Investor Abilities and Financial Contracting: Evidence from Venture Capital

by

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Abstract

We investigate how investors' abilities to mitigate agency problems in non-contractual ways impacts contract design. Our empirical setting is the venture capital (VC) industry, in which there are substantial agency problems, considerable flexibility in contract design, and wide variation in the abilities of VCs to monitor and add value to their portfolio companies. Our analysis uses a new database of contractual provisions for investments by 646 private-partnership VCs in 1,266 startup companies over 1,534 investment rounds. We find that more experienced VCs, who likely have better monitoring abilities and whose withdrawal as active, value-added investors is more costly to entrepreneurs, are less likely to use contracts that give them greater cash flow rights if company performance is poor. This result survives a battery of controls for company characteristics, including valuation, as well as specifications that control for endogenous selection effects. The relation between VC experience and downside protections is weaker when agency problems are less severe.

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1. Introduction

Understanding the mechanisms by which investors attempt to control agency problems is a central issue in corporate finance. Financial contracting theories explore how agency problems can be mitigated by the contingent allocation of cash flow and control rights between managers and investors.[1] At the same time, agency problems can potentially be contained through other channels. Investors may stage investments and terminate funding if interim performance is poor (Bolton and Scharfstein, 1990). Investors may also attempt to monitor managerial effort and actions directly. To the extent that these mechanisms address the same types of agency problems as do contracts, contract design should be related to investors' abilities to make effective use of these other mechanisms. Whether this is the case empirically is an important open question.

In this paper we provide evidence on this question from the venture capital (VC) industry. While solutions to agency problems are clearly important in a variety of applications, the VC industry has several advantages as a setting for investigating the interaction between contract design and other solutions to agency problems. VCs are sophisticated financial intermediaries who face substantial information and agency problems, have strong incentives to maximize value and thereby to mitigate these problems, and have considerable flexibility in designing contracts between themselves and the entrepreneurs they finance.[2] In addition, VCs are actively involved in their portfolio companies and almost always stage investments, creating scope for mitigating agency problems through direct monitoring and intervention or refusal to provide follow-on funding.

Our empirical analysis uses a new database of VC contracts covering investments by 646 private-partnership VCs in 1,266 startup companies over 1,534 investment rounds. We focus on six separate contractual terms that can be attached to the convertible preferred equity that is used

[1] See, for example, Jensen and Meckling (1974), Holmstrom (1979), Aghion and Bolton (1992), and Dewatripont and Tirole (1994).
[2] Indeed, Hart (2001) and Kaplan and Strömberg (2003, 2004) argue that VCs and the entrepreneurs they finance closely resemble the principals and agents of theory.

almost exclusively in VC investments (and exclusively in our sample). These terms are redemption rights, anti-dilution rights, liquidation preference, cumulative dividends, participation rights, and pay-to-play provisions.[3] We code each contract term based on the downside protection it offers the VC. A higher score for a given term means that it allocates more cash flow rights to the VC if performance is poor and/or the company valuation upon a subsequent investment or liquidation is low. We add the scores for each contract term to create a downside protection index (DPI).

Our main empirical question is whether the degree of contractual downside protection is related to the abilities of the VC to mitigate agency problems in other ways. It is not obvious what the sign of the relation should be. On the one hand, because affiliation with better VCs is valuable to entrepreneurs (Hsu, 2004), it is possible that better VCs are able to negotiate contracts with more downside protections. On the other hand, downside protections may be superfluous (and even costly from a risk-sharing point of view) if better VCs can contain agency problems in other ways. Indeed, we construct a simple agency model that predicts that VCs with better monitoring or value-add abilities will use contracts with weaker downside protection, and that this relationship will be weaker if agency problems are less severe.

Consistent with the model, our main finding is that more experienced VCs – who because of their superior monitoring and value-added abilities are more likely to be able to contain agency problems through non-contractual channels[4] – are less likely to use contracts that give them greater cash flow rights if company performance is poor. Thus, although all VCs in our sample receive convertible preferred equity in return for their investments, more experienced VCs are less likely to attach contractual provisions that produce a more debt-like payoff structure. In fact, VC firms in the top experience quartile are about twice as likely as VC firms in the bottom experience quartile to use contracts with above-median downside protections. These relations

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[3] The exact meaning, and importance, of these contractual provisions is described in section 4.
[4] See Baker and Gompers (2003), Wongsunwai (2007), Sorensen (2008), and Chemmanur, Krishnan, and Nandy (2008). We discuss this issue in detail in section 2.5.

continue to hold for a variety of different measures of VC experience and for all six contract terms individually in addition to the aggregate DPI.

We also find that the relation between VC experience and downside protections is weaker when agency problems appear less severe. In such cases, the ability of an experienced VC to mitigate agency problems is relatively less important. Specifically, we find that the negative relation between VC experience and DPI is weaker in more mature companies, companies whose founder is a serial founder whose previous company had an IPO, and companies that raise more VC financing.

A potential concern about our empirical results that experienced VCs obtain lower contract DPI is that they are driven by selection. Perhaps more experienced VCs obtain fewer downside protections because they invest in companies with less significant agency problems. Such a story is consistent with Sorensen (2008) and Chemmanur, Krishnan, and Nandy (2007), who provide evidence that experienced VCs invest in higher-quality companies. We address this concern in two ways.

First, the battery of control variables in our main specifications is intended to control for as many factors that might drive selection effects as possible. Notably, the negative relationship between VC experience and downside protection is economically large and statistically significant even after we control for company location, industry, investment year, founder background, round amount, number of round investors, and pre-money valuation. Second, we also control for selection effects in an instrumental variables framework similar to that employed by Botazzi, Da Rin, and Hellmann (2007), who face a similar selection problem. Our main findings are robust to these specifications. Taken as a whole, these results suggest that it is unlikely that our main findings are driven by selection effects.

As further evidence of a link between VC abilities and contract design, we show that VCs that have stronger syndication networks use contracts with less downside protection. Hochberg, Ljungqvist, and Lu (2007) show that better networked VCs have better investment performance.

Moreover, better networked VCs plausibly are more able to credibly transmit negative information about an entrepreneur to other VCs (Robinson and Stuart (2007) make a similar argument in the context of strategic alliances). Taken together, these observations suggest that better networked VCs are more able to contain agency problems through the value of association with them. The result that better networked VCs use contracts with weaker downside protection holds after controlling for VC experience, and is robust to different definitions of network strength.

While our main results explore differences between private partnership VCs, we also compare the downside protections obtained by private partnership VCs to those obtained by corporate and financial VCs. We find that private partnership VCs obtain lower contractual DPI than other VCs, but the difference is only significant for private partnership VCs in the top experience quartile. These results are consistent with the hypothesis that experienced private partnership VCs have greater abilities to mitigate agency problems in non-contractual ways than do corporate or financial VCs. They are also consistent with Botazzi, Da Rin, and Hellmann (2007), who show that independent VC firms are more actively involved in portfolio companies than are VCs that are owned by banks, corporations, or governments, and with Hellmann (2002) Hellmann, Lindsey, and Puri (2008), who argue that bank VCs may have substantially different motivations and behavior than private partnership VCs.

Our work is related and contributes to several strands of literature. We add to the literature that uses the VC industry as a setting to investigate empirical solutions to agency problems. Kaplan and Strömberg (2003, 2004) find that VC contracts vary with the characteristics of the entrepreneur and firm to be financed in a manner that is broadly consistent with financial contracting theories. While their work implicitly treats VCs as a uniform class, this paper examines whether VC contracts also vary with VC quality as measured by experience.

In doing so, our work attempts to unite the literature examining VC contracts through an agency lens with the growing literature that documents that VCs differ in quality, behavior, and ability to add value to their portfolio companies.[5] In particular, our analysis complements that of Hsu (2004), who studies the market for affiliation with high-quality VCs. Hsu finds that entrepreneurs who are offered multiple term sheets choose more reputable (experienced) VCs even though these VCs offer lower pre-money valuations. Our results suggest that entrepreneurs do not similarly "pay" for affiliation with high-quality VCs by offering those VCs superior downside protection. Rather, our results together with Hsu's suggest that experienced VCs optimally use their bargaining power to obtain a higher payoff on the upside rather than to contractually minimize losses on the downside.

Our results are also related to Kaplan, Martel, and Strömberg (2007) who show that VC contracts outside the U.S. are *more* likely to include stronger investor downside protection when the VC is more experienced or has previously syndicated with a U.S. investor. Their findings are consistent with VCs outside the U.S. gradually learning about the benefits of contracts with more contingent allocation of cash flow and control rights.

Finally, our work adds to the literature that examines the interaction between the use of contractual provisions and other solutions to agency problems in other economic settings. Robinson and Stuart (2007) examine contracts governing strategic alliances and find that reputational concerns are a substitute for explicit contractual control mechanisms in mitigating potential moral hazard problems. Corts and Singh (2004) find similar evidence in offshore oil-drilling contracts. Drucker and Puri (2007) examine bank loans, and find that loans sold to third-party investors (who are likely to be at an informational disadvantage) contain more protective covenants than loans that are not sold.

The remainder of the paper proceeds as follows. Section 2 develops our empirical predictions. Section 3 describes the sample. Section 4 discusses the meaning of each contract

[5] Prominent papers investigating differences in VC quality and behavior include Hsu (2004), Kaplan and Schoar (2005), Chemmanur, Krishnan, and Nandy (2007), Zarutskie (2008), Bottazi, Da Rin, and Hellmann (2007), Gompers, Lerner, Kovner, and Scharfstein (2007), and Sorensen (2008).

term and how the downside protection index is computed. Section 5 presents empirical evidence on the relation between contractual downside protection and VC experience. Section 6 concludes.

2. Theoretical discussion and empirical predictions

We construct a simple agency model in order to derive formal propositions about the relationship between the investor's ability to monitor and withdraw value-adding funding and the contractual allocation of cash flow rights. We then show that the contracts that are derived in the model correspond well to the real-world contracts that VCs use, and provide our motivation for why we believe that VC experience is a good proxy for the type of investor abilities that are input parameters in the model. As a final step we map the propositions from the model to the VC setting and derive testable empirical predictions on the relationship between VC experience and contract design.

2.1 Model assumptions

Consider an entrepreneur who owns a project that requires external financing. In the first period, the project needs funding of I_1 and the entrepreneur solicits financial contracts from a large number of identical investors. Conditional on financing in the first and second round, the project has a binary outcome so each financial contract is such that the entrepreneur receives S if the project fails and $(S + S \times q)$ if the project is successful. Thus, q captures the investor's downside protection because because a higher q means a higher relative upside payoff to the entrepreneur. The entrepreneur has no initial wealth so $S \geq 0$ and $q \geq -1$. After the project receives the investment I_1 from the investor, the entrepreneur faces a binary decision of whether to put in effort, which incurs a cost of e, or not.

In the second period, the investor observes with a probability of m the effort level of the entrepreneur. The investor then chooses whether to continue funding the project, which means investing an additional I_2, or terminating the project at no cost. The investment I_2 could be interpreted as a follow-up financing round of effort put in by the investor (at cost I_2). Thus, the parameter m captures both the probability that the investor monitors the entrepreneur and withdraws funding from the project.

In the third period project cash flows, which are verifiable, are realized. Cash flows are C_F if it fails and $(C_F + C_S)$ if the project is successful. If the entrepreneur has put in effort in the first period then the project has a positive probability of being successful, denoted p. If the entrepreneur has not put in effort then the project always fails. If the project is terminated by the investor in the second period, then cash flows are 0. We assume that $C_F < I_2$ so that the investor would want to terminate the project if low effort is observed.

The investor is risk neutral while the entrepreneur is risk averse. To capture risk aversion in a tractable way we define the entrepreneur's utility as

$$U_{entrepreneur} = S + S \times p \times q \times (1 - r) \tag{1}$$

The parameter r captures the degree of risk aversion and $0 < r < 1$. To simplify notation, we define F as profit of a failed project (excluding the effort cost), $F = C_F - I_1 - I_2$. To ensure that there is an internal solution to the model, we need to assume that effort costs are sufficiently high so that the agency problem cannot be solved only with monitoring/withdrawal, formally $([F + C_S \times p] \times m < e)$. Also, the entrepreneur's risk aversion r must be relatively small in relationship to the cost of effort, formally $([F + C_S \times p] \times [1 - r] > e)$.

2.2 *Optimal contract*

The only pure strategy equilibrium is such that the entrepreneur always puts in effort because no effort implies negative payoffs for the investor (by assumption is $C_F < I_2$). If the entrepreneur puts in effort then it is never optimal for the investor to terminate the project in the second period. It can be shown that this is the only equilibrium because any contract that is implied by a mixed strategy equilibrium gives the entrepreneur lower utility than the contract of the pure strategy equilibrium.

In the pure strategy equilibrium, perfect competition between investors means that the investor participation (IR) constraint holds with equality.

$$U_{investor} = F + C_S \times p - S \times (1 + p \times q) = 0 \qquad \text{if entrepreneur puts in effort} \qquad (2)$$

Solving for S gives:

$$S = (F + C_S \times p) / (1 + p \times q) \qquad \text{if entrepreneur puts in effort} \qquad (3)$$

For the equilibrium to hold the entrepreneur's utility of effort needs to be higher than the utility of no effort. Thus, the following incentive (IC) constraint of the entrepreneur needs to hold

$$S \times (1 + p \times q \times [1 - r]) - e \geq S \times (1 - m) \qquad (4)$$

Substituting (3) in (4) and solving for q gives

$$q \geq [e / (F + C_S \times p) - m] / [1 - r - e / (F + C_S \times p)] \times 1 / p \qquad (5)$$

Due to risk aversion, the entrepreneur chooses the contract that has the lowest possible q. To formally see this substitute in (2) in (1) and note how $U_{entrepreneur}$ is decreasing in q.

$$U_{entrepreneur} = (F + C_S \times p) / (1 + p \times q) \times [1 + p \times q \times (1 - r)] \qquad (6)$$

Thus, the optimal equilibrium contract $q^{\sim}$ is defined as

$$q^{\sim} = [e / (F + C_S \times p) - m] / [1 - r - e / (F + C_S \times p)] \times 1 / p \qquad (7)$$

We note that in (7) the numerator is decreasing in m, C_S and p, and the denominator is increasing in p and C_S.

2.3 Propositions about optimal contract and investor abilities

Proposition 1: The optimal contract gives the investor stronger downside protection if the investor has a better ability to monitor and withdraw funding to the project. Proof: The numerator of (7) is decreasing in m.

Proposition 2: The optimal contract gives the investor stronger downside protection if the investor adds more value to the project, as measured by p or C_s. Proof: The numerator of (7) is decreasing in C_S and p and the denominator is increasing in p and C_S.

Proposition 3: The optimal contract gives the investor stronger downside protection if the cost of the entrepreneur's effort is higher. Proof: The derivative of $q^{\sim}$ with respect to e is positive.

$$dq^{\sim} / de = 1 /(F+C_S \times p) \times (1 - r - m) / (1 - r - e / [F+C_S \times p - e])^2 \times 1 / p > 0 \qquad (8)$$

Proposition 4: The sensitivity between the investor stronger downside protection and investor abilities (m, C_S and p) is higher when the cost of the entrepreneur's effort is higher. Proof: Equation (8) is decreasing in m, C_S and p.

2.4 Optimal contract in VC investments

The setup of the model is such that the investor receives cash flows equal to $(C_F - S)$ if the project fails and $(C_F + C_S - S - S \times q)$ if the project succeeds. While this payoff structure cannot be replicated by either straight debt or common equity, it corresponds well to the convertible preferred equity that is almost exclusively used in VC investments. The lower S that is implied by a higher q translates into a higher face value and a higher conversion ratio for both straight convertible preferred and participating preferred. In other words, a higher q means that the convertible enhances its debt component and weakens its equity component.

The variable q also corresponds to contractual mechanisms, such as anti-dilution, that adjust the VC's equity fraction if company valuation is low. The lower S that is implied by a higher q translates into giving the investor a larger number of shares when company performance is bad (cash flows are C_F), which is the implication of stronger anti-dilution protection.

2.5 VC experience and investor abilities

Our model predicts that the investor's ability to monitor and to add value to the company affects contract design. In the context of venture capital, a good proxy for such abilities is experience of the VC firm. VC investing is to a large extent a learning-by-doing task so abilities are overall likely to be higher for firms that have existed for a longer time and invested in more portfolio companies. Also, more experienced VCs are on average better than less experienced

VCs because of the survivorship bias that follows from the fact that poorly performing VCs find it hard to raise follow-up funds (Kaplan and Schoar, 2005).

Recent empirical studies support the notion that more experienced VCs have better monitoring abilities. Baker and Gompers (2003) and Wongsunwai (2007) show that more experienced VCs hold more board seats, which increases their ability to control agency problems by monitoring the entrepreneur and credibly threatening to replace her should she not take the desired actions.[6]

For reputational reasons, more experienced VCs may also be more willing to act on negative information gathered from their monitoring activities and replace or withdraw further funding from a "lazy" entrepreneur. A VC that currently has and in the future will have more portfolio companies has a stronger incentive to show that it takes its role as an enforcer of corporate governance seriously. On the other hand, it is also possible that more experienced VCs may be more lax towards a lazy entrepreneur because tough enforcement could scare future entrepreneurs away. While we cannot empirically rule out this second possibility, it is unlikely that a less experienced VC would have a probability of withdrawing funding conditional on observing a lazy entrepreneur that is so much higher than this conditional probability of a more experienced VC so that the *joint* probability of observing and withdrawal is higher for a less experienced VC.

Another prediction of our model is that the ability of a VC to add value to a project affects the contract design – VCs with greater value-added abilities induce "good behavior" because of the value of a continuing relationship with them. Sorensen (2008) shows that more experienced VCs have better abilities to add value to portfolio companies: companies backed by experienced VCs are more likely to go public, even controlling for selection effects. This view is supported by Chemmanur, Krishnan, and Nandy (2008), who show that companies backed by

[6] Hellmann and Puri (2002) show that founder CEOs are often replaced in venture-backed companies, and it is plausible to assume that experienced VCs can more easily find a good replacement CEO.

more reputable VCs (measured by the VC firm's success in fundraising) have higher sales growth, lower capital expenditures, and lower production and material costs, consistent with better value-add abilities.

Similarly, Hsu (2004) provides evidence that entrepreneurs believe that more experienced VCs have greater ability to add value. Hsu shows that entrepreneurs are more likely to accept financing offers from more experienced VCs even if such offers are financially less attractive than those from less experienced VCs. As such, the refusal of an experienced, prominent VC to participate in a follow-up investment would be more costly to the company than the refusal of an inexperienced VC, both because of the loss of value-added services and because of the negative signal that would be sent to other potential VCs. In unreported tests, we find additional evidence that entrepreneurs prefer financing from more experienced VCs –more experienced VCs are more likely to be repeated investors in a company, i.e. invest in more than just one financing round.

Overall, then, we believe that VC experience is a good empirical proxy for VC abilities to mitigate agency problems through non-contractual channels.

2.6 Empirical predictions

Our two empirical predictions follow from combining the propositions of the model with the notion that more experienced VCs have better abilities to monitor entrepreneurs and a stronger threat to withdraw as investors given their superior value-added capabilities. The first prediction is that more experienced VCs will use contracts with weaker downside protection. The second prediction is that the negative relationship between VC experience and downside protection will be weaker when agency problems are less pronounced.

3. Sample

3.1 Sample description

The sample consists of contracts from 3,394 U.S. private partnership VC investments in 1,534 financing rounds involving 1,266 unique U.S. companies, and so is roughly ten times larger than the sample studied by Kaplan and Strömberg (2003). We obtain the contract data from legal documents that companies are required to file when making changes to the outstanding equity. The fact that our contract data come from mandatory legal findings is important because it means that our sample is relatively free from selection issues. Our sample is random in the sense that it is not selected from a particular type of companies or particular VC firms.

The contract sample has been collected and coded with the help of the venture capital consulting firm VCExperts.[7] While the data provide detailed information on cash flow rights, they do not provide information about the exact allocation of voting rights and board seats. Our contract data only identifies contract terms that apply identically to all investors in a given financing round so the number of unique contracts is 1,534.

For each contract we find the matching financing round in Venture Economics, extract data on company and round characteristics, and identify all the VCs that invested in the round. We exclude companies that did not receive financing from at least one U.S. private partnership VC. Table 1 provides an overview of the sample. Most of our sample involves investments in companies located in California (530 rounds, or 35%) or Massachusetts (247 rounds, or 16%). 425 (28%) of the financing rounds are first-round financings. The sample is recent; 83% of the financing rounds were completed in either 2006 or 2007 and only 1% before 2004. Because a venture-backed company typically needs 4-7 years between first round financing and exit, we cannot yet collect meaningful data on company outcomes. 141 (9%) of our financing rounds

[7] We are very grateful to VCExperts, and in particular to Joseph Bartlett, Cory Buecker, Justin Byers and Michael Ostendorff for all their help with the data.

involve companies in the bio-tech industries, 221 (14%) in the life-science industries, 228 (15%) in media industries, 793 (52%), and 151 (10%) in other industries.

3.2 Summary statistics

Panel B of table 1 displays summary statistics for our sample of financing rounds. For each VC we use VentureEconomics data to create a number of variables to measure the VC's experience at the time of investment, which we use as proxy for VC monitoring and value-add abilities. "VC number of investments", the main independent variable in our empirical work, is the number of unique companies in which the VC had invested. "VC age" is the number of years since the founding of the VC firm. "VC fraction IPO" is the IPO rate of the companies in which the VC had invested, and thus is a measure of VC quality. "VC fund size" is the committed capital of the VC fund, which is again a measure of VC quality to the extent that successful VCs are able to raise larger funds (Kaplan and Schoar, 2005). At the time of a sample financing round, the average VC has invested in 118 companies, is 14.3 years old, and has a historical IPO rate of 11%. The average fund size is $307 million.

In 49% of our sample financing rounds, the VC and company are located in the same state, consistent with VC preferences for geographically proximate investments (Sorensen and Stuart, 2001). 37% of VCs are located in California and 19% in Massachusetts.

We also create measures of the VC's geographical and industry specialization. At the time of a sample financing round, the average VC has made 39% of its historical investments in companies located in the same state and 28% of its historical investments in the same industry as that of the company being financed.

From VentureEconomics, we collect data on when a VC holds board seat in the company being financed. This occurs in 53% of investments in our sample. For such cases, we identify the name of the VC partner and create the variable "VC partner board portfolio", which is the number of company boards of which the VC partner has been a member. This variable is another measure of VC abilities because VC partners with more board experience are likely to be better at monitoring and adding value.

The average company receiving financing in our sample is about 5 years old and receives financing from 4.3 investors, of which 2.2 are private partnership VCs. 91% of our sample financing rounds are syndicated, i.e. involve more than one VC. The average total amount invested in the round is $11.1 million (median $12.7 million). From VentureEconomics and VCExperts we are able to obtain valuation data for roughly half of our financing rounds. For these rounds, the average company pre-money valuation is $47.8 million (median $56.4 million).

Finally, we hand-collect information on the founders of our sample companies. 24% of the founders are serial founders (defined as having previously founded another company). 6% of founders (25% of serial founders) are serial founders at least one of whose previous companies went public in an IPO, and 9% of founders (38% of serial founders) are serial founders at least one of whose previous companies was acquired. The experience of the founder is an important measure of the quality of a company's human capital. Gompers, Kovner, Lerner and Scharfstein (2007a) show that a company started by a serial founder whose previous company was acquired or went public is more likely to be successful.

4. Contract terms and downside protection index

We code six important contract terms for each of the 1,534 unique contracts in our sample. The contract terms that we study are cumulative dividend rights, liquidation preference, participation rights, anti-dilution rights, redemption rights, and pay-to-play requirements. The exact meaning and economic importance of each term is described below. The six contract terms all affect the cash flow rights that are attached to the preferred stock that VCs receive in exchange for their investment. Because VC financing contracts call for the mandatory or "automatic" conversion of preferred stock to common stock if performance is sufficiently good (usually upon a successful IPO or an acquisition at a high price), the cash flow rights attached to preferred stock only have bite if company performance is poor, and thereby are downside protections for the VC.

Even if the selling price is such that mandatory conversion of the preferred stock does not occur, the contract terms that we study have stronger bite if company performance is poor. For example, anti-dilution rights gives the VC more shares if the company secures a financing round at a lower valuation, redemption rights are effectively only exercised by the VC if company performance is bad, and dividends and liquidation preference give the VC a higher fraction of total cash flows when company performance is poor (total cash flows are smaller).

We code each contract term based on how favorable it is to the VC. Redemption rights are coded as present (1) or not present (0), and the remaining five contract terms are coded as 0, 1 or 2. A higher value indicates that the contract term provides more downside protection for the VC. In particular, a contract with more downside protections allocates relatively more cash flow rights to the VC if company performance is bad.

In the following subsections we describe each contract term and our coding scheme in more detail.

4.1 Cumulative dividends

Cumulative dividend rights give the VC the right to receive dividends every year until the company is sold or liquidated. Cumulative dividends accumulate and are not paid out in cash to the VC until the company has a liquidation event, and are a claim on company cash flows senior to that of common stock.[8] The dividend rights are expressed as a percentage of the VC's investment and are typically compounding, meaning that investors also earn dividends on accumulated, unpaid dividends. As an illustration, suppose the VC invests \$2 million and receives 8% in compounding cumulative dividends. If the company is sold after 5 years for \$10 million, then the VC receives $(1.08^5 - 1) \times \$2$ million = \$0.94 million in dividends.

[8] A liquidation event is a merger, acquisition, or bankruptcy or other dissolution of the company.

Table 2 shows that 65% of our sample contracts include no cumulative dividends (downside protection=0). The most common dividend rate is 8% and 28% of all contracts have a rate of 8% or less (downside protection=1), and the remaining 7% of contracts have a dividend rate above 8% (downside protection=2). These figures are similar to those for Kaplan and Strömberg's (2003) sample, in which 44% of all financing rounds have cumulative dividends and the median dividend rate is 8%.

4.2 Liquidation preference

Liquidation preference is the multiple of the VC's investment amount that he receives when the company has a liquidation event. Liquidation preference is claim on company cash flows senior to that of common stock. Thus, for an investment of $2 million, a liquidation preference of 2X means that the VC gets the first $4 million of proceeds in liquidation. Unlike cumulative dividends, the amount of the VC's liquidation preference does not increase over time.

Table 2 shows that 92% of our sample contracts have a 1X liquidation preference (downside protection=0) and 6% have above 1X and up to 2X (downside protection=1). Only 22 contracts in our sample (1%) have a liquidation preference above 2X (downside protection=2).

4.3 Participation rights

If a VC's preferred stock is not participating, the VC effectively holds a convertible and has the option, at the time of the liquidation event, of receiving either the liquidation preference or converting the preferred stock to common stock. The conversion is typically 1:1, and gives the VC common ownership equal to the ratio of the VC's investment amount to the post-money valuation of the round.

As an illustration of (non-participating) convertible preferred stock, suppose the VC invests $2 million at a $10 million post-money valuation with a 1X liquidation preference. When the company is sold the VC can either claim $2 million in liquidation preference or 20% (2/10) of the common stock. The VC would choose to convert if and only if the proceeds from the company are above $10 million.

If the preferred stock is instead participating, the VC does not have to choose between the liquidation preference and converting the preferred stock to common stock but instead receives both. Building on the example, participating preferred stock would give the VC both $2 million and 20% of the common equity. If the company is sold for $7 million then the VC receives $2 million in liquidation preference and $1 million in common stock (20% of the remaining $5 million).

Participation can either be unconditional, as described above, or conditional on how large the cash flows to the VC are. With such “capped” participating preferred stock the VC always gets the common stock but receives the liquidation preference only if the VC’s cash flows are below a specified multiple of the VC’s investment.

In our sample, 29% of contracts have (non-participating) convertible preferred stock (downside protection=0) and 25% have capped participating preferred stock (downside protection=1). 46% of our contracts have uncapped participating preferred stock (downside protection=2). By comparison, in Kaplan and Strömberg’s (2003) sample 39% of contracts have participating preferred stock (whether capped or uncapped).

4.4 Anti-dilution

If anti-dilution is included in the contract, the VC is issued more preferred stock if and only if the price per share at which a future financing round is conducted is below the price that the VC paid in the earlier financing round. Hence, anti-dilution only comes into effect when the company raises a follow-up round at a lower valuation. Anti-dilution comes in two forms, weighted average and full ratchet. Of the two, full ratchet is more generous to the VC in that the VC receives more shares, especially if the new financing round is small relative to the previous round.

Anti-dilution seems to be almost a boilerplate provision in VC contracts. Only 2% of contracts in our sample have no anti-dilution (downside protection=0). Weighted average is most common and found in 89% of all contracts (downside protection=1), while only 10% of contracts have full ratchet anti-dilution (downside protection=2). By comparison, in Kaplan and Strömberg's (2003) sample, 5% of contracts have no anti-dilution, 73% have weighted average anti-dilution, and 21% have full ratchet anti-dilution.

4.5 Redemption rights

Redemption rights give the VC the right to sell back his preferred stock to the company after a specified period of time, for the price the VC originally paid. Redemption rights are essentially a put option. In practice, the redemption option is only exercised by the VC if the company is performing poorly, because the VC's redemption proceeds are limited to the amount of the VC's investment. In this situation the company is unlikely to repay the VC the investment amount so redemption effectively forces the company into bankruptcy.[9]

In our sample, redemption is not included in 39% of contracts (downside protection=0) and is included in 61% (downside protection=1). By comparison, redemption rights are present in 79% of contracts in Kaplan and Strömberg's (2003) sample.

4.5 Pay-to-play

The final contract term that we code is pay-to-play, which unlike the other terms is not favorable to the VC. When pay-to-play is included in the contract, a VC that chooses to not invest in follow-up financing rounds of the company is forced to give up some or all of the control and cash flow rights that are attached to the preferred stock. To be consistent with the coding of the other contract terms we give a lower score to a pay-to-play provision that is less favorable to the VC.

[9] We have interviewed VC partners and lawyers about how redemption rights are used in practice.

Pay-to-play is not included in 82% of the sample contracts (downside protection=2). Pay-to-play in which the VC loses some (but not all) contractual rights, typically anti-dilution, is found in 4% of contracts (downside protection=1). Pay-to-play in which the VC loses all contractual rights is forced to convert to common stock is found in 13% of the contracts (downside protection=0).

4.6 Cross-correlations of contract terms

Panel B of table 2 displays a cross-correlation matrix for the different contract terms. For the most part, the contract terms are positively correlated with one another; that is, contracts involving one type of downside protection tend to include others as well. The major exception is pay-to-play, which is not significantly positively correlated with any of the other contract terms.

4.7 Aggregation to downside protection index

To study the six contract terms jointly, we aggregate the terms to an index that measures the overall downside protections the contract offers the VC. The ideal aggregation method would work as follows. First, for each financing round in our sample and for each outcome contingency, we would calculate the exact joint cash flow implications of the contract terms that we study. Second, we would calculate the expected value of these cash flows implications using the expected probability distribution of outcomes. This calculation is difficult because almost all input data is unavailable – we do not know the probability that the company will raise a follow-up financing round (which affects both anti-dilution and pay-to-play), the probability that VCs will use the redemption option, the probability distribution of sale or liquidation cash flows, and the timing of the liquidation event.

In light of these difficulties, we create our downside protection index using the most naïve and transparent aggregation method available to us – adding the downside protection scores of each contract term together.[10]

Figure 1 shows the distribution and summary statistics of the resulting downside protection index (DPI). The index appears to be approximately normally distributed with mean 4.94 and standard deviation 1.65. The distribution of downside protection is relatively narrow with 88% of all observations having a DPI between 4 and 8. All but one contracts have at least one contract term attached to the preferred stock and one contract has the maximum harshness value of 11 (1+2+2+2+2+2). Contracts with DPI above 5 (the median DPI) are classified as "High DPI" and contracts with 5 or below are classified as "Low DPI". About 38% of all contracts have high DPI.

5. Empirical analysis

In this section we provide empirical evidence that more experienced VCs have less downside protection, which is the first prediction of our model, and that this relation is weaker when agency problems appear less severe, which is the second prediction of our model.

5.1 Relation between downside protection and VC experience

Table 3 presents a univariate comparison of the mean of individual contract terms and contract DPI for different quartiles of VC experience, measured by "VC number of investments". This table shows that more experienced VCs use fewer contract terms that gives the VC downside protection, and thereby has a lower DPI. DPI for the 4th quartile of VC experience, which includes VCs with the lowest number of investments, is 5.31 and DPI for the 1st quartile of VC experience, which includes VCs with the highest number of investments, is 4.36.

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[10] Gompers, Ishi and Metrick (2004) similarly add together scores for various corporate governance measures to arrive at a corporate governance index for firm.

In practice, contract DPI is correlated with many factors, including company and founder characteristics, geographical location of the company or VC, and year of the investment. To control for such factors, we run a multivariate regression where DPI is regressed on various measures of VC experience. Table 5 presents regressions where the unit of observation is a VC investment. The regressions include controls for whether the VC firm and company are located in the same state, the company's age, whether the founder is a serial founder, whether the founder is a serial founder whose previous company went public in an IPO, whether the founder is a serial founder whose previous company was acquired, the round number, the amount invested in the round, and the total number of VCs investing in the round. The regressions also include fixed effects for VC firm location (California, Massachusetts, Texas, New York, and other states), company location (state), company industry (VentureEconomics 10-level classification), and year of investment round.

These controls are intended to capture aspects of the company and entrepreneur that might affect contract terms, and thereby to make it less likely that coefficients on VC experience actually reflect selection effects. We address the selection issue in more detail in section 5.5.

Because all VCs investing in a round receive the same contract, we compute standard errors by clustering residuals by both VC firm and portfolio company using the two-way method of Petersen (2007). In table 7, we show that our conclusions hold when we collapse the data to only one observation per investment round.

The results in table 4 are easily summarized. Controlling for company and round characteristics, experienced or successful VCs use contracts with significantly lower DPI. This finding is consistent with the first prediction of our model.

Specifications 1-5 show that this result holds no matter whether we measure VC experience as the number of historical investments ("VC number of investments"), the age of the VC firm, or the size of the VC fund. Figure 2 illustrates the negative relation between "VC number of investments" and DPI.

The economic magnitude of the effect is substantial. Doubling “VC number of investments” is associated with a 12 percentage point lower probability of DPI greater than 5, and VCs in the top experience quartile have a DPI score that is 0.50 lower than other VCs and 0.56 lower than VCs in the bottom experience quartile. These coefficients are substantial relative to the sample average DPI of 4.94 and correspond to about one third of a standard deviation.

The significantly negative coefficients on “VC IPO ratio” in specifications 6 and 7 suggest that the historical success of the VC, rather than simple longevity or number of portfolio companies invested in, is an important determinant of contractual downside protections. This result is intuitive: the ability to mitigate agency problems is likely to be associated with VC success.

Gompers, Kovner, Lerner and Scharfstein (2007b) show that VCs that focus their investments in fewer geographical areas or industries have higher successful rates than VCs that invest in many different areas and industries. This suggests that more focused VCs have higher abilities and could use contracts with weaker downside protection. We include “VC focus in state” and “VC focus in industry” , which measure the fraction of the VC’s historical investments in companies in the same state and industry respectively as the current company, as measures of VC monitoring and value-add abilities. The significantly negative coefficient on “VC focus in industry” suggests that focused VCs have better abilities to implement non-contractual solutions to agency problems.

The coefficients on the control variables in table 4 are generally insignificant, with three important exceptions. First, the coefficient on company age is significantly positive. This result is surprising because agency problems in particular should decrease as the company matures. However, the coefficient on round amount, which is another proxy for maturity insofar as more mature companies require more capital to grow, is significantly negative and of similar magnitude as the coefficient on company age.

The third significant control variable is “Serial founder with IPO”, while “Serial founder” is not significant. Kaplan and Strömberg (2003) find that serial founders receive better terms from VCs on a variety of dimensions, but do not distinguish between successful and unsuccessful serial founders. Our results suggest that the past success of a serial founder is an important indication of entrepreneur and company quality, and so is an important determinant of the downside protections provided in the financing contract. This finding is intriguing in light of Gompers, Kovner, Lerner and Scharfstein’s (2007a) finding of no significant relationship between founder experience and company valuation. Taken together, their results and ours suggest that even though successful serial founders are not able to negotiate higher valuations per se, they do raise capital at more attractive terms because the VCs get less downside protection.

5.2 Individual Contract Terms

To verify that the main empirical results are not driven by our choice of aggregation method, we run separate probit regressions for each individual contract term. These regressions are displayed in table 5. In table 5, the dependent variable takes the value 1 if cumulative dividends are present (specification 1), if the liquidation preference is above 1X (specification 2), if preferred stock has participation (specification 3), if full-ratchet anti-dilution is present (specification 4), if redemption rights are present (specification 5), and if pay-to-play is not present (specification 6), and 0 otherwise.

In table 5 and subsequent tables we focus on the “VC number of investments” measure of VC experience. In untabulated regressions we use “VC age” and “VC IPO rate” and obtain similar results. The results using individual contract terms are similar using the other measures described in sections 3 and 5.1.

Consistent with the results in table 4, the coefficient on “VC number of investments” in table 5 is negative and significant for all individual contract terms. The coefficients on the control variables are also consistent with those in table 4, though the effects of the control variables tend to be less statistically significant. We are unable to cluster by both VC firm and portfolio company in the probit specifications in table 5 because the resulting residual covariance matrixes are not positive definite. The residuals in table 5 are instead clustered by portfolio company (only). Linear probability models analogous to the specifications in table 5, in which we are able to cluster by both VC firm and portfolio company, yield similar results. These results suggest that the results in table 4 (and those that follow) are unlikely to be driven by our choice of aggregation method.[11]

5.3 Interaction Effects

Our theoretical discussion in section 2 suggests that the relation between VC experience and contract DPI should be weaker when agency problems are less severe. To test this hypothesis, we interact "VC number of investments" with several proxies for the degree of agency problems. Table 6 displays the results.

We first investigate whether the relation between VC experience and DPI depends on the background of the entrepreneur. Agency problems are likely to be less severe for serial founders, particularly when the founder has proven his quality with previous success. Gompers, Kovner, Lerner and Scharfstein (2007a) find that such founders have a higher probability of success. The first and second specifications of table 6 present evidence consistent with this idea: the relation between DPI and VC experience is weaker, but not significantly so, when the company founder is a serial founder. When the company founder is a serial founder whose previous company went public in an IPO, the relation between DPI and VC experience disappears.

The third specification of table 6 shows that the relation between VC experience and DPI is strongest for first round investments, when the success probability the lowest and agency problems should be most severe and, and weakens for subsequent financing rounds. Similarly,

[11] We also check the robustness of our results by redefining DPI as the simple sum of a binary coding of each contract term. We obtain qualitatively similar results in untabulated regressions when using this definition of DPI as our measure of downside protection.

the relation between VC experience and DPI weakens with company age. The estimated coefficient on this interaction term is however not significant.

Specification 5 of table 6 includes an interaction between VC experience and the total amount invested in the round. Companies that are able to raise more VC financing may be more mature and thereby have lower agency problems and a higher probability of success. We find that the relation between VC experience and DPI weakens with the round amount.

Overall, the evidence in table 6 supports the second prediction of our model that the relation between VC experience and contract DPI is weaker when agency problems are less severe. In untabulated regressions, we use “VC age” and “VC IPO ratio” as measures of VC experience and obtain qualitatively similar results as those shown in table 6.

5.4 Robustness

Table 7 presents several specifications that explore the robustness of our main findings. In specifications 1 and 2 we investigate the idea that the negative relation between contract DPI and VC experience may be driven by unobserved company quality rather than the experience of the VC. To address this concern, we include a control for the pre-money valuation of the company, which almost by definition captures company-specific value-relevant factors missed by our other control variables. We have valuation data for slightly over half our investment rounds.

Table 7 shows that the negative relation between VC experience and contract DPI are robust to controlling for company pre-money valuation. The coefficient on company pre-money valuation is negative and almost statistically significant, which is consistent with the idea the pre-money valuation is a useful measure of company quality

Specifications 3-5 of table 7 investigate whether the relation between VC experience and contract DPI is driven by the experience of the VC firm per se or rather by the abilities of specific VC partners. To address this question, we limit our sample to investments in which the VC takes a board seat and control for the number of boards on which the specific VC partner on the board has previously sat. Specifications 3-5, taken together, indicate that the general abilities of the VC partnership as a whole are more important in contract design than the specific abilities of the partner on the board.

Specifications 6 and 7 of table 7 collapse the data to one observation per investment round, using the experience of the lead VC and the average experience of the round VCs, respectively, as the measure of VC experience. The negative relation between VC experience and contract DPI holds in these specifications. Finally, specification 8 of table 7 restricts the sample to only one investment per company per VC firm. Again, the negative relation between VC experience and contract DPI holds.

The results presented in table 7 show that the negative relation between VC experience and contractual downside protection is also found in more conservative empirical estimations. In untabulated regressions we obtain similar results to those presented in table 7 when we use "VC age" and "VC IPO rate" as measures of VC experience.

5.5 Endogenous selection

In this subsection, we consider in detail whether selection biases are likely to be driving our main results. Despite the battery of control variables used in our regressions so far, it remains possible that the observed negative correlation between VC experience and contract DPI simply reflects selection effects wherein more experienced VCs invest in companies that are less prone to asymmetric information and agency problems. The problem we face here is very similar to that faced by Botazzi, Da Rin, and Hellmann (2007), and we follow their approach to examine whether selection issues are likely to be driving our results.

The first approach is based on instrumental variables. Our instrument for VC experience is the local availability of experienced VCs, which is very similar to Berger et al. (2005) who instrument an individual bank's size with the median size of banks in the local market. Botazzi, Da Rin, and Hellmann (2007) point out that if VC markets are segmented (at least to some extent), then while a company's choice of VC is endogenous, the local availability of experienced VCs from which to choose is exogenous. As such, it is reasonable to instrument VC experience with the local availability of experienced VCs – the latter plausibly helps determine which VC is chose but not what contract is written conditional on the choice of VC.

In the first three specifications of table 8, we conduct such an instrumental variables analysis, in which we instrument for the VC experience (number of portfolio companies, age, IPO ratio) variables using the average experience (number of portfolio companies, age, IPO ratio) at the time of investment of all VC firms located in the same state as the company receiving investment. From this average we exclude the actual VC investor because we do not want to contaminate our instrument by using an observation as its own instrument. The negative relations between the measures of VC experience and contract DPI are robust to these specifications, though the coefficient on VC age is not quite significant.

The second approach considered by Botazzi, Da Rin, and Hellmann (2007) is a variant of the rich identification strategy of Ackerman and Botticini (2002). The identifying assumption is that the distribution of local market characteristics is exogenous, and matching is determined both by the availability of experienced VCs and by the number of companies seeking financing. As such, VC experience can be instrumented by market fixed effects (which subsumes the approach described in the previous two paragraphs). We instrument for VC experience (age, IPO ratio) using a set of fixed effects representing the interaction between company state (50 states) and industry (10 VentureEconomics industries), for a total of 500 fixed effects. The second three specifications of table 8 show that our main results are robust to these specifications.

Our final approach is what Botazzi, Da Rin, and Hellmann (2007) label the "Sorensen-Heckman" approach. This approach is based on combining the insight of Sorensen (2008) that there is information in all potential matches (including unrealized ones) in a market with the selection framework of Heckman (1979). Following Sorensen (2008), we form all potential matches between VC firms and companies in our sample and run a Heckman model where the dependent variable in the selection equation takes the value 1 if the match is a realized match and 0 otherwise. Due to computational limitations, we restrict the sample to VC firms and companies that are located in the five states that have the largest VC markets, which are California, Massachusetts, Texas, New York and North Carolina. We use "VC number of investments", "VC age" and "VC IPO rate" as measures of VC experience and find that the negative coefficient remains after controlling for endogenous selection using the Sorensen-Heckman approach.

Overall, the results in table 8 suggest that it is unlikely that the observed negative correlation between VC experience and contract DPI remains significant even after controlling for endogenous matching and selection.

5.5 *Network measures*

We also investigate whether better-networked (as opposed to more experienced) VCs also use contracts with lower downside protection. In doing so, we are motivated by Hochberg, Ljungqvist, and Lu's (2007) findings that better-networked VCs have better investment performance. It is also plausible that better-networked VCs are more able to credibly transmit negative information about an entrepreneur to other VCs (Robinson and Stuart (2007) make a similar argument in the context of strategic alliances). These observations suggest that better networked VCs are more able to contain agency problems through the value of association with them.

Table 9 provides evidence consistent with this view. Better-networked VCs use contracts with lower DPI. This relation is robust to different measures of network strength, and holds even after controlling for VC experience.

5.6 Out-of-sample evidence

Our analysis so far has focused on contract differences between private partnership VCs of differing experience. At the same time, a growing literature explores the activities of corporate and bank VCs. In particular, Botazzi, Da Rin, and Hellmann (2007) document that independent VC firms are more actively involved in portfolio companies than are VCs that are owned by banks, corporations, or governments. In light of their work, one might expect independent VC firms to be better at mitigating information and agency problems in non-contractual ways and, therefore, to use contracts with weaker downside protection.

Table 10 provides evidence consistent with this view. In the table, we expand our main tests to include VC firms that are not organized as private partnership VCs. Such VCs include corporate VCs, financials VC, VCs affiliated with a consulting firm, and endowments and foundations that make direct investments into companies. When including such VC firms, the total number of VC investments increases to 4,451, of which 271 (6.1%) are financial VCs, 339 (7.6%) are corporate VCs, and 447 (10.0%) are other non-private partnership VCs. Table 9 shows that only the most experienced (top quartile) private partnership VCs have lower contract DPI on average than corporate or financial VCs. The last column of table 9 shows that corporate, financial and other non-private partnership VCs do not significantly differ in contract DPI.

These results are consistent with Hellmann (2002) and Hellmann, Lindsey, and Puri (2008), who argue that bank VCs may have substantially different motivations and behavior than private partnership VCs. Our evidence suggests that bank VCs (and financial VCs generally) place a greater emphasis on downside protection than do private partnership VCs.

6. Conclusion

This paper presents evidence consistent with the prediction that investors who are more able to mitigate agency and information problems through non-contractual means - such as monitoring or the threat of refusing follow-up financing – will use financial contracts with weaker downside protection. Our evidence comes from the VC industry, in which there are significant agency problems, large differences in investor abilities, and substantial variation in contractual solutions.

While all VCs in our large sample use convertible preferred equity, more experienced VCs are less likely to add on contractual terms that make the payoff structure more similar to that of a standard debt contract. This result holds for both the aggregate investor downside protection and for individual contractual terms, and is robust to controls for company characteristics and for endogenous selection effects. In the cross-section, the relation between VC experience and downside protections is weaker when agency problems appear less severe.

Our work is related and contributes to several strands of literature. We add to the literature that uses the VC industry as a setting to investigate empirical solutions to agency problems. Kaplan and Strömberg (2003, 2004) find that VC contracts vary with the characteristics of the entrepreneur and firm to be financed in a manner that is broadly consistent with financial contracting theories. While their work implicitly treats VCs as a uniform class, this paper examines whether VC contracts also vary with VC quality as measured by experience.

In doing so, our work attempts to unite the literature examining VC contracts through an agency lens with the growing literature that documents that VCs differ in quality, behavior, and ability to add value to their portfolio companies. In particular, our analysis complements that of Hsu (2004), who studies the market for affiliation with high-quality VCs. Hsu finds that entrepreneurs who are offered multiple term sheets choose more reputable (experienced) VCs even though these VCs offer lower pre-money valuations. Our results suggest that entrepreneurs do not similarly "pay" for affiliation with high-quality VCs by offering those VCs superior downside protection. Rather, our results together with Hsu's suggest that experienced VCs optimally use their bargaining power to obtain a higher payoff on the upside rather than to contractually minimize losses on the downside.

Our results are also related to Kaplan, Martel, and Strömberg (2007) who show that VC contracts outside the U.S. are *more* likely to include stronger investor downside protection when the VC is more experienced or has previously syndicated with a U.S. investor. Their findings are consistent with VCs outside the U.S. gradually learning about the benefits of contracts with more contingent allocation of cash flow and control rights.

Finally, our work adds to the literature that examines the interaction between the use of contractual provisions and other solutions to agency problems in other economic settings. Robinson and Stuart (2007) examine contracts governing strategic alliances and find that reputational concerns are a substitute for explicit contractual control mechanisms in mitigating potential moral hazard problems. Corts and Singh (2004) find similar evidence in offshore oil-drilling contracts. Drucker and Puri (2007) examine bank loans, and find that loans sold to third-party investors (who are likely to be at an informational disadvantage) contain more protective covenants than loans that are not sold.

References

Aghion, Philippe and Patrick Bolton 1992, "An Incomplete Contract Approach to Financial Contracting", *Review of Economic Studies* 59:473-494.

Baker, Malcolm and Paul Gompers 2003, "The Determinants of Board Structure at the Initial Public Offering", *Journal of Law and Economics* 46:569-598.

Bolton, Patrick and David S. Scharfstein 1990, "A Theory of Predation Based on Agency Problems in Financial Contracting", *American Economic Review* 80:93-106.

Bottazi, Laura, DaRin, Marco and Thomas Hellmann, 2007, "Who Are the Active Investors? Evidence from Venture Capital", *Journal of Financial Economics*, forthcoming.

Chemmanur, Thomas, Karthik Krishnan and Debarshi Nandy, 2007, "How does Venture Capital Financing Improve Efficiency in Private Firms? A Look beneath the Surface" working paper.

Corts, K. and J. Singh 2004, "The Effect of Repeated Interaction on Contract Choice: Evidence from Offshore Drilling", *Journal of Law, Economics, and Organization* 20:230-260.

Dewatripont, Mathias and Jean Tirole 1994, "A theory of debt and equity: Diversity of securities and manager-shareholder congruence", *Quarterly Journal of Economics* 109:1027-1054.

Drucker, Steven and Manju Puri 2008, "On Loan Sales, Loan Contracting, and Lending Relationships", *Review of Financial Studies,* forthcoming.

Gompers, Paul 1998, "An Examination of Convertible Securities in Venture Capital Investments", working paper.

Gompers, Paul, Joy Ishii, and Andrew Metrick 2003, "Corporate Governance and Equity Prices", *Quarterly Journal of Economics* 118:107-155.

Gompers, Paul, Anna Kovner, Josh Lerner, and David Scharfstein 2007a, "Skill vs. Luck in Entrepreneurship and Venture Capital: Evidence from Serial Entrepreneurs", working paper.

Gompers, Paul, Anna Kovner, Josh Lerner, and David Scharfstein 2007b, "Specialization and Success: Evidence from Venture Capital", working paper.

Hart, Oliver 2001, "Financial Contracting", *Journal of Economic Literature* 39:1079-1100.

Hellmann, Thomas 2002, "A Theory of Strategic Venture Investing", *Journal of Financial Economics* 64:285-314.

Hellmann, Thomas, Laura Lindsey, and Manju Puri 2008, "Building Relationships Early. Banks in Venture Capital", *Review of Financial Studies* 21:513-541.

Hellmann, Thomas and Manju Puri, 2002, "Venture Capital and the Professionalization of Startup Firms: Empirical Evidence" *Journal of Finance*, 57, 169–197.

Holmström, Bengt 1979, "Moral Hazard and Observability", *Bell Journal of Economics* 10:74-91.

Hochberg, Yael, Alexander Ljungqvist, and Yang Lu 2007, “Venture Capital Networks and Investment Performance”, *Journal of Finance* 62:251-301.

Hsu, David 2004, “How Much Do Entrepreneurs Pay for Venture Capital Affiliation”, *Journal of Finance* 59: 1805-1844.

Hsu, David 2007, “Experienced Entrepreneurial Founders, Organizational Capital, and Venture Capital Funding”, *Research Policy* 36, 722-741.

Kaplan, Steven, Frederic Martel, and Per Stromberg 2007, “How do Legal Differences and Learning Affect Financial Contracts”, *Journal of Financial Intermediation* 16:273-311.

Kaplan, Steven and Per Strömberg 2003, ”Financial contracting meets the real world: An empirical analysis of venture capital contracts”, *Review of Economic Studies*, 70, 281-316.

Kaplan, Steven, and Per Strömberg 2004, ”Characteristics, Contracts, and Actions: Evidence from Venture Capitalist Analyses”, *Journal of Finance* 59, 2177-2210.

Lerner, Joshua 1995, “Venture Capitalists and the Oversight of Private Firms”, *Journal of Finance* 50:301-318.

Petersen, Mitchell 2007, “Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches”, *Review of Financial Studies,* forthcoming.

Robinson, David and Toby Stuart 2007, “Network Effects in the Governance of Strategic Alliances”, *Journal of Law, Economics, and Organization* 23:242-273.

Sorensen, Morten 2008, “How Smart is Smart Money? A Two-Sided Matching Model of Venture Capital”, *Journal of Finance*, forthcoming.

Sorenson, Olav, and Toby E. Stuart 2001, "Syndication Networks and the Spatial Distribution of Venture Capital Investments." *American Journal of Sociology* 106: 1546-1586.

Wongsunwai, Wan 2007, “Does Venture Capitalist Quality Affect Corporate Governance?”, working paper.

Zarutskie, Rebecca 2008, “The Role of Top Management Team Human Capital in Venture Capital Markets: Evidence from First-Time Funds”, *Journal of Business Venturing,* forthcoming.

Table 1 - Sample Overview and Summary Statistics

The sample consists of venture capital (VC) financing contracts from U.S. companies that receive financing from (at least one) U.S. Private Partnership VC. Each contract is matched by company name and round date with an investment round listed in Venture Economics. All VC variables are updated to match the year of the contract.

Panel A: Sample Overview

	Unique VC Investment Rounds	Unique Rounds	First Round	Unique Companies	Unique VC Firms
	3,394	1,534	425	1,266	646
Company Location	CA	MA	TX	NY	Other
# of Rounds	530	247	108	95	554
Percent	*35%*	*16%*	*7%*	*6%*	*36%*
Round Number	1	2	3	4	5 or above
# of Rounds	425	277	229	207	396
Percent	*28%*	*18%*	*15%*	*13%*	*26%*
Year of Round	before 2004	2004	2005	2006	2007
# of Rounds	17	26	227	668	596
Percent	*1%*	*2%*	*15%*	*44%*	*39%*
Industry Group	Bio-Tech	Life-Science	Media	High Tech.	Other
# of Rounds	141	221	228	793	151
Percent	*9%*	*14%*	*15%*	*52%*	*10%*

Panel B: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
VC Number of Investments	3,394	118	144	0	779
VC Age	3,394	14.3	11.2	0.0	47.0
VC Fraction IPO	3,394	0.11	0.09	0.00	1.00
VC Fund Size ($ million)	2,581	307	361	0.2	5,000
VC and Company in Same State	3,394	0.49	0.50	0.00	1.00
VC in California	3,394	0.37	0.48	0.00	1.00
VC in Massachusetts	3,394	0.19	0.39	0.00	1.00
VC Focus in Geography	3,394	0.39	0.32	0.00	1.00
VC Focus in Industry	3,394	0.28	0.20	0.00	1.00
VC Board Seat	3,394	0.53	0.50	0.00	1.00
VC Partner Board Experience	1,808	6.2	5.1	0.0	31.0
Company Age	1,534	4.99	4.20	0.00	53.00
Number of VCs in Round	1,534	4.3	2.7	1.0	24.0
Number of private-partnership VCs in round	1,534	2.2	1.3	1.0	11.0
Syndicated Round	1,534	0.91	0.28	0.00	1.00
Total Round Amount ($ million)	1,534	11.1	12.7	0.0	110.0
Pre-Money Valuation ($ million)	786	47.8	56.4	0.6	458.4
Serial Founder	1,534	0.24	0.43	0.00	1.00
Serial Founder with IPO	1,534	0.06	0.24	0.00	1.00
Serial Founder with Merger	1,534	0.09	0.29	0.00	1.00

Table 2 - Contract Terms

See Table 1 for sample overview. Each contract term contributes with 0, 1 or 2 to the Downside Protection Index, where 2 is the harshest to the entrepreneur / most favorable to the VC. In VC Contract Round, one observation is a unique investment by a VC in a round (N=3,364). In Contract Round, one observation is a unique round (N=1,534).

Panel A: Contract Terms Descriptions and Frequency Distributions

Cumulative Dividends

Dividends that the investor earns annually until the company is sold or liquidated. Cumulative means that the dividends are not paid out annually but when the company is sold or liquidated. Cumulative dividends are senior to common stock.

	Above 8% = 2	8% or Below = 1	Not Included = 0
VC Contract Round	205 (6%)	925 (27%)	2,264 (67%)
Contract Round	108 (7%)	430 (28%)	996 (65%)

Liquidation Preference

The multiple of the investor's investment that is paid back to the investor when the company is sold or liquidated. Liquidation preference is senior to common stock.

	Above 2X = 2	Above 1X, Up to 2X = 1	1X = 0
VC Contract Round	36 (1%)	193 (6%)	3,165 (93%)
Contract Round	19 (1%)	86 (6%)	1,429 (93%)

Participation

With participation the investor receives both a liquidation preference and a fraction of common stock when the company is sold or liquidated. With "Capped" participation the investor only receives the liquidation preference if his investment IRR is below a certain hurdle. With no participation the investor holds convertible preferred stock.

	Not Capped = 2	Capped = 1	Not Included = 0
VC Contract Round	1,579 (47%)	855 (25%)	960 (28%)
Contract Round	711 (46%)	378 (25%)	445 (29%)

Anti-Dilution

The investor is issued additional shares if the company raises a new financing round at a lower valuation than what the investor paid (down round). "Full Ratchet" gives the investor more additional shares than "Weighted Average", especially if the new financing round is small.

	Full Ratchet = 2	Weighted Average = 1	Not Included = 0
VC Contract Round	301 (9%)	3,046 (90%)	47 (1%)
Contract Round	148 (10%)	1,358 (89%)	28 (2%)

Redemption

The investor has the right to sell his shares back to the company after a specified time period. A typical redemption right provision gives the investor the right to sell back 1/3 of his shares after 5 years, 1/3 after 6 years and the 1/3 after 7 years.

	Included = 1	Not Included = 0
VC Contract Round	2,034 (60%)	1,360 (40%)
Contract Round	931 (61%)	603 (39%)

Pay-To-Play

Pay-to-play provisions specify what contractual rights that the investor loses if he does not invest in a follow-up financing round of the company. With "Convert to Preferred" the investor loses some contractual rights that are attached to his preferred stock. With "Convert to Common" the investor loses all contractual rights that are attached to his preferred stock.

	Not Included = 2	Convert to Preferred = 1	Convert to Common = 0
VC Contract Round	2,671 (79%)	163 (5%)	560 (16%)
Contract Round	1,263 (82%)	68 (4%)	203 (13%)

Panel B: Correlations Between Contract Terms

	Cumulative Dividends	Liquidation Preference	Participation	Redemption
Liquidation Preference	0.063**			
Participation	0.137***	0.067***		
Anti-Dilution	0.110***	0.090***	0.149***	
Redemption	0.357***	0.0371	0.133***	
Pay-To-Play	0.0100	0.0279	-0.0231	-0.049*

Table 3 - Downside Protection Index, Individual Contract Terms and VC Experience, Univariate Comparison

See Table 1 for sample overview. One observation is one VC investment. VC Number of Investments is updated to match the year of the contract. The 4th quartile represents the lowest VC number of investments (least experienced VCs) and the 1st quartile represents the highest number of VC investments (most experienced VCs). Panel A shows for different quartiles of VC Number of Investments sample means of the individual contract terms. The definition and coding of these contract terms is shown in table 2. Downside Protection Index (DPI) is the sum of the coding of the the individual contract terms. Panel B shows the p-values of Kruska-Wallis tests of equality of populations.

	Panel A: Individual Contract Terms and DPI				**Panel B: Kruska-Wallis Tests of Equality of Populations**				
VC Number of Investments Quartile	4th	3rd	2nd	1st	4th-3rd	3rd-2nd	2nd-1st	4th-1st	All
Variable	Sample Mean				P-Value				
Cumulative Dividends	0.48	0.44	0.41	0.24	0.286	0.210	0.000	0.000	0.000
Liquidation Preference	0.08	0.11	0.08	0.05	0.039	0.072	0.019	0.035	0.000
Participation	1.32	1.25	1.15	1.01	0.094	0.014	0.000	0.000	0.000
Anti-Dilution	1.10	1.09	1.09	1.02	0.632	0.960	0.000	0.000	0.000
Redemption	0.65	0.61	0.64	0.50	0.224	0.290	0.000	0.000	0.000
Pay-To-Play	1.70	1.66	1.59	1.54	0.138	0.065	0.192	0.000	0.000
DPI	5.31	5.16	4.96	4.36	0.038	0.005	0.000	0.000	0.000
Observations	852	852	847	843					

Table 4 - Downside Protection Index and VC Experience

See Table 1 for sample overview. One observation is one VC investment. All VC variables are updated to match the year of the contract. Specifications 1 and 3-8 are OLS regressions with the Downside Protection Index (DPI) as the dependent variable. Table 2 details the coding of contract terms that we aggregate to compute DPI. Specification 2 is a probit regression in which the dependent variable takes the value 1 if DPI is above 5 (roughly the sample average) and 0 otherwise. Coefficients in specification 2 reflect marginal effects. All specifications include fixed effects for VC firm location (California, Massachussets, Texas, New York, and other), company location (state), company industry (Venture Economics 10-level classification), and round year. Standard errors are clustered by both company and VC firm using the two-way method of Petersen (2007) and reported in brackets. Significance at 10% level is marked with *, 5% with ** and 1% with ***.

Specification	1	2	3	4	5	6	7	8
Dependent Variable	DPI	DPI>5	DPI	DPI	DPI	DPI	DPI	DPI
(log) VC Number of Investments	-0.170***	-0.119***					-0.131***	-0.210***
	[0.029]	[0.023]					[0.032]	[0.034]
VC Number of Investments Top Quartile			-0.502***					
			[0.094]					
VC Number of Investments Bottom Quartile			0.063					
			[0.080]					
(log) VC Age				-0.197***				
				[0.044]				
(log) VC Fund Size					-0.103***			
					[0.033]			
VC IPO Ratio						-2.053***	-1.091***	
						[0.393]	[0.406]	
VC Focus in Industry								-0.497**
								[0.246]
VC Focus in Geography								-0.085
								[0.236]
VC and Company in Same State	-0.032	-0.016	-0.037	0.001	0.072	-0.028	-0.047	-0.031
	[0.073]	[0.060]	[0.074]	[0.074]	[0.087]	[0.074]	[0.073]	[0.074]
(log) Company Age	0.306***	0.282***	0.306***	0.323***	0.285***	0.314***	0.308***	0.304***
	[0.088]	[0.080]	[0.088]	[0.088]	[0.095]	[0.089]	[0.088]	[0.087]
Serial Founder	-0.028	0.01	-0.037	-0.035	-0.061	-0.033	-0.03	-0.029
	[0.138]	[0.126]	[0.139]	[0.141]	[0.151]	[0.141]	[0.138]	[0.138]
Serial Founder with IPO	-0.683***	-0.407*	-0.687***	-0.689***	-0.640***	-0.665***	-0.664***	-0.682***
	[0.216]	[0.210]	[0.217]	[0.216]	[0.218]	[0.215]	[0.215]	[0.217]
Serial Founder with Merger	0.007	-0.015	0.004	0.012	0.051	0.023	0.019	0.007
	[0.176]	[0.175]	[0.178]	[0.177]	[0.185]	[0.177]	[0.175]	[0.176]
Round Number	0.038	0.001	0.031	0.037	0.041	0.037	0.041	0.038
	[0.042]	[0.038]	[0.042]	[0.042]	[0.045]	[0.042]	[0.042]	[0.042]
(log) Total Round Amount	-0.228***	-0.228***	-0.231***	-0.246***	-0.217***	-0.235***	-0.222***	-0.228***
	[0.058]	[0.049]	[0.057]	[0.058]	[0.063]	[0.058]	[0.058]	[0.058]
(log) Number of VCs in Round	-0.059	0.09	-0.042	-0.029	-0.147	-0.03	-0.058	-0.058
	[0.143]	[0.119]	[0.142]	[0.142]	[0.154]	[0.142]	[0.143]	[0.143]
Observations	3,394	3,394	3,394	3,394	2,581	3,394	3,394	3,394
R-squared	0.22	0.16	0.22	0.22	0.22	0.22	0.23	0.22

Table 5 - Individual Contract Terms and VC Experience

See Table 1 for sample overview. One observation is one VC investment. All VC variables are updated to match the year of the contract. This table presents probit regressions in which the dependent variable takes the value 1 if cumulative dividends are present (specification 1), if the liquidation preference is above 1X (specification 2), if the preferred stock has participation (specification 3), if full-ratchet anti-dilution is present (specification 4), if redemption rights are present (specification 5), and if pay-to-play is conversion to common equity (specification 6), and 0 otherwise. Coefficients reflect marginal effects. All specifications include fixed effects for VC firm location (California, Massachussets, Texas, New York, and other), company location (state), company industry (Venture Economics 10-level classification), and round year. Standard errors are clustered by company and reported in brackets. Significance at 10% level marked with *, 5% with ** and 1% with ***.

Specification	1	2	3	4	5	6
Dependent Variable	Dividend	Liq.Pref.	Particip.	Anti-Dil.	Redemp	Pay-Play
(log) VC Number of Investments	-0.104***	-0.075**	-0.094***	-0.051*	-0.086***	-0.057**
	[0.023]	[0.030]	[0.022]	[0.031]	[0.024]	[0.023]
VC and Company in Same State	-0.067	-0.013	-0.044	0.072	0.03	0.024
	[0.070]	[0.091]	[0.065]	[0.084]	[0.067]	[0.064]
(log) Company Age	0.230***	0.427***	0.002	0.341***	0.152	0.117
	[0.084]	[0.127]	[0.086]	[0.108]	[0.093]	[0.082]
Serial Founder	0.075	0.203	-0.259*	-0.299	0.198	0.18
	[0.143]	[0.168]	[0.143]	[0.200]	[0.164]	[0.143]
Serial Founder with IPO	-0.475*	-0.137	-0.032	-0.074	-0.643***	-0.331
	[0.244]	[0.255]	[0.224]	[0.254]	[0.228]	[0.207]
Serial Founder with Merger	-0.389*	0.037	0.383*	0.052	-0.031	-0.082
	[0.215]	[0.236]	[0.199]	[0.251]	[0.210]	[0.186]
Round Number	-0.079**	0.098**	0.047	0.114**	-0.049	-0.001
	[0.039]	[0.050]	[0.040]	[0.046]	[0.043]	[0.039]
(log) Total Round Amount	-0.095*	-0.289***	-0.154***	-0.211***	0.114**	-0.079
	[0.049]	[0.071]	[0.050]	[0.060]	[0.054]	[0.051]
(log) Number of VCs in Round	0.085	0.163	0.213	-0.063	-0.494***	0.005
	[0.120]	[0.170]	[0.139]	[0.146]	[0.137]	[0.121]
Observations	3,394	3,394	3,394	3,394	3,394	3,394
R-squared	0.25	0.17	0.09	0.16	0.14	0.21

Table 6 - Downside Protection Index - Interaction Effects

See Table 1 for sample overview. One observation is one VC investment. All VC variables are updated to match the year of the contract. All specifications are OLS regressions with the Downside Protection Index (DPI) as the dependent variable. Table 2 details the coding of contract terms that we aggregate to compute DPI. All specifications include fixed effects for VC firm location (California, Massachussets, Texas, New York, and other), company location (state), company industry (Venture Economics 10-level classification), and round year. Standard errors are clustered by both company and VC firm using the two-way method of Petersen (2007) and reported in brackets. Significance at 10% level marked with *, 5% with ** and 1% with ***.

Specification	1	2	3	4	5
Dependent Variable	DPI	DPI	DPI	DPI	DPI
(log) VC Number of Investments	-0.181***	-0.183***	-0.268***	-0.246***	-0.995**
	[0.034]	[0.030]	[0.052]	[0.060]	[0.389]
(log) VC Number of Investments X Serial	0.046				
	[0.052]				
(log) VC Number of Investments X Serial Founder with IPO		0.192***			
		[0.069]			
(log) VC Number of Investments X Round Number			0.030**		
			[0.014]		
(log) VC Number of Investments X Company Age				0.046	
				[0.035]	
(log) VC Number of Investments X Total Round Amount					0.051**
					[0.024]
VC and Company in Same State	-0.033	-0.032	-0.035	-0.033	-0.037
	[0.073]	[0.073]	[0.073]	[0.073]	[0.073]
(log) Company Age	0.302***	0.301***	0.295***	0.114	0.299***
	[0.088]	[0.088]	[0.089]	[0.155]	[0.089]
Round Number	0.038	0.041	-0.081	0.039	0.043
	[0.042]	[0.042]	[0.067]	[0.042]	[0.042]
Serial Founder	-0.21	-0.021	-0.035	-0.027	-0.024
	[0.252]	[0.138]	[0.138]	[0.139]	[0.138]
Serial Founder with IPO	-0.690***	-1.507***	-0.669***	-0.677***	-0.689***
	[0.217]	[0.390]	[0.217]	[0.217]	[0.216]
Serial Founder with Merger	-0.004	-0.003	0.006	0.004	-0.005
	[0.176]	[0.176]	[0.176]	[0.176]	[0.176]
(log) Total Round Amount	-0.227***	-0.226***	-0.222***	-0.226***	-0.436***
	[0.058]	[0.058]	[0.059]	[0.058]	[0.105]
(log) Number of VCs in Round	-0.059	-0.06	-0.066	-0.061	-0.058
	[0.143]	[0.143]	[0.143]	[0.143]	[0.143]
Observations	3,394	3,394	3,394	3,394	3,394
R-squared	0.23	0.23	0.23	0.23	0.23

Table 7 - Robustness Tests

See Table 1 for sample overview. One observation is one VC investment. All VC variables are updated to match the year of the contract. The table presents OLS regressions with Downside Protection Index (DPI) as the dependent variable. Table 2 details the coding of contract terms that we aggregate to compute DPI. The sample is limited to observations for which valuation data is available in specifications 1 and 2, and in which the VC takes a board seat in specifications 3-5. Sample is limited to one observation per round in specifications 6-7, and one observation per VC in specification 8. All specifications include fixed effects for VC firm location (California, Massachussets, Texas, New York, and other), company location (state), company industry (Venture Economics 10-level classification), and round year. Standard errors are clustered by both company and VC firm using the two-way method of Petersen (2007) and reported in brackets. Significance at 10% level marked with *, 5% with ** and 1% with ***.

Specification	1	2	3	4	5	6	7	8
Dependent Variable	DPI	DPI	DPI	DPI	DPI	DPI	DPI	DPI
(log) VC Number of Investments	-0.136***	-0.136***	-0.224***		-0.197***	-0.210***		-0.163***
	[0.031]	[0.031]	[0.040]		[0.047]	[0.044]		[0.029]
(log) VC Partner Board Experience				-0.248***	-0.07			
				[0.054]	[0.056]			
(log) Average Experience of VCs							-0.309***	
							[0.049]	
VC and Company in Same State	-0.05	-0.05	-0.005	0.031	-0.004	0.081		-0.062
	[0.092]	[0.092]	[0.103]	[0.104]	[0.102]	[0.097]		[0.070]
(log) Company Age	0.265**	0.264*	0.284***	0.291***	0.285***	0.294***	0.281***	0.300***
	[0.134]	[0.135]	[0.102]	[0.103]	[0.101]	[0.077]	[0.076]	[0.082]
Round Number	0.125**	0.125**	0.06	0.072	0.065	0.03	0.04	0.033
	[0.061]	[0.061]	[0.049]	[0.050]	[0.049]	[0.039]	[0.039]	[0.043]
Serial Founder	-0.042	-0.045	-0.033	-0.037	-0.029	-0.057	-0.05	-0.063
	[0.170]	[0.170]	[0.141]	[0.147]	[0.142]	[0.125]	[0.123]	[0.145]
Serial Founder with IPO	-0.832***	-0.827***	-0.678***	-0.647***	-0.670***	-0.360*	-0.387**	-0.585***
	[0.282]	[0.286]	[0.237]	[0.237]	[0.237]	[0.191]	[0.188]	[0.204]
Serial Founder with Merger	-0.151	-0.148	0.046	0.049	0.043	0.111	0.102	0.004
	[0.223]	[0.224]	[0.183]	[0.189]	[0.183]	[0.149]	[0.146]	[0.179]
(log) Total Round Amount	-0.063	0.15	-0.165**	-0.173**	-0.162**	-0.192***	-0.173***	-0.197***
	[0.111]	[0.995]	[0.068]	[0.069]	[0.067]	[0.053]	[0.052]	[0.062]
(log) Pre-Money Valuation	-0.147	-0.257						
	[0.105]	[1.407]						
(log) Total Round Amount Squared		-0.007						
		[0.033]						
(log) Pre-Money Valuation Squared		0.003						
		[0.041]						
(log) Number of VCs in Round	-0.248	-0.247	-0.161	-0.168	-0.163	0.042	0.065	-0.089
	[0.187]	[0.189]	[0.162]	[0.164]	[0.162]	[0.126]	[0.124]	[0.144]
Observations	1,827	1,827	1,808	1,808	1,808	1,534	1,534	2,849
R-squared	0.27	0.27	0.23	0.22	0.23	0.23	0.25	0.22
Sample	Valuation Data		VC has Board Seat			Unique Round		Uniq. VC

Table 8 - Endogenous selection

See Table 1 for sample overview. One observation is one VC investment. All VC variables are updated to match the year of the contract. In the table, contract Downside Protection Index (DPI) is the dependent variable. Table 2 details the coding of contract terms that we aggregate to compute DPI. All specifications include fixed effects for VC firm location (California, Massachussets, Texas, New York, and other), company location (state), company industry (Venture Economics 10-level classification), and round year. Specifications 7-9 restrict the sample to observations where the VC and company location is California, Massachussets, Texas or New York. Significance at 10% level marked with *, 5% with ** and 1% with ***.

Empirical Approach used to Instrument for VC Abilities	IV Model			Ackenberg-Botticini			Heckman-Sorensen		
Dependent Variable	DPI	DPI	DPI	DPI	DPI	DPI	DPI	DPI	DPI
(log) VC Number of Investments	-0.352***			-0.429***			-0.369***		
	[0.119]			[0.100]			[0.090]		
(log) VC Age		-0.785			-0.472***			-0.395***	
		[0.529]			[0.136]			[0.107]	
VC IPO Ratio			-3.53**			-4.277***			-2.359***
			[1.663]			[1.536]			[0.512]
VC and Company in Same State	-0.095	-0.074	-0.069	-0.117	-0.033	-0.085	-0.926***	-0.88**	-0.896**
	[0.085]	[0.097]	[0.084]	[0.078]	[0.072]	[0.081]	[0.355]	[0.373]	[0.375]
(log) Company Age	0.295***	0.346***	0.312***	0.293***	0.335***	0.314***	0.329***	0.338***	0.328***
	[0.086]	[0.090]	[0.089]	[0.086]	[0.087]	[0.089]	[0.070]	[0.070]	[0.070]
Round Number	0.051	0.068	0.047	0.055	0.051	0.049	0.026	0.027	0.03
	[0.041]	[0.050]	[0.042]	[0.041]	[0.041]	[0.041]	[0.032]	[0.032]	[0.032]
Serial Founder	-0.027	-0.054	-0.036	-0.026	-0.044	-0.037	-0.069	-0.074	-0.079
	[0.139]	[0.142]	[0.144]	[0.138]	[0.143]	[0.143]	[0.110]	[0.110]	[0.110]
Serial Founder with IPO	-0.651***	-0.611***	-0.631***	-0.634***	-0.651***	-0.611***	-0.915***	-0.916***	-0.903***
	[0.216]	[0.230]	[0.216]	[0.218]	[0.216]	[0.219]	[0.147]	[0.147]	[0.147]
Serial Founder with Merger	0.019	0.064	0.044	0.025	0.036	0.055	0.12	0.119	0.136
	[0.176]	[0.186]	[0.179]	[0.175]	[0.178]	[0.175]	[0.131]	[0.132]	[0.132]
(log) Number of VCs in Round	-0.11	-0.083	-0.045	-0.131	-0.054	-0.05	0.019	0.054	0.061
	[0.144]	[0.151]	[0.143]	[0.143]	[0.140]	[0.141]	[0.097]	[0.097]	[0.097]
(log) Total Round Amount	-0.194***	-0.204***	-0.217***	-0.179***	-0.226***	-0.207***	-0.178***	-0.198***	-0.194***
	[0.060]	[0.069]	[0.061]	[0.058]	[0.057]	[0.059]	[0.041]	[0.041]	[0.041]
Observations	3,394	3,394	3,394	3,394	3,394	3,394	1,881	1,881	1,881
R-squared	0.21	0.15	0.22	0.2	0.21	0.21			
Sample	Full	Full	Full	Full	Full	Full	CA, MA, TX, NY, NC		
Selection Equation	Local VC Experience			Company State X Industry			Company State X Firm State		
Number potential deals							887,680	887,680	887,680

Table 9 - Downside Protection Index and VC Network Strength

See Table 1 for sample overview. One observation is one VC investment. All VC variables are updated to match the year of the contract. VC syndication variables reflect syndications with U.S. Private Partnership VCs only. All specifications are OLS regressions with the Downside Protection Index (DPI) as the dependent variable. Table 2 details the coding of contract terms that we aggregate to compute DPI. All specifications include fixed effects for VC firm location (California, Massachussets, Texas, New York, and other), company location (state), company industry (Venture Economics 10-level classification), and round year. Standard errors are clustered by both company and VC firm using the two-way method of Petersen (2007) and reported in brackets. Significance at 10% level is marked with *, 5% with ** and 1% with ***.

Specification	1	2	3	4	5	6	7
Dependent Variable	DPI	DPI	DPI	DPI	DPI	DPI	DPI
(log) VC Number of Investments				-0.217***	-0.181***	-0.125***	-0.128***
				[0.033]	[0.036]	[0.032]	[0.032]
VC Number of Investments Top Quartile			-0.309***				
			[0.109]				
VC IPO Ratio					-0.885**	-0.982**	-1.013**
					[0.406]	[0.406]	[0.406]
(log) VC Number of Syndications	-0.171***						
	[0.025]						
(log) VC Number of Unique Syndication Partners		-0.196***	-0.123***				
		[0.032]	[0.039]				
VC Number of Unique Syndication Partners / VC Number of Investments				-0.218***	-0.197***		
				[0.065]	[0.065]		
Average Number of Companies for Syndication VC Partner						-0.109**	
						[0.055]	
Average Number of Syndications for Syndication VC Partner							-0.102*
							[0.062]
VC and Company in Same State	-0.045	-0.039	-0.049	-0.046	-0.056	-0.049	-0.047
	[0.072]	[0.072]	[0.072]	[0.072]	[0.072]	[0.073]	[0.073]
(log) Company Age	0.295***	0.297***	0.298***	0.295***	0.297***	0.300***	0.301***
	[0.089]	[0.090]	[0.089]	[0.089]	[0.090]	[0.090]	[0.090]
Serial Founder	-0.053	-0.054	-0.057	-0.051	-0.05	-0.054	-0.052
	[0.142]	[0.142]	[0.142]	[0.142]	[0.142]	[0.142]	[0.142]
Serial Founder with IPO	-0.700***	-0.707***	-0.707***	-0.707***	-0.689***	-0.682***	-0.684***
	[0.217]	[0.216]	[0.218]	[0.216]	[0.215]	[0.216]	[0.216]
Serial Founder with Merger	0.043	0.046	0.044	0.046	0.048	0.048	0.045
	[0.181]	[0.181]	[0.182]	[0.180]	[0.180]	[0.180]	[0.181]
Round Number	0.047	0.047	0.042	0.049	0.051	0.048	0.047
	[0.042]	[0.042]	[0.042]	[0.042]	[0.042]	[0.042]	[0.042]
(log) Total Round Amount	-0.219***	-0.223***	-0.221***	-0.221***	-0.216***	-0.215***	-0.216***
	[0.058]	[0.058]	[0.057]	[0.058]	[0.058]	[0.058]	[0.058]
(log) Number of VCs in Round	-0.049	-0.044	-0.049	-0.03	-0.033	-0.061	-0.062
	[0.142]	[0.142]	[0.142]	[0.142]	[0.143]	[0.144]	[0.144]
Observations	3,394	3,394	3,394	3,394	3,394	3,394	3,394
R-squared	0.24	0.23	0.24	0.23	0.24	0.24	0.23

Table 10 - Comparison with non-Private Partnership VCs

See Table 1 for sample overview. One observation is one VC investment. All VC variables are updated to match the year of the contract. In the table, contract Downside Protection Index (DPI) is the dependent variable. Table 2 details the coding of contract terms that we aggregate to compute DPI. All specifications include fixed effects for VC firm location (California, Massachussets, Texas, New York, and other), company location (state), company industry (Venture Economics 10-level classification), and round year. Standard errors are clustered by both company and VC firm using the two-way method of Petersen (2007) and reported in brackets. Significance at 10% level marked with *, 5% with ** and 1% with ***.

Specification	1	2	3	4
Dependent Variable	DPI	DPI	DPI	DPI
VC Partnership	-0.077	-0.522***	0.052	
	[0.071]	[0.104]	[0.068]	
VC Corporate				0.125
				[0.132]
VC Financial				0.068
				[0.155]
VC and Company in Same State	0.092	0.232**	0.056	0.393***
	[0.066]	[0.097]	[0.070]	[0.111]
(log) Company Age	0.350***	0.265**	0.399***	0.431***
	[0.091]	[0.121]	[0.092]	[0.144]
(log) Total Round Amount	-0.248***	-0.138**	-0.268***	-0.211***
	[0.056]	[0.070]	[0.054]	[0.079]
Serial Founder	0.013	-0.014	0.052	0.119
	[0.149]	[0.174]	[0.154]	[0.237]
Serial Founder with IPO	-0.670***	-0.463	-0.748**	-0.599
	[0.256]	[0.319]	[0.292]	[0.538]
Serial Founder with Merger	-0.078	0.063	-0.218	-0.297
	[0.190]	[0.224]	[0.201]	[0.286]
Round Number	0.013	0.047	-0.006	-0.01
	[0.041]	[0.056]	[0.040]	[0.060]
(log) Number of VCs in Round	0.033	0.13	0.013	0.179
	[0.139]	[0.174]	[0.141]	[0.207]
Observations	4,451	1,909	3,599	3,598
R-squared	0.19	0.20	0.20	0.20
<u>Sample</u>				
Main sample	PEP	Top PEP	Non Top PEP	
Out of sample	Non PEP	Non PEP	Non PEP	Non PEP

Figure 1 - Distribution of Downside Protection Index

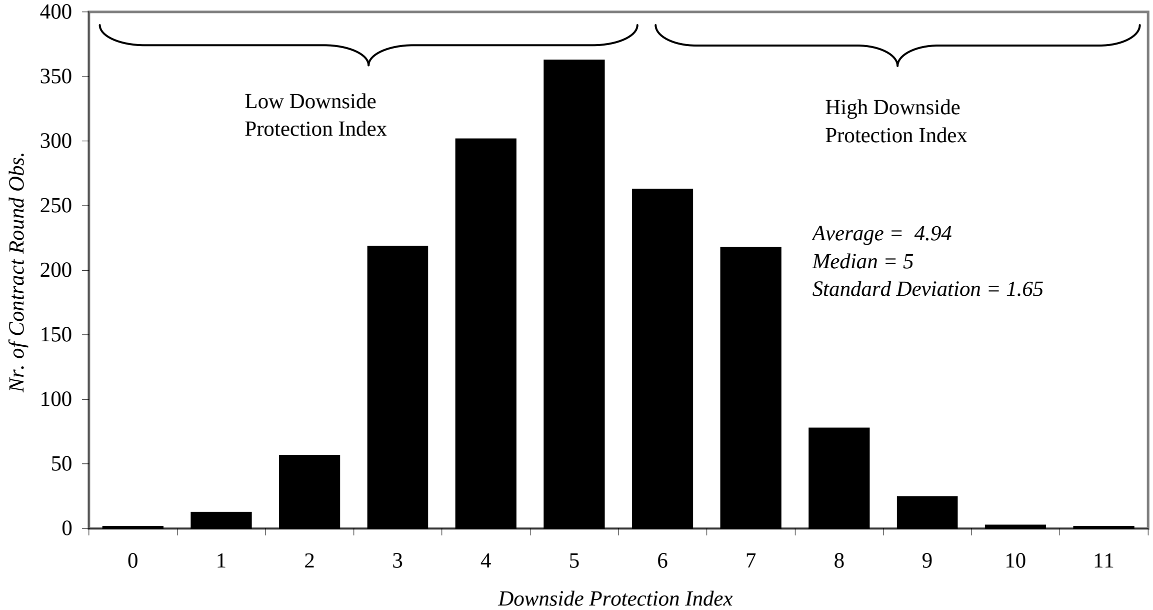

Figure 2 - Downside Protection Index and Average VC Experience