Preliminary

Changing the Nexus: The Evolution and Renegotiation of Venture Capital Contracts

by

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Abstract

We study empirically how financial contracts evolve and are renegotiated as venture capital (VC)-backed companies secure new rounds of financing. Because VC contract designs vary considerably between companies according to their economic circumstances, it is plausible to expect that the contracts governing successive financing rounds of a quickly-evolving company should often be dissimilar. The data offer little support for this intuitive hypothesis. In fact, the majority of cash flow provisions in a new round contract are recycled from the previous round contract, even when the company has evolved substantially. Such recycling may be beneficial in typical situations because it alleviates information problems in negotiations and reduces the complexity of the company's nexus of financial contracts (Fama, 1980). However, in some situations restructuring contract design may be necessary to entice investors to provide new capital. Consistent with debt overhang arguments (Myers, 1977), we show that venture capital contracts evolve to include more investor-friendly cash flow provisions when the valuation of the company has not increased since the previous round, when new investors join the new round, or when new round investors hold larger debt-like claims. Although major renegotiations of previous round contracts are rare, minor renegotiations appear to be more common and almost uniformly result in making the previous round contract more similar to the new round contract. Overall, our findings suggest that the tradeoff relevant for changing a company's nexus of financial contracts is different from the tradeoffs relevant for the initial structuring of this nexus.

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1. Introduction

Financial contracting theory emphasizes the role of well-designed contracts in addressing the information and agency problems inherent in an investment opportunity (Bolton and Scharfstein, 1990; Aghion and Bolton, 1992; Hart and Moore, 1994; Dewatripont and Tirole, 1994). One broad prediction from theory is that the design of financial contracts should not only vary between companies according to their economic circumstances, but also within a company as economic circumstances change over time. Yet there is little empirical evidence on how new contracts differ from existing contracts and how existing contracts are renegotiated as a company goes through financing events. This lack of evidence is an important impediment to understanding the economic tradeoffs pertaining to changing or adding to the existing nexus of contracts that constitutes a firm (Alchian and Demsetz, 1972; Jensen and Meckling, 1976; Rajan and Zingales, 1998, 2001).

In this paper we study these issues using empirical evidence from the venture capital (VC) industry. The VC industry offers several advantages for our purposes. First, VCs are sophisticated financial intermediaries with strong incentives to structure contracts to maximize value, thereby closely resembling the principals envisioned by theory (Hart, 2001; Kaplan and Strömberg 2003, 2004). Second, VCs almost always stage investments. Each time a startup receives a new round of VC financing, a new contract is signed that spells out the rights of all the company's security holders, including both current round and previous round investors. Third, startups are innovative fast-growing companies so the nature of the financing problem is likely to change considerably between financing rounds as the company evolves (Hellman and Puri, 2002; Kaplan, Sensoy and Strömberg, 2008). Fourth, the contracts used in VC investments exhibit considerable real-world variation in provisions that determine the allocation of cash flow provisions (Kaplan and Strömberg, 2003; Bengtsson and Sensoy, 2009). Thus the VC industry offers a unique and rich set of opportunities for studying the evolution and renegotiation of financial contracts.

Our analysis is based on contracts governing VC investments in 210 U.S. startup companies for which we have contract data covering at least two distinct and consecutive financing rounds.[1] We focus on six of the most important contractual terms that can be attached to the preferred equity that is used almost exclusively in VC investments (and exclusively in our sample). These terms are redemption rights, anti-dilution rights, liquidation preferences, cumulative dividends, participation rights, and pay-to-play provisions. These contractual terms all relate to the VC's cash flow rights. While our data contain complete and comprehensive information on these cash flow rights, we do not have similar data on control (board or voting) rights and so cannot include them in our analysis. Kaplan and Strömberg (2003), Metrick (2007), and Bengtsson and Sensoy (2009) provide detailed descriptions of the economic meanings of each of these cash flow rights.

Our analysis is in three parts. First, we investigate the frequency and determinants of contractual changes from one round of investment to the next, for example whether and why the contract governing a second round of investment differs from that governing the first round in the same company. We refer to this as the "evolution" of the financial contract. Second, we analyze the frequency and determinants of changes to a previous-round contract at the time of a new investment, for example whether and why the rights previously granted to first round investors change at the time of the same company's second financing round. Such changes are a renegotiation of the first round contract. Third, we discuss theoretical explanations to the observed pattern of contract evolution and renegotiation.

Our results on contract evolution are as follows. Even though contract designs vary considerably *between* venture-backed companies, we observe few changes to contract design between financing rounds *within* a given company. More than half of all new investments use a

[1] A relatively small sample size is common to studies of venture capital. The number of sample companies is 170 in Hellman & Puri (2002), 119 in Kaplan & Stromberg (2003), 51 in Hsu (2004), 132 in Cumming (2008), and 50 in Broughman & Fried (2009).

contract that does not differ along any of the six dimensions we study from the contract used in the previous round. The incidence of contract changes is substantially lower than the incidence of economically meaningful changes at the companies themselves, as measured by alliances, mergers, new product introduction, patent acquisition, and management turnover. Further consistent with this evidence of inertia in within-firm contract evolution, we find that new round contracts for a firm are more similar to previous round contracts for that firm than they are to contracts from a matched sample of other firms with the same VC as the lead investor.

To the extent they do occur, contract changes are more common when the time between rounds is longer, when the company has evolved significantly, when new VCs participate in the subsequent round, and when the company valuation is unchanged or lower than the valuation in the previous round. Directionally, changes that increase the payoff to the VC in bad or mediocre states of the world are more common when the valuation of the company has not increased since the previous round, or when new investors join the new round. New round contracts include more senior claims when the valuation of the company has not increased and when the previous round contracts give VCs large debt-like payoffs.

With respect to renegotiations, we evaluate both "major" and "minor" renegotiations. Major renegotiations involve either a reverse split, in which the previous VC forfeits some shares but the remaining shares retain their contractual rights, or conversion to junior securities (usually common), in which the contractual rights are forfeited. Major renegotiations are rare, occurring in only 6% of cases. However, they are more likely to occur when the valuation of the company does not increase, when not all VCs also invested in the previous round, when the new round contract is to be senior, and when the new round contract gives more rights to the VCs than the previous round contract. Minor renegotiations, in which some of the terms for previous-round contracts are modified, occur in about 50% of cases. These minor renegotiations appear to almost uniformly result in making the previous round contract more similar to the new round contract.

We validate our primary findings on contract evolution and renegotiation in an out-of-sample analysis of 911 U.S. VC contracts. The results have important implications for our understanding of how financial contracts are negotiated and structured in situations where a nexus of such contracts is already in place. The general low rate of evolution or renegotiation of VC contracts, which contrasts with the rapid and substantial progression and growth of venture-backed companies, suggests the presence of first-order contracting frictions that prevent fully updating contracts to reflect the company's new economic circumstances.

One possible friction is the asymmetric information that arises when the company's prospective VCs, existing VCs and other shareholders (e.g. founders, employees and business angels) negotiate whether a new round contract should include less or more investor-favorable cash flow provisions than the previous round contract. As shown by Admati and Pfleiderer (1994), the equilibrium outcome of such three-party bargaining in the presence of asymmetric information is that the contract remains constant between financing rounds.[3] Other frictions related to the negotiation process are *status quo* bias, according to which economic agents have a preference to not changing an existing solution, and fiduciary duty requirements that may expose VCs to lawsuits if they engage in self-dealing when negotiating contracts.

In addition to these negotiation frictions, an overly complex nexus of financial contracts could be associated with cognition efforts and computational costs for the contracting parties (Dye, 1985; Anderlini and Felli, 1994, 1999, 2004; Tirole, 2008). Cash flow provisions recycled from the company's previous contract do not increase the complexity of a venture-backed company's nexus of contracts. However, if every round of financing has a unique set of such provisions then it becomes very difficult to calculate the precise payoff to each shareholder. Given that cash flow provisions are primarily in place to provide monetary incentives (to either

[3] The model presented by Admati and Pfleiderer is motivated by the VC setting but assumes that investors hold all-equity contracts. We discuss in Section 7.5 how the predictions from this model are likely to generalize to equity contracts that include investor-friendly cash flow provisions.

entrepreneur or VC), an overly complex nexus of contracts may have unwanted implications on the provision of effort (Fama, 1980).

Whatever the exact reasons, our results suggest that VC contract design is heavily dependent on a company's history of financing contracts, and less so on changes in the company's economic fundamentals. We believe this is an important aspect of real-world contracting that deserves more theoretical attention.

Despite the apparent frictions that impede changes to the design of VC contracts, our analysis shows how new round investors in some situations negotiate cash flow provisions that are different from those used in previous rounds, or insist on previous contracts to be renegotiated. The strongest predictor of changes to contract design is that the valuation of the company has decreased since the previous financing. Importantly, this result cannot be explained simply by the rationale that tougher economic circumstances may increase the bargaining power of new VCs. Instead of demanding more investor-friendly cash flow provisions, new VCs could simply use their stronger bargaining power to negotiate a lower price per share and thereby get a larger equity ownership.

The changes that we observe to contract design are consistent with theoretical arguments about how investors can overcome the debt overhang problem (Myers, 1977). The cash flow provisions that we study essentially provide the VCs more debt-like claims.[4] The presence of such claims means that new round VCs partly subsidize the investments of previous round VCs, unless new round VCs receive even stronger debt-like claims or previous VCs accept a renegotiated claim. The underinvestment problem that follows from the debt overhang is likely to be particularly severe when the company has experienced adverse performance, when the new round VCs did not also invest in the company's previous round, and when new round VCs are

[4] See Appendix A for a detailed description of the cash flow provisions that we study. Anti-dilution protection implies a debt-like payoff because it increases the VC's equity ownership following a decrease in the company's valuation. The absence of pay-to-play is favorable to VCs, and particularly so in bad states-of-the-world since it allows the VCs to retain other cash flow provisions.

entitled to large debt-like payoffs. Our analysis shows that new round VCs negotiate more investor-friendly cash flow provisions in precisely these situations. We also provide evidence that VCs overcome the underinvestment problem by renegotiating previous round contracts more often following adverse company performance.

This paper adds to a small empirical literature on renegotiation in financial contracting. Despite the important role played by possibility of renegotiation in theory (e.g. the hold-up theory of Hart and Moore, 1994), there is little empirical evidence on the frequency, determinants, and outcomes of contract renegotiation. Our work joins recent work by Roberts and Sufi (2008), who study private credit agreements and Benmelech and Bergman (2007), who study airplane leases, in providing some evidence on this important issue. By focusing our attention on financial contracts in the VC setting, we also contribute to the literature on the determinants of the structure of venture capital contracts. While ours is the first study of the time-series – the evolution and renegotiation patterns – of venture capital contracts within a particular company, the cross-sectional determinants of VC contract design has previously been studied by Gompers (1998), Kaplan and Strömberg (2003, 2004), Bengtsson and Sensoy (2009), and Bengtsson and Ravid (2009). Our work is also related to Broughman and Fried (2008) who study deviations from contractual priority in liquidation of VC-backed companies and find that entrepreneurs sometimes receive more than they are entitled to according to their equity ownership and cash flow provisions.

This paper proceeds as follows. Section 2 describes the data. Section 3 presents and discusses our evidence on the overall frequency of contract evolution (i.e. how new round contract differs from previous round contract). Section 4 presents our analysis on the determinants of this evolution. Section 5 presents our evidence on the contract renegotiation (i.e. how previous round contracts are modified following a new financing round). Section 6 presents the results of out-of-sample tests. Section 7 discusses how our findings can be explained by

contracting frictions such as information asymmetries, bounded rationality and debt overhang problems. Section 8 concludes.

2. Data

2.1 Sample Overview

Our sample of venture capital contracts is collected, with the help of the Private Equity data provider *VCExperts*, from legal filings (Certificates of Incorporation) that venture-backed companies are required to file with their states of incorporation.[5] The contracts studied in this paper represent a subsample of the 1,800 contracts between U.S. venture-backed companies and U.S. VCs analyzed in Bengtsson and Ravid (2009). Although cost considerations prevent this dataset from covering all U.S. venture capital investments, it is a large sample that is representative with respect to key entrepreneur, company, and VC characteristics. The sample is recent—most contracts stem from financing rounds conducted in 2006 and 2007. While the data contain comprehensive information on the cash flow rights of the VCs, information on board and voting rights is not always completely provided in the Certificates of Incorporation that we study.

In order to analyze how contracts evolve between rounds, we limit our sample to contracts for which we also have data on the contract used in the preceding financing round. We exclude contracts from investment rounds that occur less than 6 months apart to ensure that each contract represents an independent financing event (as opposed to milestone or staged rounds).[5] These restrictions jointly limit our sample to 227 contracts from 210 unique venture-backed companies.

For each contract we extract from *VentureEconomics* variables that capture company, VC and round characteristics at the time of the financing round relevant for each contract. Table 1 provides summary statistics of the variables used in our analysis. As reported in Panel A, our

[5] The financial contract used in a milestone/staged round is not the result of a new negotiation but negotiated at the time of the previous financing round. Neither our data nor *VentureEconomics* identify which rounds are milestone/staged rounds.

sample is a good representation of the cross-section of U.S. VC investments, with about half of the sample companies being headquarted in either California or Massachusetts, and the largest industry groups being High Technology and Life Science. Panel B reports different round characteristics. The average round amount is $12.5 million, which is more than twice as large as the amount of the preceding financing round, and the post-money valuation is $67 million. A whole 78% of all rounds are so called up-rounds, for which the valuation was higher than in the preceding round, and only 15% are down-rounds, for which the valuation was lower. The average time between rounds is 14 months and 16% of all companies have evolved in-between rounds from seed/early stage to later/expansion stage.

Characteristics of VCs who invested in the round are reported in Panel C. The average round has about five VCs, which is relatively high due to the fact that the contracts in our sample are all from follow-up financing rounds. Two thirds of contracts are from inside rounds, in which all VCs were also investors in the company's preceding round, and two thirds of all companies have the same lead VC in both the new and preceding rounds. The average lead VC is at the time of the contract 20 years old and has invested in 186 unique companies.[6]

2.2 Structure of Venture Capital Contracts

Each time a venture-backed company receives a new round of financing, a new class of preferred stock is issued to all the VCs that invest in that round. Each class of preferred stock has a set of cash flow rights, which affect how payoffs are distributed, and control rights (board seats and restrictive covenants), which allocate decision power between all of the company's shareholders. A new financing round involves a new contract that spells out the rights of all the company's security holders, including both current round and previous round VCs. These rights could be identical between rounds or different following many possible permutations.

[6] The distribution of 'VC Number of Companies' is highly right-skewed because a small number of VC firms (e.g., Kleiner Perkins Caufield & Byers and New Enterprise Associates), have each invested in over 500 unique companies. The sample median for 'VC Experience' is 122 companies.

Importantly, the rights of the previous round VCs can legally only be altered if they agree to a renegotiation of the cash flow and control rights to which they are entitled.

2.3 Overview of Contract Terms

We code six contract terms for each of the 227 contracts in our sample. The contract terms that we study are cumulative dividends, liquidation preference, participation rights, anti-dilution rights, redemption rights, and pay-to-play requirements. Our motivation for focusing on these contract terms is threefold. Firstly, these contract terms jointly determine the most important cash flow rights that are attached to the preferred stock that VCs almost always hold. Secondly, unlike many other aspects of venture capital contracts, these terms exhibit considerable cross-sectional variation in their use. This variation is important for our purposes since we are interested in understanding the tradeoffs relevant for changes to the contract design. Thirdly, these contract terms are always reported in the mandatory legal filings that we study. Other terms, such as preemptive rights, tag along and drag along rights, reflect agreements between different VCs and are therefore typically not reported in our contract documents.

The six cash flow rights that we study increase the payoff to the VC if company performance is bad or mediocre (the VC loses all rights attached to preferred stock if the company undertakes a successful public offering). Appendix A provides a detailed description of each of these cash flow rights. Kaplan and Strömberg (2003), Metrick (2007), and Bengtsson and Sensoy (2009) discuss their economic meanings and real-world importance.

Panel D reports data on contracts terms. Cumulative dividends are given to VCs in 35% of all contracts, and 8% of all contracts include a liquidation preference that is above 1X. Participation rights are present in 71% of all contracts. Almost all contracts include some form of anti-dilution protection but only 9% of contracts have full-ratchet anti-dilution, which is particularly friendly to investors when subsequent financing rounds are relatively small. Investors have the right to redeem their stock in 66% of all contracts (redemption rights). Pay-to-play

requirements, according to which investors have to continue to fund the company in order to keep their cash flow rights, are present only in 23% of all contracts.

3. Evolution of Contract Terms

3.1 Definition of Evolution

Our first research question is how often do contracts evolve within a company so that new round contracts include different contract terms than previous round contracts. To explore this, we code each of the six cash flow rights in the preceding contract and compare with the cash flow rights in the new contract. A change could either make the contract more VC-friendly or less VC-friendly, with the latter meaning a contract that is more friendly to the common shareholders such as founders, employees and business angels, and to preferred shareholders whose financial claim is pari-passu or junior to the new contract.

To illustrate how a contract could change, consider a preceding contract that has 8% cumulative dividends. With cumulative dividends, the VC can instead of receiving yearly dividend payments claim unpaid dividends at the time the company is sold or liquidated. Given that most venture-backed companies are cash constrained for long periods of time, dividends only infrequently paid out every year so cumulative dividends are very valuable. The new contract could be less VC-friendly in two ways: the dividends are cumulative but the dividend rate lower, or the dividends are non-cumulative. Similarly, the new contract is more VC-friendly if the dividends are cumulative with a higher rate. In order to have the same dividend rights as the preceding contract, the new contract must have cumulative dividends with the same dividend rate.

3.2 Evidence on Evolution

Appendix A provides a description of all possible changes. Given the large flexibility in VC contracts, there exist many possible combinations of changes to the cash flow rights. Table 2 summarizes the actual changes found in our sample of 227 contracts. As presented in Panel A

under “Actual”, more than half (58%) of the contracts are exactly the same as the preceding contract, 19% have changes that make the contract unambiguously more VC-friendly and 18% have changes that makes the contract unambiguously less VC-friendly. Only 5% of all contracts include changes that make the contract more VC-friendly along one dimension and less VC-friendly along another dimension. Hence, our findings clearly show that changes to cash flow rights between rounds are rare.[7]

A breakdown of changes by cash flow right is provided in Panel B. Each cash flow right is much more likely to be identical in the new contract than to change by either becoming less or more VC-friendly. For example, 89% of all new contracts have exactly the same dividend right, whereas 7% become less VC-friendly and 5% more VC-friendly. Similarly, 97% of all new contracts has redemption rights similar to the preceding contract (i.e. if the preceding contract has redemption rights then the new contract has redemption rights, or alternatively if the preceding contract does not have redemption rights then the new contract does not have redemption rights).

We also study whether the new contract has a liquidation preference and cumulative dividends that are senior, junior, or pari-passu to the liquidation preference and cumulative dividends from the preceding round. This seniority affects how payoffs are split between VCs but not how payoffs are split between VCs and common shareholders because common stock is always junior to the liquidation preference and cumulative dividends of preferred stock. As reported in table 2 Panel C, 55% of all contracts are pari-passu and 45% are senior. No new contracts are junior to the preceding contract.

3.3 Comparison to Cross-Sectional Variation in Contract Terms

One trivial explanation to why changes to contracts within a company are rare would be that VC contract design does not vary significantly within a company because it does not vary

[7] The actual number of changes is plotted in Panel D. The histogram shows that contracts that have more than one change are very rare.

between companies that share certain characteristics. If this explanation were correct then we would expect to observe few hypothetical "changes" between a new contract in our sample and a contract that comes from a different company that shares important company, VC and round characteristics with our sample company. The data for the matched sample comes from the full sample of 1,800 VC contracts analyzed by Bengtsson and Ravid (2009). To find the relevant match we match on variables that have been found in earlier studies to significantly impact how VC contracts are structured (Kaplan & Strömberg 2003, 2004; Bengtsson & Sensoy, 2009; and Bengtsson & Ravid, 2009). These variables are company industry, company location (U.S. state), year of contract, round amount, whether the founder of the company previously founded a company that has since gone public, company age and experience of the lead VC (number of unique company investments).

Results of this matching are reported under "Random Company" in Panels A, B and D. The results consistently presented in Panel A show that the fraction of contracts that would have the same cash flow rights is significantly lower if the new round is compared with a random company that has shares important company, VC and round characteristics. A mere 5% of all such contracts would have the same cash flow rights. Put differently, the small fraction of actual changes to contracts cannot be explained by small cross-sectional differences in contract design.

3.4 Comparison to Contract Terms Used by Same VC

We next explore the possibility that the low fraction of contract changes between rounds may be explained by most companies retaining the lead VC from the previous round and each VC using a fixed contract design. We redo the above matching but include as our primary matching criterion the identity of the VC that was the lead investor in the round. Thus, instead of the actual preceding contract we find another random contract that is used by the same lead VC in another company that has similar company and round characteristics as the sample company. Results from this matching are reported in Panels A-C under "Random Same VC". With this matching

the number of contracts that have exactly the same cash flow rights are only 14%, which is three times higher than the corresponding fraction from "Random Company" but more than three times lower than for the "Actual" match. From this comparison we can make two important inferences. First, the result that most follow-up contracts are similar to the contract used in the preceding round cannot be explained by VCs always using the same contract. Second, the cross-sectional variation in contracts is smaller when comparing only contracts given by the same VC. One explanation for this result, as presented in Bengtsson and Sensoy (2009), is that a VC's preference for different contract designs depends on the VC's abilities to monitor and take actions against entrepreneurs.

3.5 Comparison to Changes in Company Business

Another possible explanation to why contracts do not change between financing rounds would be that the optimal contract solution remains the same for most companies because they make no important changes to the business nature. We explore the validity of this explanation by hand-coding all changes that each sample company does to its business relationships, products or human capital. We collect this data from company web-pages, press releases, newspaper articles and from the database CapitalIQ. The self-reported nature of this data introduces two types of bias—almost all reported changes are to the company's favor, and some companies may choose not to disclose certain favorable changes. This bias implies that our data represents the lower bound on the true frequency of business changes.

Appendix B presents results pertaining to changes to the company's business. About half of all companies make a change to its business relationships by entering into a strategic alliance / joint venture or acquiring another company; 68% make changes to product or services; and 42% change the company's human capital (CEO, CFO or another senior management position). Overall, 82% of all sample companies report at least one business change. The large prevalence of business changes is not surprising given that we exclusively study venture-backed companies,

which by nature are early-stage fast-growing innovative companies that operate in undeveloped industry segments. The finding that business changes are commonplace in our sample is evidence against the explanation that most contracts do not change between financing rounds because the optimal contract solution remains the same.

4. Determinants of Contract Evolution

4.1 Evidence on Determinants of More Investor-Friendly Contract Terms

We next study how the frequency of contract changes varies with round, company and VC characteristics. We first study the aggregate change to the six cash flow rights, and then proceed to study changes to each separate cash flow right. Our first empirical measure of contract change is the aggregate change to the six cash flow rights that we study. Table 3 presents univariate comparisons of different characteristics between the four types of contract changes: (i) only more VC-friendly, (ii) same, (iii) both less and more VC-friendly, and (iv) only less VC-friendly. While a univariate comparison is illustrative, it ignores correlations between different explanatory variables and correlations between explanatory variables and other control variables. We account for such correlations by running multivariate probit regressions where the dependent variable takes the value 1 if contract change is "only more VC-friendly" and 0 otherwise. Results are presented in table 4a. All regressions include controls for company industry (Life Science, High Tech, or Other Industry), and company location (California, Massachusetts, or Other State); have normalized coefficient estimates to reflect sample means; and cluster standard errors by company to account for the potential cross-correlation within the 17 companies that have contracts from more than round in our sample.

Results from specifications including our full sample of 227 contracts are reported in Table 4a regression models 1-3. The largest and statistically most significant coefficient is "Valuation Up", which captures whether the new financing round had a higher valuation in the new round than in the previous round. The negative coefficient shows that contract evolve to

include more investor-friendly cash flow provisions significantly less often when the company experiences a valuation increase. We also find evidence that investor-friendly contract changes are significantly less common when all the VCs in the new round also invested in the company's preceding financing round (i.e. an inside round). For these specifications that include the full sample we find no significant results for "Relative Round Amount", "Months Between Rounds", "Round Sequence", "VC Number of Investments", "Serial Founder" or "Serial Successful Founder". We do, however, find that the new contract is more likely to be VC-friendly if a company has had any change to its business operations between rounds. This result is somewhat surprising in light of the fact that our data on business changes is likely to be biased towards positive changes.

4.2 Subsample Analysis

We next analyze how coefficients differ between important subsamples. Regression model 4 includes only contracts from inside rounds, in which all VCs invested also in the preceding round. Model 5 includes only contracts from outside rounds, in which at least one VC did not invest in preceding round. While the negative coefficient on "Valuation Up" is large for inside rounds, it is small and statistically insignificant for outside rounds. Similarly, the positive coefficient on "Any Change to Business" is found only for inside rounds. The variable "Relative Round Amount", which is calculated by dividing the total dollar amount of the new round with the total dollar amount of the preceding round, is positive for the inside round but negative for the outside round. Thus, larger rounds are more likely to lead to a VC-friendly change to the contract if no new VC invests in the round but less likely to lead to a VC-friendly change if at least one new VC invests in the round. The subsample analysis also reveals that later stage rounds (higher "Round Sequence") are more likely to have a VC-friendly change if the round is an outside round, and that inside rounds are less likely to have a VC-friendly change if the founders were serial founders with no prior IPO exit.

Our next subsample comparison sorts the sample by "Up Round" and "Flat/Down-Round". This analysis gives two results. Firstly, the result that an inside round is less likely to have a VC-friendly change is confined to rounds where the valuation has increased. Secondly, the time between financing rounds, as measured by "Months Between Rounds", is negatively correlated with VC-friendly changes for up rounds but positively correlated for flat and down rounds. A company that raises two financing rounds within a longer time interval gets a contract that is less VC-friendly if the valuation has increased but a more VC-friendly contract if the valuation is unchanged or has decreased.

4.3 Analysis of Separate Cash Flow Rights

We next analyze changes to each cash flow right separately. Table 4b shows results of probit regressions where the dependent variables takes the value 1 if a cash flow right was changed by becoming more VC-friendly, and 0 otherwise. The coefficient on "Valuation Up" is negative (but not significant) for all cash flow rights except pay-to-play. The coefficient on inside round is negative for dividends, liquidation preference and pay-to-play and positive, but with smaller magnitudes, for participation, anti-dilution and redemption. The small number of statistical significant coefficients is not surprising given the small sample size and the infrequent occurrence of investor-friendly changes for each cash flow right.

4.4 Evidence on Evolution to More Senior Claims

In table 5 we replicate the regression models presented in table 4 but let the dependent variable take the value 1 if the new contract is senior to the preceding round, and 0 otherwise. The seniority of different classes of preferred stock determines the order of which liquidation preferences and cumulative dividends are paid out when the company is sold or liquidated. As such, the seniority does not affect the payoff to common shareholders but is important for how payoff are split between VCs which invest in different rounds. As noted in our description of the

sample, about half of the contracts give the new round VCs a claim that is senior to the claim held by previous round VCs (and the remaining contracts give VCs a pari-passu claim).

The analysis of the full sample (models 1-3) shows that contracts are less likely to be senior if the company's valuation has increased. The subsample comparison of inside and outside rounds (models 4-5) reveals that this result does not depend on whether a new investor joins in the round.

We also code a new explanatory variable, "Sensitivity of New Contract to Seniority", which captures whether the new round contract either includes investor-friendly cumulative dividends, liquidation preference above 1X or has participation rights. The idea of this variable is to test whether seniority is included more often when such seniority is more important to new round investors. The coefficient on "Sensitivity of New Contract to Seniority" is positive but larger for outside rounds than for inside rounds, and larger for flat/down rounds than for up rounds. Thus VCs are more likely to get a senior claim if the dollar payoff associated with this seniority is higher, but even more likely if the round includes new VCs or the company valuation has not increased since the preceding round.

5. Renegotiation

5.1 Types of Renegotiation

When a venture-backed company secures a new round of financing, the contract terms given to VCs in previous round can be subject to renegotiations. Since the contracts are legally binding documents, such renegotiations are only possible if these investors agree to surrender the cash flow or control rights that are attached to their preferred stock. In practice, renegotiations of venture capital contracts come in two forms: major and minor renegotiations.

5.2 Evidence on Major Renegotiation

Major renegotiations involve either a reverse split, in which the previous VC forfeits some shares but the remaining shares retain their contractual rights, or conversion to junior securities (usually common), in which the contractual rights are forfeited. Table 6 shows that major renegotiations are rare, occurring in only 6% of cases. However, they are more likely to occur when the valuation of the company does not increase, when not all VCs also invested in the previous round, when the new round contract is to be senior, and when the new round contract gives more rights to the VCs than the previous round contract.[8]

5.3 Evidence on minor renegotiation

Minor renegotiations involve a more selective change to some of the contractual rights of existing investors. We code the instance of such renegotiations for 40 randomly selected contracts from our sample (which reflect a sequence of first and second round contracts). Panel A of table 7 shows that minor renegotiations are much more common that major renegotiations, occurring in about 50% of cases, and almost uniformly result in making the previous round contract more similar to the new round contract. Panel B of table 7 shows that these minor renegotiations are more frequent when new investors join the round, when the company valuation is flat or down, and when the new contract differs more from the previous contract.

6. Out-of-Sample Analysis

In this section we discuss whether the main empirical findings of this paper are specific to our sample or rather reflect a broader empirical pattern of how venture capital contracts are negotiated and structured. To do this, we analyze an 911 out-of-sample U.S. venture capital contracts. These contracts, which are a subset of the contracts studied by Bengtsson and Ravid

[8] The small size or our sample combined with the low frequency of renegotiations makes a multivariate regression unreliable. We therefore focus on univariate differences.

(2009), include all follow-up contracts (i.e. second round and forward) that are not included in the sample used for our above analysis. We focus on follow-up contracts since we are interested in the evolution and renegotiation of contract terms. Importantly, for this larger sample we do not have access to the preceding contract for the same company. This limitation means that we cannot analyze how contract terms used in the new round compare to those used in the previous round. We can, however, analyze the overall investor-friendliness of the contract, the seniority of liquidation preferences and cumulative dividends, and the occurrence of major renegotiations.

Appendix C presents the results of multivariate regressions that all control for a large number of company, round and VC characteristics. In regression models 1 and 2, we find that contracts include more investor-friendly cash flow rights for companies which have not experienced an increase in their valuations.[9] Unlike the results discussed above on how contracts evolve between rounds, this result provides only indirect evidence on contract evolution. It is possible that also the previous round contract includes more investor-friendly cash flow rights if the company is more likely to experience adverse performance. In models 3 and 4, we confirm the finding that a new round contract is more likely to be senior to the previous round contract if the valuation of the company has not increased or when the new contract includes more liquidation preferences, cumulative dividends or participation rights. Finally, in models 5 and 6 we confirm the result that major renegotiations of previous round contracts occur more often when the valuation of the company has not increased. The insignificant coefficients on the interaction variable "Valuation Up X Round Sequence" in regression models 2, 4 and 6 suggests that these empirical patterns do not depend on the number of the financing round.

[9] We follow the methodology of Bengtsson and Sensoy (2009) to aggregate the cash flow rights to an index ("Downside Protection Index") that captures how friendly the contract is to new round VCs.

7. Theoretical Explanations

7.1 Overview of Main Results

Our empirical results on the evolution and renegotiation of venture capital contract can be summarized as follows. Changes to the six important cash flow rights that we study are rare relative to the considerable cross-sectional variation in these contractual rights and relative to the extent of business changes that venture-backed companies go through between financing rounds. Major renegotiations of previous round contracts occur only with low frequency whereas minor renegotiations or "adjustments" are more common. To the extent they occur, changes that make the new round contract more investor-friendly are more prevalent when the company's performance since the previous round has been bad, or when new VCs join the new round. New round contracts which include larger debt-like claims are more likely to be senior to the previous round contract.

Taken together, our findings indicate the presence of considerable contracting frictions that impede changes to contract design. These contracting frictions could either be associated with how a new financial contract is negotiated or with the overall structure of the company's nexus of financial contracts. Because the contract evolution and renegotiation that we observe follow a systematic pattern, there must also exist a countervailing economic mechanism that can explain such changes.

7.2 Contracting Friction: Asymmetric Information

One possible explanation to why many contracts are similar to the contract from the preceding round is that (at least) one of the negotiating parties has inside information about the value of the company's current and future assets. In many VC financing rounds, the negotiation is conducted between three distinct parties, each of which has its own incentives when it comes to contract design. Non-VC (common) shareholders who do not invest in the new round prefer a high share price and few investor-friendly cash flow rights. VCs that invest in the new round but

did not invest in the previous round ("outside" VCs) prefer a low share price and many investor-friendly cash flow rights. VCs that invest in the new round and also invested in the previous round ("inside" VCs) have ambiguous preferences because a lower price and more investor-friendly cash flow rights is beneficial for their new investment but detrimental for the previous investments (which gets diluted).

The equilibrium outcome of this type of bargaining game has been derived by Admati and Pfleiderer (1994). In their model, which explicitly deals with VC investments, the optimal financial contract should be designed so that the existing investors of the company retain exactly the same ownership stake between financing rounds. This inertia in ownership stake is optimal because the "inside" VC has been actively involved with the company and as a result collected valuable private information. Importantly, the negotiated contract affects the payoff to the inside VC both by increasing the ownership stake following the new investment and by diluting the ownership stake from previous investments. If the inside VC would have a lower ownership stake following the new round then the "outside" VC would worry that the negotiated price per share was above its actual value. If, on the other hand, the inside VC would have a higher ownership stake then the entrepreneur would worry that the negotiated price per share was too low. The optimal contract that minimizes the two opposing mispricing incentives implies a constant ownership stake for the inside VC between rounds (a so called "fixed-fraction" contract).

Although the equilibrium of the Admati-Pfleiderer model is formally only derived for all-equity contracts, the intuition can be extended to the more realistic VC contracts with cash flow rights attached to the preferred stock. A new round contract that has fewer investor-friendly cash flow rights than the previous round contract would signal to the outside VCs that the inside VCs may be negotiating a solution that preserves the value of their previous round contracts. Conversely, a new round contract with more investor-friendly rights would signal to other shareholders that the inside VC may be negotiating a contract with an unfairly high payoffs to the new round contract. The balanced solution to these two incentive problems would be a "fixed-

deal term" contract, according to which the contract used in the new financing round recycles most or all of the cash flow rights from the previous round contract. To summarize, differences in contract design between financing rounds would rare because existing VCs frequently continue to invest in a company and thereby have an incentive to act on their private information in an opportunistic way.

Our result that cash flow rights are similar between sequential financing rounds for the same company is consistent with the notion that asymmetric information problems impede contract changes. However, our cross-sectional analysis shows that contracts change more often (to include more investor-friendly cash flow rights) when new VCs join the round. This piece of evidence is inconsistent with the extended Admati-Pfleiderer argument since contract inertia should be particularly pronounced in a three-party bargaining situation.

7.3 Contracting Friction: Status Quo Bias

Another explanation to why changes to contracts are relatively uncommon is *status quo* bias, according to which decision-makers tend not to change an established behavior unless they can find very compelling reason for making a change. In the context of VC contracts, *status quo* bias could be attributed to any of the parties that negotiates what cash flow rights should be included in the final contract—the executive of the VC firm that invests in the new round, the executive of the VC firm that invested in the previous round, the CEO of the company, or large common shareholders such as the founders and business angels. Our interviews with lawyers, entrepreneurs and VC executives support the view that there is a *status quo* bias in the negotiation of follow-up contracts—any change has to be motivated ("why include this contract term now", "what does that contract term imply", "why was that contract term not included in the preceding contract", etc) and conflicts are costly because the parties will later interact in board meetings and individually undertake value-adding activities that add value to the company.

7.4 Contracting Friction: Fiduciary Duty

Finally, it is possible that legal reasons can, at least partly, explain why the outcome of a new contract negotiation often is to recycle the contract design from the previous round. Changes to contract design between financing rounds can also expose VCs to potential lawsuits where other shareholders argue that the VCs, in their role as board members, have breached their fiduciary duty to act in the interest of all shareholders. Atanasov, Ivanov and Litvak (2009) study lawsuits filed against VCs and show that such procedures could be very costly to the involved VCs. Fried & Ganor (2006) present evidence that in some recent cases the fiduciary duty requirement of board members has not been enforced by the courts. Our own interviews with lawyers and VC partners confirm the view that many VCs are cautious about making self-serving decisions as board members.

The friction associated with fiduciary duty, *status quo* bias and asymmetric information are similar in the sense that they affect the negotiation process of VC contracts. The underlying motivation for these three frictions is, however, dissimilar. The fiduciary duty argument is related to the structure of the legal system, the *status quo* bias is motivated on behavioral grounds whereas asymmetric information problem is motivated on rational grounds.

7.5 Contracting Friction: Complex Payoff Implications

A third possible explanation to the observed inertia in contract design is that changes to cash flow rights make the aggregate contractual payoffs overly complex (Fama, 1980). Cash flow rights attached to the preferred stock issued in the first VC financing round can introduce up to four different intervals of the curve that plots the VC's payoff as a function of the company's exit value.[11] Each interval is associated with a kink where the relative payoff to common shareholders such as founders, CEO and employees changes. While this type of a contingent payoff structure

[11] To be precise: capped participating preferred result in four intervals, non-participating convertible preferred in three intervals, and uncapped participating preferred result in two intervals. See Metrick (2007) for a detailed description of the payoff implications of preferred equity used in VC investments.

conceptually could align incentives in a careful way, it also requires that the contracting parties actually understand its actual implications. While all the information needed to calculate the contractual payoffs to VCs and common shareholders is provided in the contracts, this calculation is in practice very difficult. The role of cognition efforts and computational costs in contract design has been modeled by Dye (1985), Anderlini and Felli (1994, 1999, 2004) and more recently by Tirole (2008).[12]

If a new round contract adopts the same cash flow rights as the contract used in the previous rounds, then the aggregate payoff curve to VCs changes but does not become more complex, i.e. it has the same number of kinks. If, however, a follow-up round uses a contract that has different cash flow rights then new kinks are introduced and the payoff curve becomes even more complex. Many venture-backed companies undergo four or more financing rounds before exit and if each round has a unique set of cash flow rights then the calculation of aggregate payoff curves becomes very complex (see Metrick, 2007). This complexity means that VC contracts would be counter-productive in their role as solving agency and information problems by fine-tuning incentives. Two of our findings support the thesis that overly complex payoff implications affect the design of venture capital contracts. Firstly, contracts from sequential financing rounds have an overall similar design. Secondly, the observed minor renegotiations almost always make to the previous round contract more similar to the new round contract.

7.6 Motivation for Changes: Bargaining Power of New Investors

New round VCs are likely to have stronger bargaining power relative to existing VCs and other shareholders in situations where companies have experienced adverse performance. At first blush, it is plausible that this shift in bargaining power can explain our empirical finding that VC

[12] These models are formalization of the concept of bounded rationality (Simon, 1957; Williamson, 1981). Even though some decisions can be rationally motivated, they are not made because of limitations to human or organizational capabilities.

contracts include more investor-friendly cash flow rights when the valuation of the company has not increased since the last financing round. This logic is, however, incomplete because VCs can also use their bargaining power to negotiate a larger ownership of the company lower price by lowering the price for a preferred share. If the pricing of VC investments can be adjusted in other ways then – from the perspective of optimal contracting – venture capital contracts should be designed primarily to mitigate information, agency costs and other financing problems. Thus, shifts in bargaining power alone cannot explain the systematic pattern of contract evolution and renegotiation that we observe.

7.7 Motivation for Changes: Debt Overhang

As noted by Kaplan and Strömberg (2003), the contracts used in VC investments entitle preferred shareholders (VCs) to fixed payoffs that are senior to the payoffs to common shareholders. These payoffs are the result of three of the cash flow rights that we study in this paper: cumulative dividends, liquidation preferences and participation rights.[13] Myers (1977) provides a theoretical argument for how the presence of debt-like claims can give rise to underinvestment problems due to debt overhang. In the setting of VC investments, this overhang could arise because the capital provided by VCs in a new financing round would partly subsidize the fixed payoffs to which previous round VCs are entitled. Assuming that new round VCs correctly price an investment, this cross-subsidization would lead to a higher cost of capital.

There are three possible solutions to the debt overhang problem. The first solution is that new round VCs negotiate cash flow rights that include higher fixed payoffs. The second is that payoffs of the new round contract become senior to payoffs of the previous round contract. The third solution is that previous round VCs agree to renegotiate their cash flow rights to have lower fixed payoffs. We show that VCs are more likely employ all of these solutions when the company

[13] The other three cash flow rights that we study (redemption rights, anti-dilution rights and pay-to-play provisions) are not associated with fixed payoffs but are similar to other important features of a standard debt contract. See Bengtsson and Sensoy (2009) for a more detailed discussion.

has experienced adverse performance, which is precisely a situation where debt overhang problems are likely to be most severe. A lower valuation of the company means that the debt-like claims of previous round VCs are larger relative to the expected payoffs from the company.

Debt overhang problems are also likely to be more severe when new round VCs did not invest in the company's previous round. We show that the presence of new investors is associated with more investor-friendly cash flow rights to new round VC contracts. Finally, the observation that new round contracts are more senior when this seniority is more important to new round VCs is also consistent with debt overhang arguments.

On the whole, our findings show that debt overhang problems are an important motivation behind contract evolution and renegotiation. Thus, VCs use their bargaining power to negotiate investor-friendly cash flow rights more often when such contractual provisions can alleviate underinvestment and lower the company's cost of capital.

8. Conclusion

We contribute empirical evidence to the large literature on contract theory by studying how important contract terms evolve and are renegotiated as a company goes through new financing events. Our analysis of 227 U.S. VC contracts shows that even though the use of investor-friendly cash flow rights varies considerably between venture-backed companies, most contracts are remarkably similar between the financing rounds of a particular company. About half of the companies in our sample make zero changes. A theoretical explanation for this inertia is that follow-up contract negotiations differ from new round negotiations because of asymmetric information (Admati and Pfleiderer, 1994). By keeping important contract terms unchanged, the existing VCs can convince both other existing shareholders and prospective investors that the structuring of the new round investment is reasonable. Another theoretical explanation to the observed few changes is that the calculation of payoffs, and thereby the provision of monetary

incentives, can become overly complex if every VC financing round would have its own unique set of cash flow rights.

Our analysis of the determinants of contract evolution and renegotiation shows that the inertia in contract design is overcome more often in situations where the valuation of the company has not increased since the previous VC financing round. This finding is consistent with the debt overhang arguments of Myers (1977) – the problem of underinvestment emanating from existing debt-like claims is particularly bad for companies which have experienced adverse performance. As further evidence that debt overhang impacts contract design we show that new round contracts are different from previous round contracts more often when new VCs invest in the round. Also, new round contracts are never junior to previous round contracts and seniority is more common when VCs are entitled to larger debt-like claims.

Our findings suggest that the tradeoff relevant for the evolution and renegotiation of a follow-up financial contract is different from the tradeoffs relevant for the initial structuring of a financial contract. Adding to or changing an already existing nexus of contracts is different from creating a new one.

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Table 1 - Summary Statistics

Sample is 227 VC contracts from U.S. venture-backed companies. Company, round, VC and contract characteristics refer to new contract. Variables for which only mean is reported are dummy variables. See Appendix A for description of contract terms.

		Mean	Std. Dev.	Min	Max
Panel A: Company Characteristics	California	0.34			
	Massachusetts	0.18			
	Life Science	0.26			
	High Technology	0.61			
	Serial Founder	0.26			
	Serial Successful Founder	0.17			
	Company Age (years)	5.06	2.59	0.00	10.00
Panel B: Round Characteristics	Round Sequence	3.67	1.25	2.00	5.00
	Round Year	2007	1	1999	2008
	Round Amount ($000s)	12,580	12,905	240	76,000
	Relative Round Amount	2.31	5.11	0.03	56.23
	Valuation Up	0.78			
	Valuation Down	0.15			
	Months Between Rounds	13.85	6.25	6.00	72.00
	Company More Mature	0.16			
Panel C: VC Characteristics	# of VCs in Round	5.21	3.48	1.00	24.00
	All VCs in Previous Round	0.68			
	Same Lead in Previous Round	0.67			
	VC Number of Investments	186	194	1	797
	VC Age (years)	20	12	0	47
Panel D: Contract Characteristics	Post-money Valuation ($000s)	66,897	77,586	1,500	573,943
	Cumulative Dividends	0.35			
	Liquidation Preference >1X	0.08			
	Participating Prefered	0.71			
	Full-Ratchet Anti-Dilution	0.09			
	Redemption Rights	0.60			
	No Pay-To-Play	0.77			

Table 2 - Evolution from Previous Contract to New Contract

Sample is 227 VC contracts from U.S. venture-backed companies. See Appendix A for description of contract terms. In Panels A, C and D, "Actual" reflects difference between new contract and actual previous contract; "Random Same VC" reflects difference between new contract and a random contract matched on lead VC identity and company and round characteristics; and "Random Company" reflects difference between new contract and a random contract matched on company, round and VC characteristics. Sample for the random matching is 1,135 contracts. In Panel C, seniority refers to the order of which liquidation preferences and cumulative dividends are paid out.

Panel A: Aggregate Changes

	Only More VC Friendly	Same	Less and More VC Friendly	Only Less VC Friendly
Actual	44	131	11	41
	19%	*58%*	*5%*	*18%*
Random Same VC	76	31	65	55
	33%	*14%*	*29%*	*24%*
Random Company	69	11	75	72
	30%	*5%*	*33%*	*32%*

Panel B: Changes in Individual Contract Terms

		Less VC Friendly	Same	More VC Friendly
Cumulative Dividends	Actual	15	201	11
		7%	*89%*	*5%*
	Random Same VC	30	161	36
		13%	*71%*	*16%*
	Random Company	44	138	45
		19%	*61%*	*20%*
Liquidation Preference	Actual	8	208	11
		4%	*92%*	*5%*
	Random Same VC	9	199	19
		4%	*88%*	*8%*
	Random Company	20	189	18
		9%	*83%*	*8%*

Table 2 continued

Panel B: Changes in Individual Contract Terms

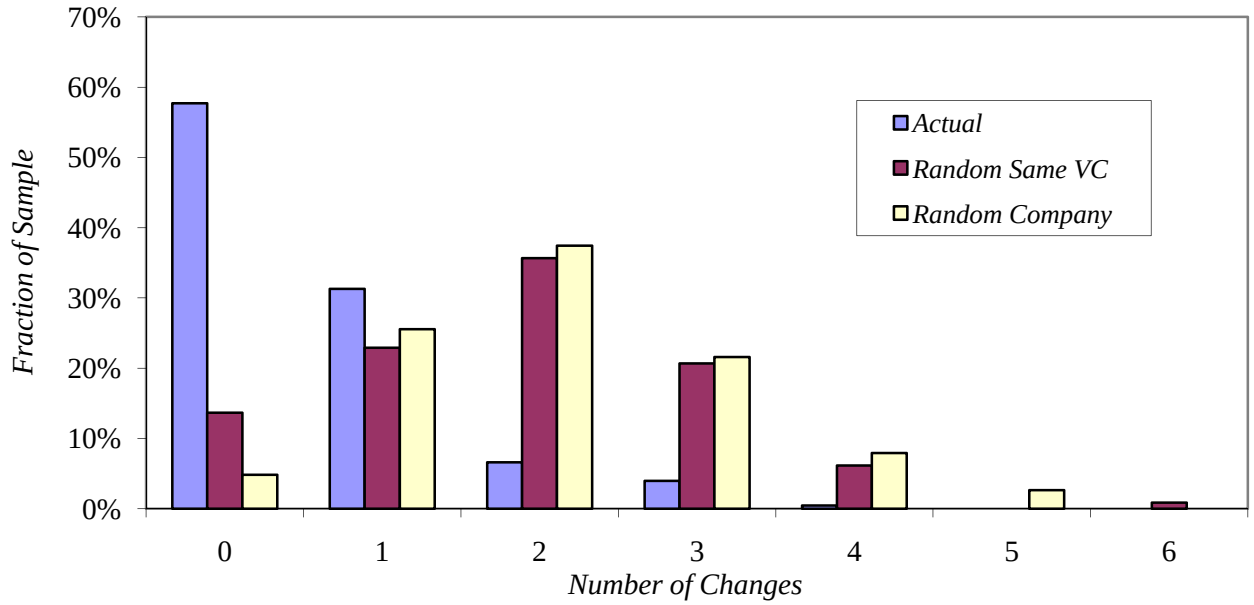
		Less VC Friendly	Same	More VC Friendly
Participation	Actual	19	191	17
		8%	*84%*	*7%*
	Random Same VC	56	96	75
		25%	*42%*	*33%*
	Random Company	70	89	68
		31%	*39%*	*30%*
Anti-Dilution	Actual	7	210	10
		3%	*93%*	*4%*
	Random Same VC	15	190	22
		7%	*84%*	*10%*
	Random Company	23	179	25
		10%	*79%*	*11%*
Redemption	Actual	3	220	4
		1%	*97%*	*2%*
	Random Same VC	38	138	51
		17%	*61%*	*22%*
	Random Company	46	143	38
		20%	*63%*	*17%*
Pay-to-Play	Actual	14	200	13
		6%	*88%*	*6%*
	Random Same VC	44	155	28
		19%	*68%*	*12%*
	Random Company	46	147	34
		20%	*65%*	*15%*

Panel C: Seniority

	Pari Passu	Senior
Actual	124	103
	55%	*45%*

Table 2 continued

Panel D: Number of Changes



Panel E: Cross-Correlation of Changes (1=More VC Friendly, 0=Not More VC Friendly)

	Cumulative Dividends	Liquidation Preference	Participation	Anti-Dilution	Redemption
Liquidation Pref.	0.0475				
Participation	0.1298*	0.001			
4. Anti-Dilution	-0.0452	0.1093	-0.1204*		
5. Redemption	0.2241	-0.0011	0.1266	-0.1848***	
6. Pay-To-Play	0.0371*	0.1332**	0.1281*	0.0006	-0.1452**

Table 3 - Univariate Comparison of Evolution of Contracts

Sample is 227 VC contracts from U.S. venture-backed companies. Percentage number (in parenthesis) reflects fraction of sample within that category. See Appendix A for description of contract terms.

	No Change To Business		Change To Business		Round Within 12 Months		Round After 12 Months		New VC in Round		All VCs in Prev. Round		Valuation Flat or Down		Valuation Up	
Aggregate Changes																
Less VC Friendly	6	(15%)	38	(20%)	29	(19%)	15	(20%)	11	(15%)	33	(21%)	10	(20%)	34	(19%)
Same	28	(68%)	103	(55%)	91	(59%)	40	(54%)	39	(53%)	92	(60%)	21	(41%)	110	(63%)
More VC Friendly	3	(7%)	38	(20%)	26	(17%)	15	(20%)	19	(26%)	22	(14%)	17	(33%)	24	(14%)
Less+More VC Friendly	4	(10%)	7	(4%)	7	(5%)	4	(5%)	4	(5%)	7	(5%)	3	(6%)	8	(5%)
Number of Changes																
No Change	28	(68%)	103	(55%)	91	(59%)	40	(54%)	39	(53%)	92	(60%)	21	(41%)	110	(63%)
1 Change	7	(17%)	64	(34%)	47	(31%)	24	(32%)	24	(33%)	47	(31%)	21	(41%)	50	(28%)
2 Changes	4	(10%)	11	(6%)	10	(7%)	5	(7%)	7	(10%)	8	(5%)	6	(12%)	9	(5%)
3 Changes	2	(5%)	7	(4%)	4	(3%)	5	(7%)	3	(4%)	6	(4%)	3	(6%)	6	(3%)
4 Changes	0	(0%)	1	(1%)	1	(1%)	0	(0%)	0	(0%)	1	(1%)	0	(0%)	1	(1%)
Seniority																
Pari Passu	23	(56%)	101	(54%)	74	(48%)	50	(68%)	36	(49%)	88	(57%)	17	(33%)	107	(61%)
Senior	18	(44%)	85	(46%)	79	(52%)	24	(32%)	37	(51%)	66	(43%)	34	(67%)	69	(39%)

Table 3 continued

	No Change To Business		Change To Business		Round Within 12 Months		Round After 12 Months		New VC in Round		All VCs in Prev. Round		Valuation Flat or Down		Valuation Up	
Cumulative Dividends																
Less VC Friendly	3	(7%)	12	(6%)	9	(6%)	6	(8%)	3	(6%)	12	(7%)	5	(6%)	3	(2%)
Same	38	(93%)	163	(88%)	139	(90%)	62	(86%)	45	(88%)	156	(89%)	72	(88%)	136	(94%)
More VC Friendly	0	(0%)	11	(6%)	7	(5%)	4	(6%)	3	(6%)	8	(5%)	5	(6%)	6	(4%)
Liquidation Preference																
Less VC Friendly	2	(5%)	6	(3%)	6	(4%)	2	(3%)	2	(3%)	6	(4%)	4	(8%)	4	(2%)
Same	35	(85%)	173	(93%)	142	(92%)	66	(92%)	65	(89%)	143	(93%)	42	(82%)	166	(94%)
More VC Friendly	4	(10%)	7	(4%)	7	(5%)	4	(6%)	6	(8%)	5	(3%)	5	(10%)	6	(3%)
Participation																
Less VC Friendly	3	(7%)	16	(9%)	10	(6%)	9	(13%)	4	(5%)	15	(10%)	1	(2%)	18	(10%)
Same	36	(88%)	155	(83%)	133	(86%)	58	(81%)	64	(88%)	127	(82%)	43	(84%)	148	(84%)
More VC Friendly	2	(5%)	15	(8%)	12	(8%)	5	(7%)	5	(7%)	12	(8%)	7	(14%)	10	(6%)
Anti-Dilution																
Less VC Friendly	1	(2%)	6	(3%)	6	(4%)	1	(1%)	2	(3%)	5	(3%)	1	(2%)	6	(3%)
Same	38	(93%)	172	(92%)	140	(90%)	70	(97%)	68	(93%)	142	(92%)	44	(86%)	166	(94%)
More VC Friendly	2	(5%)	8	(4%)	9	(6%)	1	(1%)	3	(4%)	7	(5%)	6	(12%)	4	(2%)
Redemption																
Less VC Friendly	1	(2%)	2	(1%)	1	(1%)	2	(3%)	0	(0%)	3	(2%)	1	(2%)	2	(1%)
Same	40	(93%)	180	(96%)	151	(97%)	69	(96%)	72	(99%)	148	(96%)	48	(94%)	172	(98%)
More VC Friendly	2	(5%)	6	(3%)	3	(2%)	1	(1%)	1	(1%)	3	(2%)	2	(4%)	2	(1%)
Pay-to-Play																
Less VC Friendly	1	(2%)	13	(7%)	8	(5%)	6	(8%)	6	(8%)	8	(5%)	6	(12%)	8	(5%)
Same	38	(93%)	162	(87%)	138	(89%)	62	(86%)	58	(79%)	142	(92%)	42	(82%)	158	(90%)
More VC Friendly	2	(5%)	11	(6%)	9	(6%)	4	(6%)	9	(12%)	4	(3%)	3	(6%)	10	(6%)

Table 4a - Regression Analysis of Aggregate Evolution of Contract Terms (More VC Friendly)

*Sample is 227 VC contracts from U.S. venture-backed companies. Company, round, VC and contract characteristics refer to new contract. Probit regressions where the dependent variable takes the value 1 if any term in the new contract is more VC friendly than in the previous contract and no contract term is less VC friendly (mean=0.18). Inside round means that all VCs in previous round participate and that no new VC enters syndicate. Coefficients are normalized and residuals clustered by company. All specifications includes industry (Life Science, High Tech, or Other), state (California, Massachussetts, or Other) and year controls. Significance marked with * at 10%, ** if 5%, and *** if 1%.*

Specification:	1	2	3	4	5	6	7
Valuation Up	-0.199***	-0.180**	-0.179**	-0.223***	-0.08		
	[0.074]	[0.075]	[0.073]	[0.083]	[0.114]		
All VCs Invested in Previous	-0.118**	-0.096	-0.101*			-0.133**	0.098
Round of Company	[0.060]	[0.060]	[0.060]			[0.063]	[0.198]
Relative Round Amount	-0.001	-0.001	-0.001	0.011**	-0.055**	0.004	-0.005
	[0.004]	[0.004]	[0.004]	[0.005]	[0.024]	[0.007]	[0.008]
Months Between Rounds		0.007	0.002	0.021	-0.035	-0.104*	0.420**
		[0.061]	[0.060]	[0.062]	[0.109]	[0.061]	[0.180]
Round Sequence		0.024	0.018	0.000	0.079*	0.014	0.105
		[0.021]	[0.021]	[0.018]	[0.047]	[0.021]	[0.073]
VC Number of Investments			0.001	-0.018	0.05	-0.005	-0.046
			[0.021]	[0.018]	[0.039]	[0.019]	[0.085]
Serial Founder			-0.077	-0.099**	0.033	-0.086	0.025
			[0.058]	[0.050]	[0.137]	[0.055]	[0.211]
Serial Successful Founder			0.005	0.023	0.027	0.068	
			[0.081]	[0.074]	[0.192]	[0.076]	
Any Change to Business			0.099*	0.100***	-0.006	0.061	0.256
			[0.055]	[0.035]	[0.152]	[0.055]	[0.201]
Observations	227	227	227	154	73	176	51
Pseudo R-squared	0.10	0.10	0.12	0.21	0.14	0.12	0.13
Sample	Full	Full	Full	Inside Round	Outside Round	Up-round	Flat/Down Round

Table 4b - Regression Analysis of Evolution of Individual Contract Terms (More VC Friendly)

*Sample is 227 VC contracts from U.S. venture-backed companies. Company, round, VC and contract characteristics refer to new contract. Probit regressions where the dependent variable takes the value 1 if a specific term in the new contract is more VC friendly than in the previous contract Inside round means that all VCs in previous round participate and that no new VC enters syndicate. Coefficients are normalized and residuals clustered by company. Significance marked with * at 10%, ** if 5%, and *** if 1%.*

Specification:	1	2	3	4	5	6
Dependent Variable:	Dividends	Liquidation Preference	Participation	Anti-Dilution	Redemption	Pay-to-Play
Valuation Up	-0.009	-0.03	-0.066	-0.085***	-0.017	0.017
	[0.024]	[0.022]	[0.050]	[0.021]	[0.020]	[0.020]
All VCs Invested in Previous Round of Company	-0.041	-0.025*	0.019	0.01	0.011	-0.056
	[0.050]	[0.014]	[0.040]	[0.018]	[0.013]	[0.038]
Relative Round Amount	-0.003	-0.013**	0.001	-0.001	0.001	0.003
	[0.003]	[0.005]	[0.003]	[0.002]	[0.001]	[0.002]
Months Between Rounds	0.00	0.017	0.038	-0.01	0.013*	0.044
	[0.017]	[0.023]	[0.042]	[0.024]	[0.007]	[0.033]
Round Sequence	0.007	0.004	0.009	0.008	0.005	0.019*
	[0.006]	[0.008]	[0.019]	[0.007]	[0.005]	[0.011]
Observations	227	227	227	227	227	227
Pseudo R-squared	0.04	0.11	0.04	0.10	0.08	0.15

Table 5 - Regression Analysis of Seniority

*Sample is 227 VC contracts from U.S. venture-backed companies. Company, round, VC and contract characteristics refer to new contract. Probit regressions where the dependent variable takes the value 1 if the liquidation preference and dividend payments of the new contract are senior to the previous contract (mean=0.47). Inside round means that all VCs in previous round participate and that no new VC enters syndicate. Sensitivity of new contract to seniority is the sum of three dummies: cumulative dividends, liquidation preference and participation. Coefficients are normalized and residuals clustered by company. All specifications includes industry (Life Science, High Tech, or Other), state (California, Massachussetts, or Other) and year controls. Significance marked with * at 10%, ** if 5%, and *** if 1%.*

Specification:	1	2	3	4	5	6	7
Valuation Up	-0.269***	-0.207**	-0.210**	-0.209*	-0.288*		
	[0.079]	[0.086]	[0.086]	[0.114]	[0.156]		
All VCs Invested in Previous	-0.074	0.008	0.011			0.001	-0.111
Round of Company	[0.073]	[0.076]	[0.076]			[0.084]	[0.220]
Relative Round Amount	-0.008	-0.009	-0.008	0.001	-0.019*	0.008	-0.293**
	[0.007]	[0.007]	[0.007]	[0.012]	[0.010]	[0.010]	[0.115]
Sensitivity of New Contract		0.168**	0.215***	0.206**	0.388**	0.172*	0.488**
to Seniority		[0.077]	[0.083]	[0.105]	[0.163]	[0.090]	[0.199]
Months Between Rounds		0.057	0.062	0.171	-0.141	0.062	0.524
		[0.099]	[0.100]	[0.120]	[0.179]	[0.121]	[0.331]
Round Sequence		0.052*	0.049	0.030	0.089	0.044	0.214**
		[0.030]	[0.031]	[0.038]	[0.070]	[0.035]	[0.093]
VC Number of Investments			0.025	0.057	-0.039	0.009	-0.089
			[0.034]	[0.043]	[0.066]	[0.036]	[0.122]
Serial Founder			-0.002	-0.041	0.008	-0.036	0.342
			[0.105]	[0.140]	[0.206]	[0.119]	[0.272]
Serial Successful Founder			0.142	0.131	0.087	0.178	-0.497*
			[0.112]	[0.135]	[0.258]	[0.128]	[0.294]
Any Change to Business			0.078	0.021	0.314	0.063	0.509***
			[0.109]	[0.127]	[0.203]	[0.113]	[0.193]
Observations	227	227	227	154	73	176	51
Pseudo R-squared	0.10	0.10	0.12	0.21	0.14	0.12	0.13
Sample	Full	Full	Full	Inside Round	Outside Round	Up-round	Flat/Down Round

Table 6 - Major Renegotiation of Previous Round Contract

Sample is 227 VC contracts from U.S. venture-backed companies. Company, round, VC and contract characteristics refer to new contract. Reverse split means that VC receives a lower number of preferred shares but that such shares retain their contractual rights. Conversion to junior securities means that VC loses contractual rights attached to their preferred shares (and may also receive lower number of shares). P-values at 10% or below are marked with bold.

Renegotiation Type	None	Reverse split	Conversion to Junior Securities	Rank Test (p-value)
Number of Observations	213	10	4	
Fraction of Full Sample	94%	4%	2%	
Up-Round	96%	3%	1%	**0.011**
Down/Flat-Round	86%	10%	4%	
Not all VCs Inv. in Prev. Round	88%	8%	4%	**0.008**
All VCs Inv. in Prev. Round	97%	3%	1%	
New Contract Pari-Passu/Junior	97%	2%	1%	**0.043**
New Contract Senior	90%	7%	3%	
New Contract Harsher	88%	10%	2%	**0.080**
New Contract Not Harsher	95%	3%	2%	
≤ 12 Months Between Rounds	94%	7%	2%	0.749
>12 Months Between Rounds	94%	4%	2%	

Table 7 - Minor Renegotiation of Previous Round Contract

Sample is 40 randomly selected contract pairs (first round and second round contracts). See Appendix A for description of contract terms.

	Reneg-otiation	*Fraction of Sample*	Renegotiation To More VC Friendly	Renegotiation To Less VC Friendly	Similar to New Contract Yes	Similar to New Contract No
Cash Flow Rights						
Liquidation Preference	2	*5%*	1	1	2	0
Participation	6	*15%*	5	1	6	0
Participation Hurdle	3	*8%*	1	2	1	2
Cumulative Dividends	2	*5%*	0	2	2	0
Dividend Rate	0	*0%*	0	0	0	0
Anti-Dilution	4	*10%*	1	3	4	0
Pay-To-Play	5	*13%*	3	2	5	0
Redemption	2	*5%*	1	1	2	0
Total Changes	24		12	12	22	2
Any Change to Contract	20	*50%*				

Appendix A - Definition of Cash Flow Provisions and List of All Possible Changes

Dividends

Dividends that the investor earns annually until the company is sold or liquidated. If dividends are non-cumulative, they are either paid out annually (which in practice is very uncommon due to cash constraints) or not at all. If dividends are cumulative dividends, they are either paid out annually or when the company is sold or otherwise liquidated. Cumulative dividends are senior to any payments to common stock and the seniority between dividends given to different classes of preferred stock is defined in the contract.

Previous Contract	New Contract	Direction of Change
Non-cumulative div.	Cumulative div.	More VC friendly
Cumulative div.	Non-cumulative div.	Less VC friendly
Cumulative div. with X% div. rate	Cumulative div. with Y% div. rate (Y>X)	More VC friendly
Cumulative div. with X% div. rate	Cumulative div. with Y% div. rate (Y<X)	Less VC friendly

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. Liquidation preference is senior to any payments to common stock and the seniority between liquidation preferences given to different classes of preferred stock is defined in the contract.

Previous Contract	New Contract	Direction
Liquidation preference multiple of X	Liquidation preference multiple of Y (Y>X)	More VC friendly
Liquidation preference multiple of X	Liquidation preference multiple of Y (Y<X)	Less VC friendly

Participation

With participation the investor receives both a liquidation preference and a fraction of common stock when the company is sold or liquidated. Participation could be "uncapped", which means that the participation always applies, or "capped", which means that the investor only receives the liquidation preference if his investment IRR or multiple is below a certain hurdle. With no participation the investor holds convertible preferred stock.

Previous Contract	New Contract	Direction
No participation	Uncapped participation	More VC friendly
No participation	Capped participation	More VC friendly
Uncapped participation	Capped participation	Less VC friendly
Uncapped participation	No participation	Less VC friendly
Capped participation	Uncapped participation	More VC friendly
Capped participation	No participation	Less VC friendly

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). Anti-dilution could either be "Full Ratchet" or "Weighted Average", with "Full Ratched" giving the investor a larger number of new shares than for "Weighted Average", especially if the new financing round is relatively small.

Previous Contract	New Contract	Direction
No anti-dilution	Weighted-average a-d	More VC friendly
No anti-dilution	Full-ratchet a-d	More VC friendly
Weighted-average a-d	No anti-dilution	Less VC friendly
Weighted-average a-d	Full-ratchet a-d	More VC friendly
Full-ratchet a-d	No anti-dilution	Less VC friendly
Full-ratchet a-d	Weighted-average a-d	Less VC friendly

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 remaining 1/3 after 7 years.

Previous Contract	New Contract	Direction
Redemption	No redemption	Less VC friendly
No redemption	Redemption	More VC friendly

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 (typically anti-dilution 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.

Previous Contract	New Contract	Direction
No pay-to-play	Convert to preferred	Less VC friendly
No pay-to-play	Convert to common	Less VC friendly
Convert to preferred	No pay-to-play	More VC friendly
Convert to preferred	Convert to common	Less VC friendly
Convert to common	No pay-to-play	More VC friendly
Convert to common	Convert to preferred	More VC friendly

Appendix B - Changes to Company Business Between Contract Rounds

Sample is 227 VC contracts. Information about changes is hand-collected using press releases, news articles, company webpages, Lexis-Nexis, and CapitalIQ.

	Sample	# of Obs	Fraction
Strategic Alliance / Cooperation with Public Company	227	38	17%
Strategic Alliance / Cooperation with Private Company	227	87	38%
Acquisition / Merger	227	24	11%
Any Change to Relationships	227	121	53%
New Product or Service	227	61	27%
New Product or Service Version / Upgrade	227	96	42%
Patent Granted	227	8	4%
Expansion into New Market / Acquired New Major Customer	227	76	33%
Product or Service Received Award or Recognition	227	31	14%
Any Change to Product or Service	227	154	68%
Hired New CEO	227	34	15%
Hired New CFO	227	23	10%
Hired New Chief, Director or Senior VP	227	71	31%
Any Change to Human Capital	227	96	42%
Any Change to Business	227	186	82%

Appendix C - Out-of-Sample Tests

*Sample is 911 VC contracts from U.S. venture-backed companies that are distinct from the main sample. Company, round, VC and contract characteristics refer to the situation at the time the contract was signed. Specifications 1 and 2 are ordered logit regressions where the dependent variable is Downside Protection Index (as defined in Bengtsson and Sensoy, 2009) which is captures the extent of investor-friendly cash flow provisions included in the contract. Specifications 3 and 4 are probit regressions where the dependent variable takes the value 1 if the liquidation preference and dividend payments of the new contract are senior to the previous contract. Specifications 3 and 4 are probit regressions where the dependent variable takes the value 1 if the previous round contract was subjec to major renegotiation via reverse split or conversion to junior securities. Coefficients are normalized and residuals clustered by company. All specifications includes controls for year, industry (Ventureeconomics 10-level), and location (California, Massachussetts, New York, Texas or Other State) of the company and lead VC respectively. Significance marked with * at 10%, ** if 5%, and *** if 1%.*

Specification:	1	2	3	4	5	6
Dependent Variable:	Downside Protection Index		Seniority		Major Renegotiation	
VC Number of Investments	-0.117	-0.116	-0.022	-0.022	0.004	0.004
	[0.052]**	[0.052]**	[0.015]	[0.015]	[0.006]	[0.006]
Company Age (years)	0.017	0.015	0.013	0.012	0.003	0.003
	[0.021]	[0.021]	[0.007]*	[0.007]*	[0.002]	[0.002]
Serial Founder	-0.292	-0.276	-0.001	0	0	0.002
	[0.228]	[0.226]	[0.058]	[0.058]	[0.024]	[0.024]
Serial Successful Founder with IPO	-0.579	-0.569	-0.049	-0.047	-0.017	-0.016
	[0.299]*	[0.298]*	[0.090]	[0.090]	[0.028]	[0.029]
Serial Successful Founder with Merger	0.169	0.172	0.012	0.012	0.034	0.033
	[0.283]	[0.283]	[0.078]	[0.078]	[0.042]	[0.041]
Round Amount ($000s)	-0.286	-0.287	-0.024	-0.024	0.01	0.009
	[0.086]***	[0.086]***	[0.020]	[0.020]	[0.007]	[0.007]
# of Round Investors	0.033	0.034	0.016	0.017	-0.003	-0.003
	[0.033]	[0.034]	[0.008]**	[0.008]**	[0.002]	[0.002]
Round Sequence	0.104	0.009	0.048	0.034	0.009	0.004
	[0.067]	[0.113]	[0.018]***	[0.030]	[0.007]	[0.009]
Sensitivity of New Contract to Seniority			0.148	0.147		
			[0.039]***	[0.039]***		
Valuation Up	-0.321	-0.867	-0.186	-0.258	-0.081	-0.143
	[0.149]**	[0.501]*	[0.040]***	[0.129]**	[0.021]***	[0.093]
Valuation Up X Round Sequence		0.14		0.02		0.009
		[0.125]		[0.035]		[0.012]
Observations	911	911	911	911	911	911
Pseudo R-squared	0.05	0.05	0.11	0.11	0.13	0.13
Mean of Dependent Variable	5.05	5.05	0.52	0.52	0.06	0.06