-0.94)
Northeast		-0.05		-0.11		-1.39		0.29
		(-0.10)		(-0.14)		(-0.09)		(0.02)
Biotech		0.42		-0.17		14.59		-13.22
		(0.63)		(-0.16)		(0.79)		(-0.54)
IT/Software		-0.29		-0.67		0.38		-16.65
		(-0.52)		(-0.16)		(0.02)		(-0.82)
Telecom		0.45		0.89		34.26		38.45
		(0.60)		(0.86)		(1.59)		(1.61)
Healthcare		2.66***		3.00***		73.57***		45.86**
		(2.84)		(3.06)		(3.65)		(2.03)
Retail		-2.17*		-1.91		-65.55***		-62.04**
		(-1.90)		(-1.33)		(-2.15)		(-1.96)
Number of observations	168	168	74	74	166	166	73	73
Pseudo R-squared	0.08	0.21	0.07	0.28	0.09	0.25	0.06	0.31
Wald test, location dummies		F=0.78 P=0.86		F=2.30 P=0.51		F=0.71 P=0.55		F=2.05 P=0.12
Wald test, industry dummies		F=15.63*** P=0.01		F=19.79*** P=0.00		F=5.48*** P=0.00		F=4.22*** P=0.00

Table 15
Complementarity and substitutability of contractual provisions

Complementarity/substitutability between different control and cash-flow rights for 90 first-round investments by 14 venture capital partnerships. Investments were made between 1987 and 1999. The last columns report results from Kruskal-Wallis chi-squared tests and/or Mann-Whitney tests for differences between groups. Asterisks indicate statistical significance at the 1% ***; 5% **, and 10% * levels.

A. VC voting control

	VC always has voting majority (N=40)		**VC voting maj. only in worst case (N=18)**		**VC never has voting majority (N=32)**		**All groups, Kruskal-Wallis Chi-sq. statistic**	**VC never maj. vs. others, Mann-Whitney Z-statistic**
Financing:	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**		
Amount of financing up front	5.1	4.0	2.5	1.8	3.3	3.0	9.46***	0.31
Amount of financing committed	11.9	6.0	3.3	2.2	3.6	3.0	21.29***	1.47
% committed staged financing	33.5	33.6	12.4	0.0	8.4	0.0	9.83***	2.77***
Ex-ante staging (% of cases)	58.9		27.8		25.0		7.09**	2.82***
Cash-flow incentives:								
Founder best case equity stake, %	24.9	24.0	50.8	51.0	48.9	47.0	38.14***	5.30***
Founder worst case equity stake, %	17.6	12.5	22.6	20.5	48.8	49.5	32.62***	6.04***
Founder best minus worst case stake, %	7.4	3.0	28.1	21.1	0.1	0.0	29.02***	3.37***
Founder (best - worst) / best case stake, %	35.5	30.4	53.1	57.4	3.0	0.0	22.52***	3.59***
Board control (% of cases)								
VC board control	22.5		0.0		3.2		2.73	0.87
Founder board control	7.5		5.9		38.7		5.99**	3.22***
Neither has board control	70.0		94.1		58.1		4.24	2.12**
Default board provision	38.5		11.8		19.3		0.19	0.75
Liquidation rights (% of cases)								
Redemption rights	89.2		80.0		89.7		0.32	0.08
Maturity, years	5.6	5.0	4.7	5.0	5.3	5.0	3.03	1.19
Cumulative preferred dividend	56.8		46.7		50.8		0.62	0.93
Participating preferred stock	50.0		33.3		15.6		6.24**	1.21
Automatic conversion price / stock price	7.9	4.6	7.1	5.0	3.2	3.0	9.22***	2.00**
Contingent contracting:								
Any contingencies	57.5		44.4		28.1		4.55*	1.58
Contingent on financial performance	37.5		27.8		9.7		4.04	2.19**
Contingent on non-financial performance	27.5		16.7		0.0		3.92	2.04**
Other terms (% of cases)								
Full ratchet anti-dilution	31.6		12.5		20.7		1.37	0.06
Weighted average anti-dilution	60.5		81.2		69.0		1.46	0.88
Non-compete clauses	77.4		78.6		65.2		0.71	1.30
Founder vesting, % of cases	55.0		88.9		12.5		21.43***	3.89***

B. Founder pay-performance sensitivity

Financing:	Founder equity stake state-contingent (N=40) Mean	Median	Founder equity stake not state-contingent (N=48) Mean	Median	Mann-Whitney Z-statistic
Amount of financing up front	4.0	3.3	3.8	2.9	0.09
Amount of financing committed	9.4	4.0	4.7	3.0	1.17
% committed staged financing	26.2	0.0	12.7	0.0	2.10**
Ex ante staging	50.0		28.2		2.07**
Cash-flow incentives:					
Founder best case equity stake, %	37.9	37.0	40.0	38.0	0.22
Founder worst case equity stake, %	20.1	12.5	41.7	40.0	4.61***
Founder best minus worst case stake, %	17.7	11.5	-2.1	0.0	(8.19***)
Founder (best - worst) / best case stake, %	52.7	54.9	-5.1	0.0	(8.14***)
Voting control (% of cases)					
VC control in good state	48.0		40.0		0.75
VC control in bad state	82.0		42.5		3.87***
Founder control in good state	36.0		37.5		0.15
Founder control in bad state	8.0		35.0		3.16***
Switch in control in bad state	42.0		2.5		4.31***
Board control (% of cases)					
VC board control	10.2		12.8		0.38
Founder board control	12.2		25.6		1.61
Neither has board control	77.6		61.5		1.63
Default board provision	14.3		20.5		0.77
Liquidation rights (% of cases)					
Redemption rights	93.2		81.1		1.64*
Maturity, years	5.6	5.0	5.1	5.0	1.66*
Cumulative preferred dividend	64.4		34.3		2.66***
Participating preferred stock	38.0		30.0		0.79
Automatic conversion price / stock price	8.9	5.0	3.1	3.0	3.89***
Contingent contracting:					
Any contingencies	54.0		32.5		2.03**
Contingent on financial performance	45.3		23.1		0.52
Contingent on non-financial performance	24.0		5.1		2.41**
Other terms (% of cases)					
Full ratchet anti-dilution	24.4		23.7		0.08
Weighted average anti-dilution	64.4		71.1		0.64
Non-compete clauses	74.4		72.4		0.18
Founder vesting, % of cases	84.0		0.0		(7.90***)

C. Ex-ante staging

	Ex-ante staging (N=34)		No ex-ante staging (N=53)		
Financing:	**Mean**	**Median**	**Mean**	**Median**	**Mann-Whitney Z-statistic**
Amount of financing up front	3.9	3.0	3.9	3.0	0.31
Amount of financing committed	12.5	6.7	3.9	3.0	(3.32***)
% committed staged financing	51.5	50.0	0.0	0.0	-
Contingent future financing (% of cases)	100.0		0.0		-
Cash-flow incentives:					
Founder best case equity stake, %	31.2	32.5	43.9	42.0	3.18***
Founder worst case equity stake, %	21.2	14.0	35.5	39.0	2.94***
Founder best minus worst case stake, %	10.2	5.0	8.3	0.0	1.79*
Founder (best - worst) / best case stake, %	38.5	38.8	19.9	0.0	2.35**
Voting control (% of cases)					
VC control in good state	63.9		30.2		3.13***
VC control in bad state	77.8		54.7		2.21**
Founder control in good state	19.4		49.1		2.82***
Founder control in bad state	5.6		30.2		2.82***
Switch in control in bad state	19.4		28.3		0.94
Board control (% of cases)					
VC board control	17.1		5.8		1.70*
Founder board control	8.6		25.0		1.93*
Neither has board control	74.3		69.2		0.51
Default board provision	31.4		7.7		2.86***
Liquidation rights (% of cases)					
Redemption rights	92.9		84.6		1.06
Maturity, years	5.7	5.2	5.1	5.0	2.29**
Cumulative preferred dividend	69.0		42.0		2.30**
Participating preferred stock	36.1		34.0		0.21
Automatic conversion price / stock price	10.3	5.0	3.8	3.0	2.64***
Contingent contracting:					
Any contingencies	63.9		32.1		2.94***
Contingent on financial performance	34.3		20.8		1.41
Contingent on non-financial performance	31.4		5.7		3.22***
Other terms (% of cases)					
Full ratchet anti-dilution	41.9		13.7		2.87***
Weighted average anti-dilution	41.9		82.4		3.75***
Non-compete clauses	82.1		66.7		1.40
Founder vesting, % of cases	58.3		39.6		1.73*