Inside Rounds, Down Rounds, and VC Returns

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Abstract

We study sequential investment decisions in the venture capital (VC) industry. VC-backed companies typically need to raise several rounds of funding from VC funds. The decision whether to provide further funding to the company and the terms of the new funding determine the returns of VC funds and their ability to back successful companies. We show that investment outcomes in the VC industry can be predicted by whether the existing VC investors can attract new outside investors to participate in the next round. Inside rounds, in which only existing investors participate, lead to a higher likelihood of failure, lower probability of IPOs, and lower cash on cash multiples than outside rounds. Inside rounds, in which the value of the company declines since the previous funding, are particularly worse. We explore two mechanisms that explain these stylized facts: the escalation of commitment that leads VC investors to irrationally make negative NPV decisions, and agency costs between VC funds and their investors that make VC investors gamble with their investors' money.

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1 Introduction

Innovation in technology and business practices is widely believed to drive long-term economic growth. In the Unites States, a sizeable fraction of innovation activity is done by young high-growth companies financed by the venture capital industry. For example, recent evidence shows that the companies that had been backed by venture capital generate revenue of about $3 trillion per annum or 20% of the U.S. GDP and employ about 12 million people in the United States. Understanding the economics of the venture capital industry is therefore an important pursuit.

Recently, significant progress has been made in exploring this industry. A number of stylized facts about venture capital (VC) has emerged that suggests that the way the VC industry operates is different from many other financial sectors. First, VC funds expect to lose on many, if not most, of their investments, because predicting the success of high-growth technologically innovative companies is challenging. Second, VC funds expect to make money (and cover their losses) from a small number of successful and very profitable investments. Third, because success is so difficult to predict, VC funds exercise real options by investing in stages. For example, a typical $100 million early stage VC fund may invest a relatively small amount of money in up to 25–30 companies. While it will see its investment evaporate on most of these companies, it will then invest further in remaining companies. For successful VC-backed companies the number of investment rounds can easily reach 4 or 5. An important determinant of the VC industry returns as well as its ability to channel capital to successful innovation is therefore the sequential allocation of capital (e.g. Gompers (1995)). To be successful, VC funds need to allocate sufficiently small amount of capital to a relatively large number of start-ups, observe the evolution of these start-ups closely, make efficient and timely calls to liquidate those start-ups that don't perform well and invest an increasing amount of capital in those start-ups that show great potential.

In this paper we address an important gap about our current knowledge of the VC industry by studying to what extent these sequential decisions are made optimally and how it affects outcomes and returns of VC investments. While the success of individual funds as well as the whole industry hinges on the ability to separate lemons from peaches as early as possible, there are a number of factors that may prevent venture capitalists from making these decisions optimally. Consider for example, a situation when a VC fund invested in a start-up that does not perform well. It may be optimal to liquidate this start-up by freeing VC fund's capital and its partners' time to devote to better start-ups in its portfolio. However, unlike investors in public equity markets, venture capitalists participate actively in the corporate governance of their portfolio companies. Specifically, they sit on start-up boards and interact frequently with the founders and executives. This interaction improves their knowledge of start-up prospects. They may also develop a personal attachment to the start-up and its employees. A large psychological literature shows that these interactions frequently lead to escalation of commitment. Effectively, an agent cannot ignore the past decisions that were made and the costs that were sunk in making future decisions. In dynamic situations, escalation of commitment can lead to throwing good money after bad, in industry's parlance.

Escalation of commitment is an important problem recognized by the VC industry. As a solution, in each subsequent rounds of funding, the existing VC investors actively seek to attract those VC investors that have not invested in the same start-up in the past (here, "outsiders"). By investing, as well as negotiating the terms of the investment round, new investors signal to the market the fair value of the company as well as unbiased opinion about its potential. In fact, many limited partners will ignore any marking up of an entrepreneurial firm that does not include at least one outside investor. The perceived wisdom in the industry is that most sequential transactions involve outsiders that leads to the resolution of the problem.

In this paper, we show that in many VC investments *only* those VC funds that invested in the start-up before take part in the next round. We call these round of investments *inside* rounds. In our sample that covers the period of 1992–2013 and has a total of 24727 investment rounds in 10120 entrepreneurial firms (excluding the initial investment rounds), there are 7717 inside rounds. These rounds are such that *all* investors in that round already invested in that start-up before.

Such a high fraction of inside rounds is surprising. But does it matter? We show that it does. Inside rounds are more likely to lead to failures, are less likely to lead to IPOs, and generate lower cash on cash multiples than outside rounds. These findings persist when we control for a number of company-specific and time-series variables. We also show preliminary evidence that suggests that those VC funds that participate in inside rounds may have lower returns on those inside investments than those VC funds that participate in outside rounds. We also find that several features of financings, investors and firm history predict the participation of outsiders. Smaller rounds of financing, later in a firm's life are more likely to be inside rounds. Moreover, if the current syndicate lacks a successful exit in their portfolio in the recent past, we find a 18% higher probability of an inside round. Consistent with the perceived wisdom among many venture capitalists we talked to, escalation of commitment seems to matter.

In addition to the stylized fact on the outcome of inside vs. outside round, we also show that returns are even lower when inside rounds are the "down" round, that is rounds, in which the value of the company is lower than the value established in the previous funding round. This pattern is consistent with the escalation of commitment story, inasmuch that outsiders perceive a negative signal and refuse to invest in the early-stage firm with the diminished or no prospects of success.

Our results are important because they shed light on the determinants of VC returns and show that there is a certain degree of predictability in VC returns. In addition, the VC

environment arguably constitutes one of the best grounds to test various contract theories. Our paper is also a rare empirical application of real options theory. Continuing to invest in the presence of negative information can be optimal for a number of reasons. Most importantly, it is a multi-stage investment process and negative information at each stage may be insufficiently negative to abandon a project. In other words, even though NPV is negative, the adjusted NPV (taking into account embedded real optionality) can still be positive. A classical real option model of McDonald and Siegel (1986) can be adjusted to demonstrate this result. In itself, this reasoning is not sufficient to preclude raising funds from the outside investors, to the extent that outside investors also understand the option nature of the decision making process. Likewise, flat rounds can be consistent with the real option model as well, if the nature of information (i.e., the shock that agents receive) is within a certain range. Importantly though, the true NPV of the project should still be positive to the VC insiders. If our proxy for VC returns captures the ex-post realization of these VC expectations well, then it is less likely that the real options rationale can explain our stylized facts. Note that VC funds can get higher returns also through better contracting terms with start-up founders.

Our paper builds on both theoretical and empirical literature. Escalation of commitment is defined in psychological and organizational literature as a greater tendency to continue an endeavor once an investment in money, effort, or time has been made, even if circumstances should dictate otherwise. It is closely related to the sunk cost fallacy and the endowment effect. See Arkes and Blumer (1985) for experimental evidence and Staw and Hoang (1995) for empirical evidence of sunk costs (in the context of NBA games). There are also two interesting studies of organizational escalation that use the case studies of very large non-profit projects: Expo86 World Fair and the Shoreham Nuclear Power Plant (Ross and Staw, 1986, 1993). In that literature, escalation effects have been typically explained by prospect theory, self-justification concerns, inside view, the desire to avoid wasting resources, etc.

From the economic viewpoint, escalation effects are irrational if they lead people to take negative NPVs.

In the VC context, irrational escalation of commitment seems a natural explanation. It has been acknowledged by many VCs in private conversations as well as in some surveys. A serious challenge in the VC industry is lack of clearly defined milestones that exacerbates the problem. Escalation of commitment can reveal itself in many ways. For example, investors may prefer to modify project goals or standards instead of abandoning projects, in an effort to create a more favorable outcome. It also could be due to "rational overcommitment" (Adner, 2007), the tendency of individual managers to continue projects with the hope of improving the outcomes, especially when their personal interests are at stake.

In two related papers, Guler (2007a) and Guler (2007b) shows that VCs, as a group, tend to make sequential investments in deals even if objective criteria suggest the deals need to be abandoned. Guler (2007b) lists the following reasons why escalation of commitment in face of negative information may be prevalent in the VC setting, based on her reading of the organizational and psychological literatures: (1) inability to update prior beliefs with new information; (2) failure to treat prior investments as sunk costs; (3) framing subsequent investments as opportunities to recover prior losses; (4) avoiding cognitive dissonance and saving face by further committing to earlier decisions. In addition, the organization structure of the VC funds may be important for how the escalation of commitment works. Typically, a deal has a pioneer in a VC partnership and the identity of that partner (seniority, previous success) as well as the structure of the company (size, hierarchical nature) may play a role.

In experimental paper, Tan and Yates (2002) study how financial budgets affect termination decisions. They find that escalation of commitment declines as financial budget gets binding. In relation tot he VC industry, the extent of the escalation of commitment can depend on dry powder, other investments in the same fund, their current perception of success

(future success can also be used as a proxy, assuming that the VC knows better about the future).

There is also now a broad recognition of emotional biases and the importance of affect in decision-making (see Loewenstein and Lerner (2003) and Lucey and Dowling (2006)). This is related to the endowment effect and can lead to escalation. Gambling in the presence of losses if there is a chance to break even (Thaler and Johnson (1990)).

The paper proceeds as follows. Section 2 describes the data and variables. Section 3 presents some preliminary empirical tests and Section 4 concludes.

2 Data and variables

This section details the set of figures and tables trying to isolate the antecedents and consquences of inside rounds.

2.1 Main variables

We consider all non-first equity financing rounds for the set of VC-backed firms founded prior to 2007 (to provide time for exits). The sample of investors is restricted to those who raise a traditional fund with a limited life and have limited partners.[1] We first calculate the fraction of the investors in the current financings that were not observed in any previous financing rounds. Call these investors "outsiders." A round is "Inside" if all the current investors have previously invested in the company. A round is thus "Outside" if there is at least one traditional VC investor who did not previously invest in the company.

Figure 1 presents the first analysis of the characteristics of VC financing valuation dynamics and insideness. For a VC financing that has a known pre-money valuation and is preceded by another financing with a known post-money valuation, consider the change

[1] In VentureSource, this includes venture capital, diversified private equity and SBIC funds.

Pre$_t$/Post$_{t-1}$. This ratio captures the relative change in valuation across rounds. A value of 1 is "flat", less than one is "down" and greater than 1 is "up." The sample of financings with a known valuation is selected positively. Firms fully reveal valuations when they go public and tend to reveal them if they are growing quickly. The figure presents the kernel densities of this ratio for inside and outside rounds. The vertical line is 1 for flat rounds. Several features emerge. Inside rounds are much more likely to be down and have a large mass at 1. Moreover, the right tail of the outside round distribution is both fatter and longer. Overall, the patterns suggest that inside rounds are relatively worse in terms of valuation growth than outside rounds.

The differences observed in Figure 1 could be due to a large set of observable and unobservable characteristics of financings. A feature available for nearly all financings is the total capital invested in the entrepreneurial firm. Figure 2 presents another set of kernel densities by insideness, now by the log of capital raised. The vertical line presents the mean capital invested, which is approximately $7.3m. Again, the two round types differ dramatically. Inside rounds are significantly smaller than outside rounds and quite often are less than $1m. This difference suggests another possible explanation for the separation between these two round types.

Small amounts of capital invested in inside rounds could imply that these rounds are quickly completed and may in fact be hidden bridge rounds. Such rounds could be used by insiders to quickly provide capital to startups when facing both internal and external shocks. The first test (more later) of this hypothesis repeats Figure 2 while excluding the set of financings that appear to be bridge rounds. To do this, we remove financings that raise less than the 10th percentile of all observed capital raised. Next, we remove financings that are followed by a financing faster than the bottom 25% of time to next financings. If a financing is the last before the end of the sample or an exit, we measure time to either in

years.[2] Figure 3 considers this sub-sample and shows again that inside rounds are still quite small compared to outside rounds. Thus, the evidence suggests that quick, small financings are not the only explanation for the size differences between the rounds.

Alternatively, inside rounds are small because they occur in different parts of the entrepreneurial firm lifecycle or in different industries. Before comparing through regressions, Figure 4 asks how rounds differ in the relative capital raised across rounds. The typical entrepreneurial firm raises larger rounds of financing over time. A slower or flat ramp up may indicate a firm struggling to raise capital or reach milestones. The leftmost red line in the figure shows a ratio of 1, while the rightmost line shows the mean across the whole sample. The average financing is twice as large as the previous. Inside rounds are significantly more likely to raise *less* capital than the previous financing.

2.1.1 Lead investor definition

The final two figures repeat earlier comparisons for an alternative definition of inside rounds. For approximately 80% of financings, we can identify the lead investor(s). Such investors are typically those that contribute the most capital and were the drivers of creating the syndicate. A round may be considered outside despite the fact that none of the new investors are leads. That is, we could be identifying a round as outside when the new investor contributed a small fraction to the financing. Thus, we relabel rounds as inside if none of the reported lead investors are new. Some 30% of financings are inside rounds, while using this new defintion 34% lack a new outside investor. Figure 5 and 6 repeat the earlier figures for this definition. The first is very similar, however, the second shows some convergence between the types for low levels of capital. The latter change suggests that some outside rounds without new lead investors are similar to the main inside round definition. The analyses below are robust to either definition of inside rounds.

[2]The end of our sample is December 30th, 2013.

3 Basic empirical tests

Table 1 provides a description of most of the variables used throughout the analysis. There are several variables characterizing the "insideness" of a financing round. Most of the analysis will consider the dummy variable that is equal to one if no outside investor participate. The analysis will also focus on the financing-level characteristics, so controls will include time-varying variables such as firm age, current size of the investor pool and the year of the financing. Time-invariant firm characteristics include the year of founding and the state of the firm's headquarters.

Table 2 summarizes the characteristics of financings for two different definitions of insideness. The first definition considers the fraction of investors in the current round that are existing investors. The second panel describes the fraction of dollars in the current financing provided by existing investors. Calculating the second measure requires allocating capital across investors in at least two financings in a sequence. This condition is difficult to meet, leading to a smaller sample. The analysis throughout will use the measure in Panel A, the fraction of investors. Within these inside measures, we can also consider two alternative benchmarks. "% insiders (relative last syndicate)" compares the current investors to only those who were in the last financing. "% insiders" instead compares the current financing to the whole pool of past investors. The latter definition will differ if existing investors participation changes over the entrepreneurial firm's lifecycle. Overall, about 60% of investors or dollars are provided by insiders. The remaining 40% is provided by outsiders of two types. The first is the set of outsiders that are traditonal VCs or private equity firms. Here, 22% of the remaining 40% come from these source. The rest of the investors are non-traditional sources such as corporations, angel investors, individuals or investment banks.

Table 3 reports the differences in financings and insideness as the entrepreneurial firm raises capital over multiple rounds. Panel A considers the traditional second financing (Series B), which compared to the other panels has lower inside participation, less capital and

are less likely to be completely comprised of insiders. [ME: why is the time since last financing not changing...it should.] The increases in inside participation over multiple financings could stem from increased capital demands or could follow from optimal staging strategy. Regression analysis will reveal more below.

Table 4 compares the set of inside financings to outside financings along with firm-level comparisons. The first panel considers observables at the time of financing. The major difference between the two financings is the total capital invested. In turn, the number of active investors is 40% smaller than the syndicates of inside rounds ("Syndicate size"). Inside rounds are also more likely to occur later in a firm's life as proxied age, round number or number of years it is VC-backed. Perhaps because inside rounds occur later in a firm's life, we see that they are more likely have have revenues or profits at the time of financing. The observed financing-level differences suggests that the entrepreneurial firms themselves may differ by their exposure to inside rounds.

The second panel of 4 presents the differences in firms that had at least one inside round to those that had none. Perhaps surprisingly, over half of our sample of firms had at least one inside financing in their life.[3] Firms with no inside rounds raise slightly less capital in fewer financings than those with at least one inside round. Firms with at least one inside round are more likely to still be private at the end of the sample (firms have to be founded prior to 2007 to be in the sample) and less likely to go IPO. Overall, there are few major differences between firms with inside rounds at the time of exit.

One possible explanation of the financing differences in Table 4 is that inside rounds provide a particular form of short-term, bridge-like financing. Table 5 repeats the first panel of Table 4 after dropping the "pseudo-bridge" financings. Such financings either raised less than the 10th percentile of the sample's capital raised or were followed by another financing quicker than the 25th percentile of years to next financing event. The major change in the

[3]Recall that the inside round definition requires at least two financing events, so we lose approximately half the sample who fail to reach this milestone.

results is the observation count by sub-sample: the number of inside round financings falls significantly more than the outside round financings. Thus, it is clear that many inside rounds may in fact be quick financings by insiders to help bridge the firm to the next investment. A comparison of the financing-level characteristics is effectively the same as what was found in Table 4, so we conclude that the "pseudo-bridge" financings are not driving out results.

We next ask how the valuation characteristics of inside financing differ from outside rounds. Before discussing the results, it is important to note some sample selection issues. The traditional measure of entrepreneurial firm valuation, post-money, is rarely required to be reported to any regulatory agency or the public. There are two exceptions. The first is an entrepreneurial firm that eventually goes public. These firms must reveal the full capitalization table and thus reveal their past valuations. Firms that go public represent 10% of entrepreneurial firms and are high quality. The second exception is similar: growing firms with a large number of investors are more likely to disclose their valuations to the public. Here, the firm and its investors have incentives to signal their type to other investors, potential employees and competitors. Again, this is a source of positive selection. Analysis of valuation differences in Table 6 should therefore be approached with caution. Fortunately, many of the hypotheses above suggest a negative selection for inside rounds and thus these valuation samples will attenuate our ability to find differences.

Table 6 reports one important dynamic valuation characteristic of a financing: "$Pre\$t/Post\$t-1$". This variable charaterizes changes in valuation across rounds. A value greater than one implies there was growth in valuation. We also characterize rounds by "Up" (a value greater than 1), "Flat" (a value "near" 1) and "Down" when the valuation falls. The selection issues discussed above are apparent when comparing the observation counts between this table and Table 4. We are left with approximately 38% of the sample. Outside rounds are more likely to have increases in valuations relative to previous financings, while inside rounds are much more likely to be flat. Note that flat in traditional markets in traded securities would be a

zero probability event. Clearly there are pricing frictions in the venture capital market. The row "Pre-money valuation" also shows that the level of valuation is dramatically lower in inside rounds. This fact is more striking when we recall that inside rounds are more likely to be in older, more captialized companies. Overall, it appears that valuation provides a different view on difference between these financing differences than the standard measures in Table 4. Table 7 repeats this table but excludes "pseudo-bridge" rounds. The results are unchanged.

Table 8 repeats the basic analysis in Table 6 but includes financing-level returns "Gross multiple." The multiple is calculated as the exit valuation of the firm divided by the current financing's post-money valuation, while accounting for the dilution of equity financings between the financing and exit.[4] Korteweg and Sorensen (2010) provide both a rich description of returns calculation and selection. The selection issues discussed above for valuations are more severe for returns. This is because we also require knowledge of the firm's exit valuation (e.g. acquisition price) and all valuations prior to the exit and after the current financing. First, the non-multiple variables differ as they did in Table 6. Second, the multiples for outside rounds are approximately 5% higher than returns in inside rounds. Importantly, a large fraction of entrepreneurial firms fail and always have a known multiple (i.e. zero). However, these financings may not have a reported post-money valuation. The next table does not require valuations and instead simply compares returns.

Table 9 repeats the analysis of the previous table but does not require that we can observe "$Pre\$t/Post\$t - 1$". The sample size increases by over 4,000 primarily coming from zero returns. The gross multiple difference is now quite large (21% smaller in inside rounds). The fraction of zero returns is also much larger for inside rounds, suggesting that they fail or have zero value acquisitions more often.

[4]Gross multiple minus one is the standard gross return.

Table 10 now asks whether the returns earned in the two round types differs by the path of valuation measured in Table 8. We bucket rounds into "Up" when the valuation between rounds has increased in any way. The columns "Down" include all financings where the valuation is unchanged or flat. Perhaps when insiders are the only investors in a round, they will"punish" the entrepreneur with a large down round. If this is the case, then we would expect to see the returns earned by investors in inside down rounds to possibly be higher than those in outside down rounds. Comparing the returns in those two columns shows, if anything, the opposite. That is, there is no evidence that the returns earned by insiders in down rounds are better in terms of returns. It should be noted, however, that the non-zero returns assume common equity. If there is any difference in the preferred stock contracts between inside and outside rounds, then these returns are an imperfect measure.

The prevelance of inside rounds may differ over the business cycle, which in the venture capital market is tied to (i) IPO markets and, (ii) new financings. Cycles in venture capital have been shown to be important predictors of outcomes and innovation (see Nanda and Rhodes-Kropf (2013)). The next two tables – Tables 1 and 4 – ask whether inside rounds are correlated with market events or time. Table 11 compares financings closed after high growth in IPOs and low growth IPOs. In each month, we calculate the number of IPOs and compute the annual growth rate. Top quartile growth rate is "High IPOs" and bottom quartile is "Low IPOs." Times with high growth in IPOs are characterized by lower inside participation and fewer full inside rounds. It appears that hot markets coincide with more outside capital. Similarly, when markets are struggling, insiders must provide relatively more capital to their portfolio companies. Next, Table 12 breaks the sample into markets with a relatively high number of first-time financings and low number of financings. As in Table 11 "colder" markets have a higher incidence of inside rounds. Both measures suggests that the supply of outside capital – independent of the prospects of the entrepreneurial firm – play a role in the participation of insiders.

We further break down the differences in hot and cold markets by considering inside and outside rounds in each. Table 13 compares inside and outside rounds in hot and cold markets defined now by above (below) median number of closed first financings in the previous 12 months. We now see a strong difference between the round types, primarily confined to cold markets. The returns, changes in valuation and fraction of zero returns are significantly lower in cold markets when only insiders participate. Such a difference again goes against any "hold-up" predictions. Instead, one could argue that these financings are simply in worse companies during cold markets.

3.1 Regression analysis

We now address the questions around the differences between inside and outside rounds using regression analysis. We consider three issues. First, we ask whether we can predict the "insideness" of a financing, particularly with proxies for certain agency problems. Second, we ask whether the differences in financing valuation can be explained by firm and time-varying observables. Next, we consider the firm-level outcomes with a simple cross-section analysis of exit results. Finally, we investigate whether the return differences can also be explained by observables. Finally,

The tables discussed above make clear that inside rounds and insider participation correlates with financing- and firm-level observables. We next ask whether we can predict the prevelance of insiders in a financing. Table 14 considers both the dummy for a financing having all insiders and the fraction of investors that are insiders. Each specification includes the interaction of industry and year fixed effects, partially controlling the market trends found in Table 11. Most of the controls have strong predictive power for inside rounds. Less capital raised in the previous round and fewer investors implies a higher probability of inside round or fraction of insiders. Larger previous syndicates weakly predicts more insider participation, perhaps because large snydicates have relatively more uncommitted investors.

Perhaps surprisingly, the longer one waits for new round of financing, the higher the probability it has outsiders. This correlation could simply follow from a higher chance of finding a new capital provider over time. Although the results do not point to one story, the ability to predict insideness of financing suggests that the variable captures something meaningful about financings. The final two columns of Table 14 ask whether investor characteristics predict inside participation.

Column (3) of Table 14 introduces the dummy variable "Syndicate fund raising" that is equal to one if we can identify at least one investor in the process of fund-raising. An investor is fund-raising if they are within two years of their next fund closing. We discuss above how LPs discourage inside rounds as means of marking up investments, so we would predict less inside round events. Column (3) bears out this prediction. The final column of Table 14 asks where the current investors' recent success can predict outside investor participation. The variable "Big exit last 2 years" is equal to one if at least one of the active investors had an IPO or large acqusiition in the previous two years. Recent success could indicate both a higher quality investment but also a weaker tendency for the investor to put good money after bad. The coefficient on this variable suggests success lowers the probability of an inside round.

The next regressions in Table 15 ask whether the univariate relationship between inside rounds and changes in valuation hold after controlling for observables. The first column shows that inside rounds have 24% lower changes in valuation controlling for year of financing, company development stage (i.e. "Round # FE") and industry fixed effects. Introduction of a host of controls for columns (2) - (6) show that the result is robust. The patterns suggest that inside rounds are characterized by slow growth in valuation.

We next ask whether the inside round in an entrepreneurial firm's history correlates with its eventual outcome. Three possibilties are considered. The first is the standard dummy variable "IPO" that is equal to one if the first goes public by the end of the sample.

"Good exit" combines these outcomes with acquisitions that have final valuations at least two times capital invested. Finally, "Log exit valuation" is the log of the reported price at sale or IPO. If the firm fails, we set the value to 25% of capital invested. The main variables of interest are a dummy variable equal to one if the entrepreneurial firm had at least one inside round (columns (1) - (3)). Controls are measured at the time of the firm's first financing, industry characteristics and geographic information. The first three columns provide the same conclusion: firm's with at least one inside round have lower success rates and exit valuations. The final three columns of the table include two additional controls "Flat round" and "Down round." These variables are one if the firm ever had one of those valuation changes in its life (if reported). Recall from Table 6 that inside rounds are more likely to be flat or down. If such valuation changes predict outcomes, then perhaps the results in the first three columns are driven the correlation with inside rounds. Columns (4)-(6) have similar relationships between inside rounds and outcomes, so we conclude that valuation changes are not the only reason for the lower success rates.

Finally, we take a first look at the cross-section characteristics of returns and inside rounds. All the results above suggest that inside rounds should have a lower mean return either because of the VC's commitment escalation or agency concerns. Column 1 of Table 17 regresses the log gross multiple of a set of financing and firm-level variables. We consider logs because of the extreme skew in the returns distribution. Controls include capital raised, time since last financing and a host of firm-level fixed effects including location, stage and industry. The coefficient on "Full inside round" suggests a strong negative relationship between inside rounds and returns. The returns are 15% lower all else equal. We have thus far ignored the rich possibilities for contracts in financings, which columns 2 and 3 attempt to address.

The gross multiple throughout assumes that the investor purchases a share of common equity. However, most VCs purchase preferred shares which include participation and liqui-

dation rights. As inside rounds are more likely to be acquired and have lower exit valuations, it is possible that these contract features strengthen when an inside round occurs. If this is the case, then we could be underestimating the true returns earned by investors in inside rounds. Column 2 replaces all gross multiples less than two but greater than zero with a $2X$ return. Here, we assume that inside rounds simply had $2X$ liquidation preference. Outside rounds less than one are set to 1X. The results are economically the same, suggesting that uniformly stronger downside protections would not eliminate return differences between the round types. Column 3 treats all missing acquisition returns for inside rounds as a $2X$ gross multiple if the capital is available (i.e. the exit valuation is at least two times capital invested). We replace outside round missing returns similarly with $1X$ returns. The results are economically smaller and statistically weaker.

The final column of Table 17 provides the first look at one particular agency problem that could be associated with inside rounds. The variable "Big exit last 2 years" is a dummy variable equal to one if at least one of the current investors had at least one IPO or large acquisition in the previous two years. If inside rounds are a signal of commitment escalation, then investors with relatively little recent success should have worse returns. The interaction term, though statistically insignificant, has the right sign and a relatively large coefficient. The sign is consistent with the story that under-performing investors are more prone to invest in relatively worse inside rounds. Future drafts will investigate this issue in more depth.

4 Conclusion

The results above present a preliminary view on the relationship between outside investor participation and entrepreneurial firm investment outcomes. We study sequential investment decisions in the venture capital (VC) industry. VC-backed companies typically need to raise

several rounds of funding from VC funds, and the decision whether to provide further funding to the company as well as the terms of the new funding determine to a large extent the returns of VC funds and their ability to back successful companies. We show that investment outcomes in the VC industry can be predicted by whether the existing VC investors can attract new outside investors to participate in the next round. Inside rounds, in which only existing investors participate, lead to a higher likelihood of failure, lower probability of IPO, and lower cash on cash multiples than outside rounds. Inside rounds, in which the value of the company declines since the previous funding, are particularly worse. We explore to mechanisms that explain these stylized facts: the escalation of commitment that leads VC investors to irrationally make negative NPV decisions, and agency costs between VC funds their investors that make VC investors gamble with their investors' money. Ongoing work will introduce new measures of agency frictions and investment heterogeneity. We also plan to incorporate new data on the specfic contract features in these investment events to help understand the true returns earned by investors.

5 Figures and Tables

Figure 1: Change in valuation: inside vs. outside rounds

Notes: The figure reports the ratio of the current financing pre-money valuation over the previous financing's post-money valuation. We can only calculate this ratio for two financings where valuation is revealed. This sample is positively selected towards high-quality entrepreneurial firms (e.g. those that go public). The red vertical line is for the ratio value of 1, which is called a "flat" round.

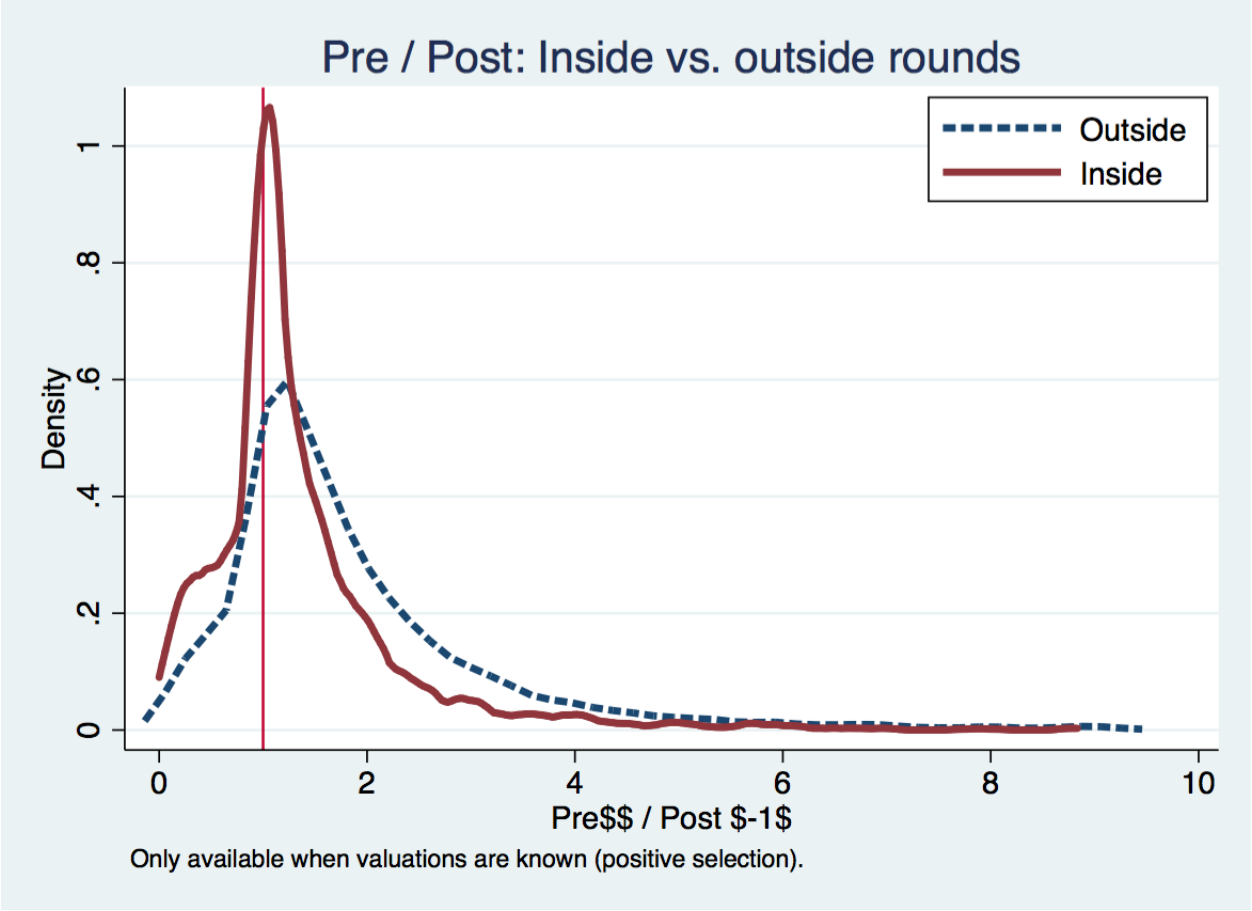

Figure 2: Log capital invested: inside vs. outside rounds

Notes: The figure reports the kernel densities of log of capital invested for a financing event in two samples. "Outside" are those financings with at least one VC investor who is new to the pool of investors. "Inside" are those financings where all investors were previously invested in the firm.

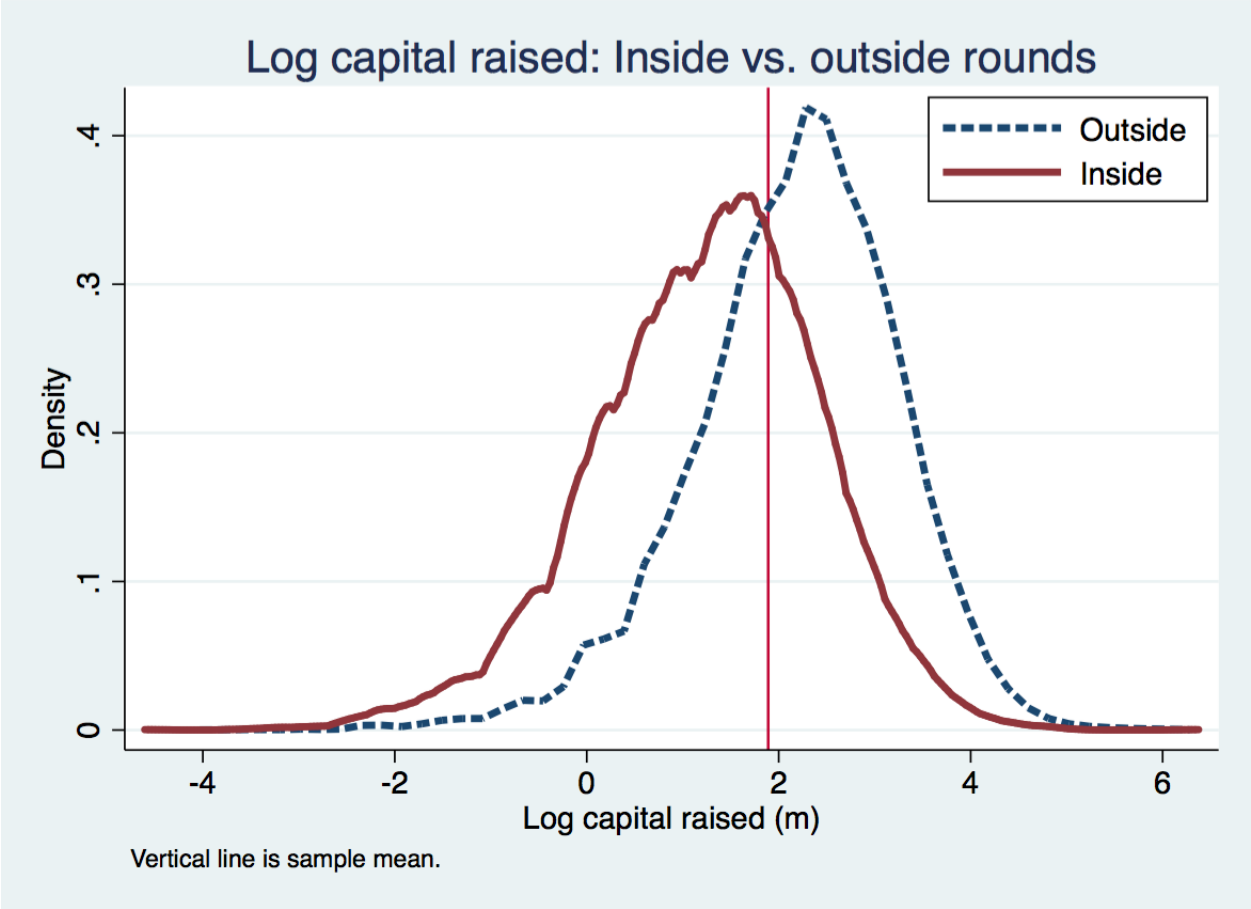

Figure 3: Log capital invested: inside vs. outside rounds (no pseudo-bridge)

Notes: The table repeats the kernel density breakdown of inside vs. outside rounds from Figure 2. This figure drops all financings events that appear to be what we call "pseudo-bridge." These are financings that raise very little capital and/or are followed by another financing relatively quickly.

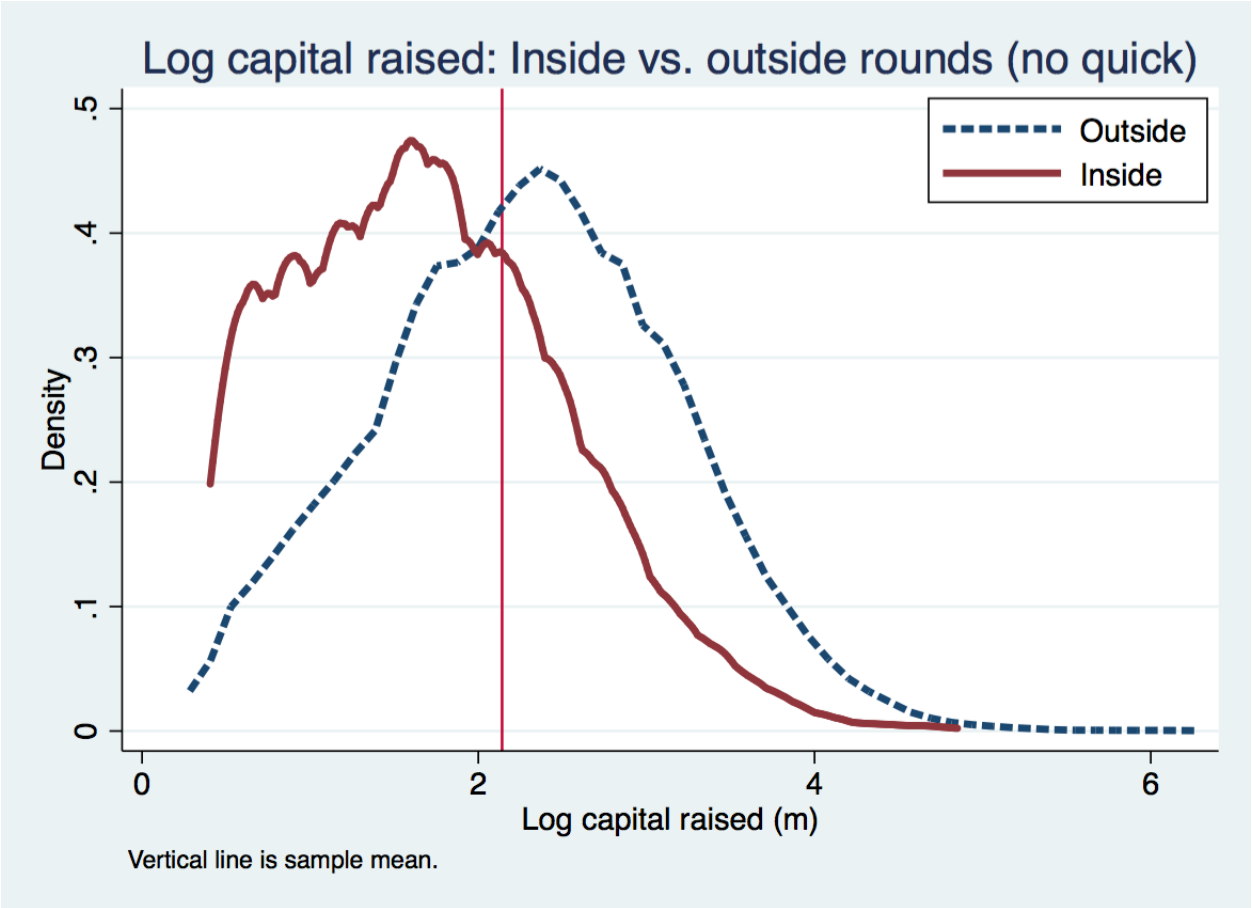

Figure 4: Capital ramp up: inside vs. outside rounds

Notes: The graph compares Raised t / raised $t-1$ when the variable is avaiable. The variable is winsorized to be less than the 95th percentile.

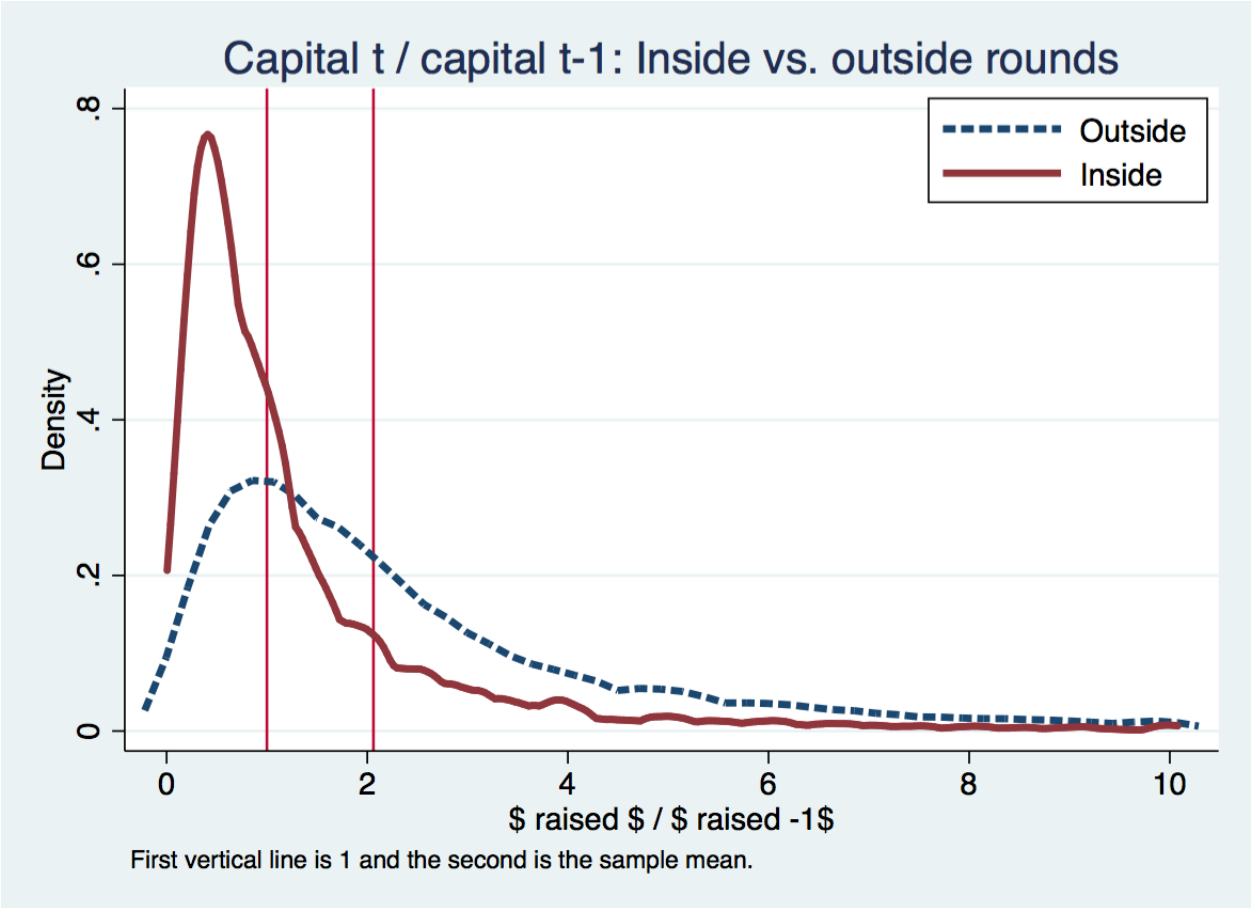

Figure 5: Log capital invested: no new lead vs new lead

Notes: The graph presents kernel densities for the log of capital raised for two subsamples. The first sample "No new lead" are financing events where there does not exist a lead investor who was not already an investor in the firm. The second sample "New lead" are those financings where we have new lead investor in the financing.

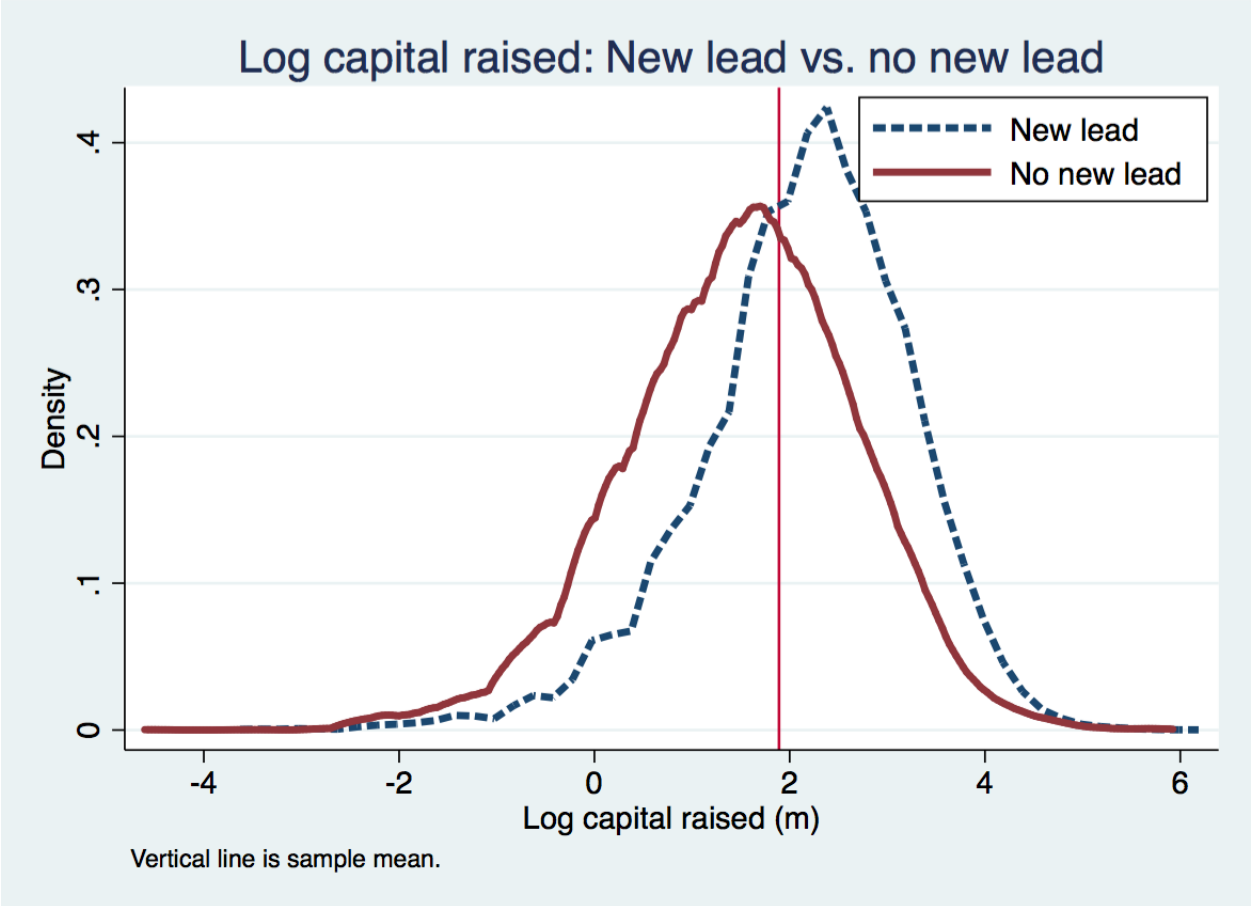

Figure 6: Capital ramp up: new lead vs. no new lead

Notes: The graph compares Raised t / raised $t-1$ when the variable is avaiable. The variable is winsorized to be less than the 95th percentile. The two samples are those financings where there is at least one new lead investor (of any type) in the current financing.

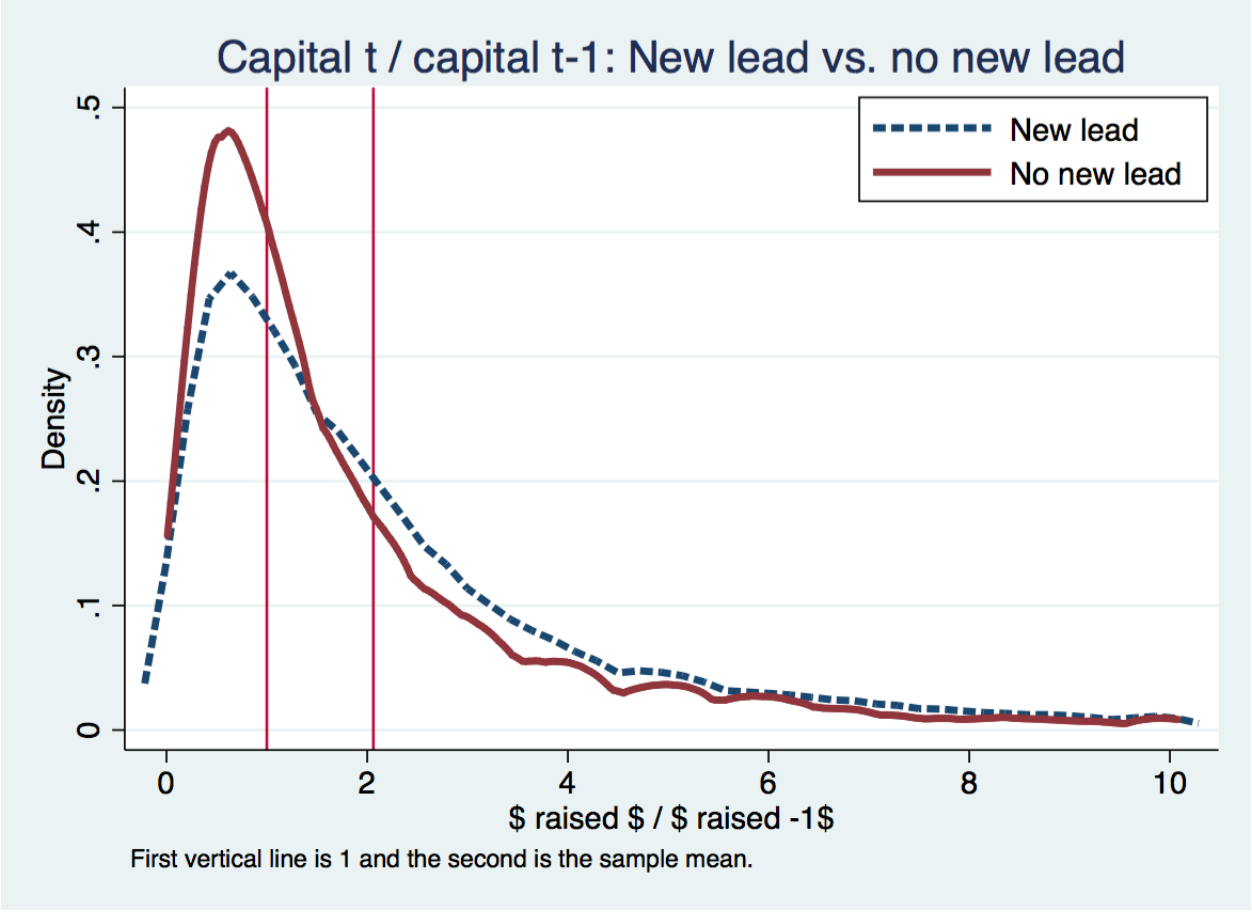

Table 1: Main variable description

Notes: The table defines the major variables used throughout the analysis.

% insiders (relative last syndicate)	Fraction of investors in financing that are old, where any investor that was not in the previous syndicate is considered new.
% insider investors	Fraction of investors in financings that are old, where insiders are defined as any previous investor. A new investor has never invested in the company.
% VC outsiders (relative last syndicate)	Fraction of investors that are new VC investors (rather than corporate and other) who did not invest in the previous syndicate.
% investors that are outsider VC	Fraction of the investors in the financing that are new and VCs, where new investors must not have invested at any point before.
% insider dollars (relative last syndicate)	Fraction of the dollars in a financing provided by the investors in the previous financing syndicate.
% inside dollars	Fraction of the dollars in the financing provided by any existing investor.
% VC outsider dollars (relative last syndicate)	Fraction of dollars in the financing that were provided by new VC investors where new is defined as any investor not in the previous financing and is a VC.
Full inside round	Equals one if the financing had all existing investors who were from the previous financing.
Full VC inside (no new non-VCs)	Equals one if the financing had no new VC investor in the round.
New lead?	A dummy variable equal to one if the financing has a known lead investor who was not a previous investor.
Years since last financing	Years from the last financing to the current financing.
Round number	The sequence number of the financing event.
Capital raisd	The total capital invested at the time of the financing (in millions of USD).

Table 2: Characteristics of the various inside variables

Notes: Table reports the characteristics of the main insideness variables. Panel A includes all financings where we could determine the insideness. Panel B restricts the sample to those where we have a complete history of capital invested by investors. It is often unknown how much capital was provided by past investors because they are general "buckets" (e.g. "Individual Investors") or lack a VC firm identifier in VentureSource.

	Panel A All financings								
	mean	sd	min	p10	p25	p50	p75	p90	max
Financing year	2001.73	6.314686	1982	1993	1998	2002	2007	2010	2014
% insiders (relative last syndicate)	.5871836	.3444787	0	0	.3333333	.6	1	1	1
% insider investors	.6228244	.3365693	0	0	.4	.6666667	1	1	1
% VC outsiders (relative last synd.)	.2470287	.2874372	0	0	0	.1818182	.4	.6666667	1
% investors that are outsider VC	.2123134	.2681921	0	0	0	.125	.3333333	.5	1
Full inside round	.3040205	.4600012	0	0	0	0	1	1	1
Full VC inside (no new non-VCs)	.4824636	.4997031	0	0	0	0	1	1	1
Round number	3.58982	1.896058	2	2	2	3	4	6	24
Year founded	1996.762	6.532564	1910	1987	1994	1998	2001	2004	2006
Years since last fin.	1.336397	1.021839	0	.4079454	.7091131	1.122534	1.692015	2.41208	24.08247
Information Technology	.5344739	.4988208	0	0	0	1	1	1	1
Healthcare	.2528229	.4346396	0	0	0	0	1	1	1
Capital raised (m USD)	12.10304	19.23072	.01	1.5	3.2	7.4	15	26.9	1500
Observations	23380								
	Panel B Financings with known past dollars								
	mean	sd	min	p10	p25	p50	p75	p90	max
Financing year	2001.502	6.561812	1982	1992	1997	2002	2007	2010	2014
% insider dollars (relative last syndicate)	.5740958	.3684333	0	0	.26	.5296	1	1	1
% VC outsider dollars (relative last synd.)	.2990795	.3310926	0	0	0	.2	.5	.8	1
% inside dollars	.6147289	.3594732	0	0	.3333333	.6027778	1	1	1
Full inside round	.3545529	.4783928	0	0	0	0	1	1	1
Full VC inside (no new non-VCs)	.4886414	.4998868	0	0	0	0	1	1	1
Years since last fin.	1.337636	.9939889	0	.4106832	.7118509	1.138962	1.702966	2.41208	16.55875
Round number	3.579447	1.868629	2	2	2	3	4	6	24
Year founded	1996.54	6.847682	1910	1987	1993	1998	2001	2004	2006
Information Technology	.5545782	.497028	0	0	0	1	1	1	1
Healthcare	.2478011	.4317493	0	0	0	0	0	1	1
Capital raised (m USD)	11.41597	18.91119	.01	1.5	3.13	7	14.5	25	1500
Observations	15803								

Table 3: Characteristics of the various inside variables: by round type

Notes: Table reports the characteristics of the main insideness variables. Panel A includes all financings where we could determine the insideness. Panel B restricts the sample to those where we have a complete history of capital invested by investors. It is often unknown how much capital was provided by past investors because they are general "buckets" (e.g. "Individual Investors") or lack a VC firm identifier in VentureSource.

	Panel A: 2nd round								
	mean	sd	min	p10	p25	p50	p75	p90	max
% insider investors	.6030291	.3141164	0	.1666667	.3636364	.6	1	1	1
% investors that are outsider VC	.2519995	.2659552	0	0	0	.25	.4285714	.6	1
Full inside round	.2734591	.4457612	0	0	0	0	1	1	1
Full VC inside (no new non-VCs)	.4073051	.491362	0	0	0	0	1	1	1
Year founded	1997.186	6.493375	1910	1988	1994	1999	2002	2005	2006
Years since last fin.	1.330858	.8971057	0	.4791304	.7529193	1.144437	1.670112	2.340894	12.5806
Capital raised (m USD)	11.0663	13.43998	.01	1.5	3.3	7.1	14	25	212.8
Observations	8323								
	Panel B: 3rd round								
	mean	sd	min	p10	p25	p50	p75	p90	max
% insider investors	.6575068	.3048224	0	.2222222	.5	.6666667	1	1	1
% investors that are outsider VC	.1893736	.242767	0	0	0	.125	.3333333	.5	1
Full inside round	.2932435	.4552942	0	0	0	0	1	1	1
Full VC inside (no new non-VCs)	.4739449	.4993701	0	0	0	0	1	1	1
Year founded	1997.18	6.425029	1937	1988	1994	1998	2002	2005	2006
Years since last fin.	1.336675	.9031529	0	.4408	.7474435	1.16634	1.72487	2.376487	13.0214
Capital raised (m USD)	13.46284	16.98487	.03	1.7	4	8.6	17	30	290.52
Observations	5047								
	Panel C: 4th round								
	mean	sd	min	p10	p25	p50	p75	p90	max
% insider investors	.7262596	.2959955	0	.3333333	.5714286	.8	1	1	1
% investors that are outsider VC	.1707479	.248316	0	0	0	0	.25	.5	1
Full inside round	.3719443	.4834146	0	0	0	0	1	1	1
Full VC inside (no new non-VCs)	.5167356	.4998138	0	0	0	1	1	1	1
Year founded	1997.319	6.484316	1919	1988	1994	1999	2002	2005	2006
Years since last fin.	1.31718	.8909366	0	.3860422	.7228025	1.130748	1.735821	2.373749	7.340279
Capital raised (m USD)	14.08893	16.65703	.04	1.8	4	9.25	19	31	300
Observations	2659								

Table 4: Inside vs. non-inside rounds and firms

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. Sample includes all entrepreneurial firms that were founded prior to 2007 to give ample time for an exit event and who had at least two financing events. The first panel considers characteristics of financings, while the second panel compares firms that had at least one inside round to those that had none.

	Financings		
	Outside round	Inside round	Total
Capital raised (m USD)	14.54	6.529	12.10
	(21.37)	(11.23)	(19.23)
Round number	3.486	3.827	3.590
	(1.831)	(2.017)	(1.896)
Year founded	1996.9	1996.4	1996.8
	(6.319)	(6.983)	(6.533)
Years since last fin.	1.329	1.354	1.336
	(1.039)	(0.981)	(1.022)
Years VC-backed	3.041	3.509	3.184
	(2.519)	(2.641)	(2.565)
Firm age	4.883	5.735	5.142
	(4.135)	(4.490)	(4.264)
Revenues/Profitable?	0.0602	0.0781	0.0656
	(0.238)	(0.268)	(0.248)
Tranched round?	0.0906	0.0767	0.0864
	(0.287)	(0.266)	(0.281)
Syndicate size	4.644	2.696	4.052
	(2.908)	(1.899)	(2.790)
# VC investors (all)	4.509	4.744	4.581
	(3.481)	(3.531)	(3.498)
Number Financings	16306	7132	23438
	Firm-level		
	Outside round	Inside round	Total
Total capital raised	37.50	41.05	39.36
	(50.29)	(69.15)	(60.92)
Total capital raised (not 1st)	31.49	35.56	33.62
	(47.58)	(67.68)	(59.00)
Total financings	3.612	4.997	4.337
	(1.744)	(2.536)	(2.301)
Information Technology	0.543	0.523	0.533
	(0.498)	(0.500)	(0.499)
Healthcare	0.218	0.247	0.233
	(0.413)	(0.431)	(0.423)
Public?	0.135	0.120	0.128
	(0.342)	(0.325)	(0.334)
Failed?	0.218	0.196	0.207
	(0.413)	(0.397)	(0.405)
Still private?	0.205	0.272	0.240
	(0.404)	(0.445)	(0.427)
Acquired?	0.451	0.422	0.436
	(0.498)	(0.494)	(0.496)
Year founded	1997.3	1996.7	1997.0
	(6.471)	(7.054)	(6.788)
Number Firms	4826	5279	10105

Table 5: Inside vs. non-inside rounds: ignore tiny capital and quick financings

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. The sample is the same as 4 except that it drops all financings that are below the 10th percentile of capital raised and/or time between financings. The first panel considers characteristics of financings, while the second panel compares firms that had at least one inside round to those that had none.

	Captital | Time to fin. > 10th percentile		
	Outside round	Inside round	Total
Capital raised (m USD)	14.71	7.865	12.97
	(17.03)	(9.013)	(15.68)
Round number	3.472	3.903	3.582
	(1.800)	(2.012)	(1.866)
Year founded	1997.0	1997.2	1997.0
	(6.453)	(6.777)	(6.537)
Years since last fin.	1.368	1.412	1.379
	(1.029)	(0.956)	(1.011)
Years VC-backed	3.098	3.692	3.249
	(2.512)	(2.579)	(2.543)
Firm age	4.918	5.837	5.152
	(4.134)	(4.333)	(4.204)
Revenues/Profitable?	0.0643	0.0754	0.0671
	(0.245)	(0.264)	(0.250)
Tranched round?	0.101	0.0970	0.0998
	(0.301)	(0.296)	(0.300)
Syndicate size	4.796	2.902	4.313
	(2.888)	(1.939)	(2.802)
# VC investors (all)	4.513	5.027	4.644
	(3.466)	(3.580)	(3.502)
Number Financings	11893	4076	15969

Table 6: Inside vs. non-inside valuation changes

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. Sample includes all entrepreneurial firms that were founded prior to 2007 to give ample time for an exit event. The sample is also constrained by our ability to calculate the change in valuation between the current and previous round (i.e. two valuations). "Pre$ t / Post $ t-1" is the ratio of current to previous valuation. "Up round" is equal to one if the valuation increased (i.e. "Pre$ t / Post $ t-1" > 1). "Up round" is equal to one if the valuation decreased (i.e. "Pre$ t / Post $ t-1" < 1). "Flat round" is equal to one if the valuation remained the same (i.e. "Pre$ t / Post $ t-1" $= 1$). * , **, *** represent significance at the 10%, 5% and 1% level respectively for difference in means.

	Outside rounds	Inside rounds	Diff./s.e.
Pre$_$t$ / Post $_$t$ − 1	2.064	1.492	0.572***
			(0.0850)
Up round	0.788	0.621	0.167***
			(0.0105)
Down round	0.185	0.311	-0.127***
			(0.00997)
Flat round	0.0275	0.0678	-0.0403***
			(0.00464)
Capital raised (m USD)	15.52	6.823	8.699***
			(0.560)
Pre money valuation	69.86	47.13	22.73
			(13.61)
Years since last fin.	1.259	1.296	-0.0373
			(0.0199)
$ raised t / $ raised $t − 1$	3.032	2.095	0.937
			(0.490)
Round number	3.294	3.630	-0.337***
			(0.0387)
Public?	0.322	0.276	0.0452***
			(0.0113)
Failed?	0.153	0.167	-0.0137
			(0.00887)
Still private?	0.134	0.172	-0.0384***
			(0.00854)
Acquired?	0.397	0.391	0.00629
			(0.0119)
Year founded	1995.5	1994.7	0.719***
			(0.154)
# VC investors (all)	4.893	5.151	-0.258**
			(0.0870)
Number observations	6557	2257	8814
Number Firms	3715	1773	4375

Table 7: Inside vs. non-inside valuation changes: no pseudo-bridge rounds

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. Sample includes all entrepreneurial firms that were founded prior to 2007 to give ample time for an exit event. The sample is also constrained by our ability to calculate the change in valuation between the current and previous round (i.e. two valuations). "Pre$ t / Post $ t-1" is the ratio of current to previous valuation. "Up round" is equal to one if the valuation increased (i.e. "Pre$ t / Post $ t-1" > 1). "Up round" is equal to one if the valuation decreased (i.e. "Pre$ t / Post $ t-1" < 1). "Flat round" is equal to one if the valuation remained the same (i.e. "Pre$ t / Post $ t-1" $= 1$).

	Outside rounds	Inside rounds	Diff./s.e.
Pre$_$t$ / Post $_$t$ − 1	2.051	1.537	0.514***
			(0.123)
Up round	0.793	0.628	0.165***
			(0.0136)
Down round	0.183	0.316	-0.132***
			(0.0130)
Flat round	0.0232	0.0558	-0.0325***
			(0.00545)
Capital raised (m USD)	15.62	8.345	7.271***
			(0.522)
Pre money valuation	57.20	46.00	11.20**
			(3.676)
Years since last fin.	1.306	1.386	-0.0795**
			(0.0253)
$ raised t / $ raised $t − 1$	3.161	2.915	0.245
			(0.767)
Round number	3.286	3.660	-0.374***
			(0.0498)
Public?	0.315	0.272	0.0428**
			(0.0148)
Failed?	0.0963	0.0878	0.00855
			(0.00940)
Still private?	0.146	0.209	-0.0628***
			(0.0117)
Acquired?	0.447	0.441	0.00606
			(0.0160)
Year founded	1995.6	1995.6	-0.0441
			(0.205)
# VC investors (all)	4.882	5.377	-0.494***
			(0.114)
Number observations	4738	1219	5957
Number Firms	2977	1051	3417

Table 8: Inside vs. non-inside valuation changes: multiple and valuation known

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. Sample includes all entrepreneurial firms that were founded prior to 2007 to give ample time for an exit event. The sample is also constrained by our ability to calculate the change in valuation between the current and previous round (i.e. two valuations). "Pre$ t / Post $ t-1" is the ratio of current to previous valuation. "Up round" is equal to one if the valuation increased (i.e. "Pre$ t / Post $ t-1" > 1). "Up round" is equal to one if the valuation decreased (i.e. "Pre$ t / Post $ t-1" < 1). "Flat round" is equal to one if the valuation remained the same (i.e. "Pre$ t / Post $ t-1" $= 1$).

	Outside rounds	Inside rounds	Diff./s.e.
Pre$_$t$ / Post $_$t$ − 1	2.146	1.634	0.512***
			(0.124)
Gross multiple	4.209	3.908	0.301
			(0.537)
Up round	0.807	0.658	0.150***
			(0.0126)
Down round	0.167	0.279	-0.112***
			(0.0120)
Flat round	0.0255	0.0629	-0.0374***
			(0.00554)
Capital raised (m USD)	15.56	7.152	8.408***
			(0.511)
Pre money valuation	62.73	46.06	16.67***
			(3.118)
Years since last fin.	1.218	1.246	-0.0278
			(0.0246)
$ raised t / $ raised $t − 1$	3.147	2.610	0.537
			(0.743)
Round number	3.316	3.605	-0.289***
			(0.0469)
Public?	0.428	0.402	0.0264
			(0.0150)
Failed?	0.221	0.266	-0.0447***
			(0.0129)
Acquired?	0.351	0.332	0.0183
			(0.0145)
Year founded	1994.7	1993.6	1.063***
			(0.187)
# VC investors (all)	5.078	5.420	-0.342**
			(0.111)
Multiple greater 0	5.8	5.66	5.77
Number observations	4514	1414	5928
Number Firms	2419	1115	2757

Table 9: Inside vs. non-inside returns (including zero multiples)

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. Sample includes all entrepreneurial firms that were founded prior to 2007 to give ample time for an exit event. The sample is also constrained by our ability to calculate the return, so comparing 4's first panel to this one will reveal some sample selection issues. "Gross multiple" is the assumed cash-on-cash return for a hypothetical common equity purchase in the financing in question that accounts for future dilution and the final exit value. "Zero return" is a dummy equal to one if the multiple was zero (i.e. return -100%). "Years to exit" is the years from the financing to the eventual exit date.

	Outside rounds	Inside rounds	Diff./s.e.
Gross multiple	4.218	3.919	0.300
			(0.538)
Zero return	0.272	0.308	-0.0355**
			(0.0137)
Years to exit (financing)	3.387	3.222	0.165*
			(0.0798)
Pre$_t$ / Post $\_t - 1$	2.145	1.635	0.510***
			(0.124)
Up round	0.807	0.657	0.150***
			(0.0127)
Down round	0.167	0.279	-0.112***
			(0.0120)
Flat round	0.0255	0.0631	-0.0376***
			(0.00555)
Capital raised (m USD)	15.56	7.144	8.413***
			(0.512)
preVal	62.72	46.10	16.62***
			(3.123)
Years since last fin.	1.218	1.245	-0.0275
			(0.0246)
Round number	3.315	3.607	-0.292***
			(0.0470)
Public?	0.429	0.403	0.0262
			(0.0151)
Failed?	0.219	0.264	-0.0444***
			(0.0128)
Still private?	0.000444	0	0.000444
			(0.000561)
Acquired?	0.352	0.333	0.0182
			(0.0145)
Year founded	1994.6	1993.6	1.064***
			(0.187)
# VC investors (all)	5.077	5.420	-0.343**
			(0.111)
Number Financings	7858	3019	10877
Number Firms	4055	2206	4726

Table 10: Inside vs. non-inside returns and outcomes: up vs down financings

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. Down round is when the valuation falls or is less than a 10% increase. Sample includes all entrepreneurial firms that were founded prior to 2007 to give ample time for an exit event. The sample is also constrained by our ability to calculate the return, so comparing 4's first panel to this one will reveal some sample selection issues. "Gross multiple" is the assumed cash-on-cash return for a hypothetical common equity purchase in the financing in question that accounts for future dilution and the final exit value. "Zero return" is a dummy equal to one if the multiple was zero (i.e. return -100%). "Years to exit" is the years from the financing to the eventual exit date.

	Outside down	Inside down	Diff./s.e.
Gross multiple	2.875	2.645	0.230
			(0.494)
Zero return	0.286	0.359	-0.0721**
			(0.0229)
Years to exit (financing)	3.268	3.161	0.107
			(0.128)
Capital raised (m USD)	14.41	6.343	8.062***
			(0.743)
Years since last fin.	1.388	1.311	0.0769
			(0.0446)
Round number	3.848	4.014	-0.166
			(0.0857)
Public?	0.390	0.311	0.0792***
			(0.0237)
Failed?	0.241	0.311	-0.0702**
			(0.0218)
Acquired?	0.369	0.378	-0.00901
			(0.0239)
# VC investors (all)	6.332	6.065	0.267
			(0.204)
	Outside up	Inside up	Diff./s.e.
Gross multiple	4.676	4.956	-0.280
			(0.797)
Zero return	0.267	0.266	0.00101
			(0.0176)
Years to exit (financing)	3.428	3.272	0.155
			(0.104)
Capital raised (m USD)	15.95	7.798	8.153***
			(0.696)
Years since last fin.	1.160	1.192	-0.0319
			(0.0301)
Round number	3.133	3.275	-0.142*
			(0.0556)
Public?	0.442	0.477	-0.0352
			(0.0198)
Failed?	0.212	0.225	-0.0132
			(0.0163)
Acquired?	0.346	0.297	0.0484*
			(0.0188)
# VC investors (all)	4.649	4.894	-0.246
			(0.132)

Table 11: Hot and Cold IPO Markets

: Table compares financings where the previous year exhibited bottom (top) quartile annual growth in VC-backed IPOs as of the month of the financing. Variables are as defined in Table 1 and used in Table 4. The stars * , **, *** represent significance at the 10%, 5% and 1% level respectively.

	Financings		
	Low IPOs	High IPOs	Diff./s.e.
% insider investors	0.644	0.593	0.0504***
			(0.00632)
Full inside round	0.328	0.272	0.0558***
			(0.00872)
Capital raised (m USD)	11.33	14.18	-2.849***
			(0.396)
Round number	3.542	3.527	0.0153
			(0.0345)
Financing year	2002.6	2001.8	0.786***
			(0.0897)
Year founded	1997.8	1997.0	0.748***
			(0.105)
Years VC-backed	3.015	2.997	0.0179
			(0.0449)
Firm age	4.957	4.892	0.0651
			(0.0798)
Revenues/Profitable?	0.0588	0.0567	0.00210
			(0.00443)
Tranched round?	0.106	0.0990	0.00689
			(0.00577)
Syndicate size	3.930	4.198	-0.268***
			(0.0525)
# VC investors (all)	4.627	4.493	0.135*
			(0.0659)
Public?	0.130	0.140	-0.00996
			(0.00646)
Number Financings	6706	4748	

Table 12: Hot and Cold First Round Financing Markets

: Table compares financings where the previous year exhibited bottom (top) quartile annual growth in first round VC financings in the month of the financing. Variables are as defined in Table 1 and used in Table 4. The stars * , **, *** represent significance at the 10%, 5% and 1% level respectively.

	Financings		
	Low 1st Rounds	High 1st Rounds	Diff./s.e.
% insider investors	0.654	0.559	0.0944***
			(0.00624)
Full inside round	0.347	0.238	0.108***
			(0.00840)
Capital raised (m USD)	11.86	14.26	-2.397***
			(0.335)
Round number	3.725	3.157	0.568***
			(0.0322)
Financing year	2003.8	1998.6	5.165***
			(0.0803)
Year founded	1998.6	1994.7	3.883***
			(0.0995)
Years VC-backed	3.382	2.335	1.047***
			(0.0440)
Firm age	5.403	4.127	1.277***
			(0.0789)
Revenues/Profitable?	0.0564	0.0505	0.00592
			(0.00419)
Tranched round?	0.129	0.0388	0.0900***
			(0.00503)
Syndicate size	3.950	4.446	-0.496***
			(0.0543)
# VC investors (all)	4.893	4.200	0.694***
			(0.0631)
Public?	0.0922	0.180	-0.0879***
			(0.00639)
Number Financings	5475	6057	

Table 13: Inside vs. non-inside returns and outcomes: Hot vs Cold Markets

: Table compares financings where there the only investors are those with an existing equity stake to those with at least one outside investor of any kind. Hot market is when the number of rounds closed in the previous year is above median. Sample includes all entrepreneurial firms that were founded prior to 2007 to give ample time for an exit event. The sample is also constrained by our ability to calculate the return, so comparing 4's first panel to this one will reveal some sample selection issues. "Gross multiple" is the assumed cash-on-cash return for a hypothetical common equity purchase in the financing in question that accounts for future dilution and the final exit value. "Zero return" is a dummy equal to one if the multiple was zero (i.e. return -100%). "Years to exit" is the years from the financing to the eventual exit date.

	Inside Hot	Inside Cold	Outside Hot	Outside Cold	Total
Gross multiple	3.446	2.850	3.474	2.363	3.172
	(9.854)	(6.886)	(20.86)	(4.244)	(16.12)
Pre$_$t$ / Post $_$t$ − 1	1.927	0.966	2.560	1.258	2.041
	(4.067)	(0.775)	(2.789)	(1.364)	(2.742)
Zero return	0.356	0.357	0.348	0.275	0.334
	(0.479)	(0.480)	(0.477)	(0.447)	(0.472)
Years to exit (financing)	3.145	3.204	3.164	3.896	3.325
	(2.820)	(2.361)	(2.620)	(2.638)	(2.649)
Capital raised (m USD)	6.255	8.286	17.74	18.41	15.36
	(8.437)	(8.664)	(21.19)	(19.77)	(19.21)
Years since last fin.	1.119	1.384	1.050	1.407	1.168
	(0.799)	(0.688)	(0.726)	(0.726)	(0.750)
Round number	3.365	3.854	3.229	3.507	3.365
	(1.573)	(1.933)	(1.378)	(1.615)	(1.528)
Public?	0.393	0.325	0.377	0.357	0.371
	(0.489)	(0.469)	(0.485)	(0.480)	(0.483)
Failed?	0.328	0.286	0.293	0.207	0.279
	(0.470)	(0.453)	(0.455)	(0.406)	(0.449)
Acquired?	0.279	0.389	0.329	0.435	0.350
	(0.449)	(0.488)	(0.470)	(0.496)	(0.477)
Year founded	1992.2	1996.5	1994.1	1997.0	1994.7
	(5.116)	(6.206)	(5.072)	(5.734)	(5.568)
Syndicate size	3.157	3.461	5.606	5.836	5.107
	(2.218)	(2.382)	(3.496)	(3.334)	(3.372)
Number Financings	467	281	1735	697	3180
Number Firms	429	262	1327	589	2044

Table 14: Prediciting insideness

Notes: Table reports regressions of a financings fraction of inside investors on a set of controls. The first colums runs a probit regression of the dummy variable equal to one if all the investors in the financings are insiders. Column 2 uses the fraction of investors that are insiders in an OLS regression. The controls are all lagged to the previous financing event (all financings are at least the second round). "Last log raised" is the log capital invested in the firm's previous round. "Years since last financing" is the years since the previous financing event. "Last # investors" is the count of the total number of active investors in all previous rounds. "Last syndicate size" is the total number of investors in the previous round. "Syndicate fund raising" is a dummy equal to one if at least one participating investor is within two years of raising their next fund. "Big exit last 2 years" is a dummy variable equal to one if at last one syndicate member have a large exit (IPO or big acquisition) in the previous two years. "YearXIndustry FE" and the interaction of the firm's industry and current financing year FE. Robust standard errors reported in parentheses. * , **, *** represent significance at the 10%, 5% and 1% level respectively.

	Inside?	% inside	Inside?	Inside?
	(1)	(2)	(3)	(4)
Last log raised	-0.0445***	-0.0223***	-0.0315***	-0.0449***
	(0.00477)	(0.00375)	(0.00944)	(0.00480)
Years since last fin.	-0.00688*	-0.00614*	0.00855	-0.00711*
	(0.00415)	(0.00360)	(0.00963)	(0.00417)
Last # investors	-0.00813***	-0.0176***	-0.00828**	-0.00760***
	(0.00181)	(0.00140)	(0.00330)	(0.00185)
First capital raised	0.00154***	0.00000519	0.00117	0.00180***
	(0.000461)	(0.000564)	(0.00108)	(0.000478)
Last syndicate size	0.00201	0.0353***	0.00224	0.00234
	(0.00191)	(0.00158)	(0.00321)	(0.00191)
Syndicate fund raising			-0.0774***	
			(0.0132)	
Big exit last 2 years				-0.0593***
				(0.0121)
Constant	-0.184	0.987***	-0.197	0.167
	(0.217)	(0.124)	(0.167)	(0.139)
Observations	13553	13553	4569	13384
R^2	0.0718	0.163	0.0951	0.0634
Num. firms	6164	6164	2809	6135
Year$x$Industry FE?	Y	Y	Y	Y
Round # FE?	Y	Y	Y	Y
State FE?	Y	Y	Y	Y

Table 15: Change in valuation: inside vs. outside rounds

Notes: Table reports linear regressions of the log change in valuation between an entrepreneurial firm's two finaning events on set of observables. The dependent variable Log(Pre_t/\$Post$\$_{t-1}$) takes the log of the ratio of the current pre-money valuation over the previous post-money valuation (if both are reported). "Full inside round" is a dummy variable equal to one if the current financing has no outside investors. "\$ raised t / \$ raised t 1" is the ratio of capital raised in the current financing over the previous. "Log raised" is the log of the current capital invested. "Years since last fin." is the number of years since the firm's previous financing event. "# VC investors (all)" is the count of the unique number of investors throughout the firm's financings. "Log total raised" is the sum of non-first round capital raised by the firm. Standard errors clustered at the entrepreneurial firm are reported in parentheses. * , **, *** represent significance at the 10%, 5% and 1% level respectively.

	Log(Pre $\$_t$/ Post $\$_t - 1$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Full inside round	-0.235***	-0.232***	-0.135***	-0.140***	-0.133***	-0.144***
	(0.0182)	(0.0180)	(0.0191)	(0.0189)	(0.0188)	(0.0189)
\$ raised t / \$ raised $t-1$		0.00367***	0.00326***	0.00317***	0.00306***	0.00304***
		(0.000794)	(0.000632)	(0.000626)	(0.000550)	(0.000569)
Log raised			0.119***	0.118***	0.132***	0.110***
			(0.00878)	(0.00874)	(0.00891)	(0.0104)
Years since last fin.				-0.119***	-0.114***	-0.109***
				(0.0145)	(0.0144)	(0.0145)
# VCs investors (all)					-0.0232***	-0.0279***
					(0.00301)	(0.00312)
Log total raised (not 1st)						0.0525***
						(0.00967)
Constant	-0.0141	-0.00974	-0.0506	-0.0431	0.00416	0.856*
	(0.516)	(0.514)	(0.537)	(0.475)	(0.520)	(0.503)
Observations	8721	8721	8721	8721	8721	8721
R^2	0.271	0.280	0.298	0.311	0.316	0.288
Num. firms	4318	4318	4318	4318	4318	4318
Year$x$Industry FE?	Y	Y	Y	Y	Y	Y
Round # FE?	Y	Y	Y	Y	Y	Y

Table 16: Entrepreneurial firm outcomes: inside vs. outside rounds

Notes: Table reports probit and OLS regressions of entrepreneurial firm outcomes on a set of observables. Column (1) uses the dependent variable "IPO" that is equal to one if the firm went public by the end of the sample. Column (2) considers "Good exit" which is equal to one if the firm had an IPO or an acquisition with a reported valuation greater than two times capital invested. "Log exit value" in column (3) is the log of the valuation (log of 25% of capital raised if a failure). The variable "Had inside round" is a dummy variable equal to one if the entrepreneurial firm ever had an inside round in its financings. Columns (3) - (6) introduce controls for whether the firm had a "down" or "flat" round in its history. "First capital raised" is the first capital raised by the firm. Robust standard errors reported in parentheses. * , **, *** represent significance at the 10%, 5% and 1% level respectively.

	IPO	Good exit	Log exit value	IPO	Good exit	Log exit value
	(1)	(2)	(3)	(4)	(5)	(6)
Had inside round	-0.0193***	-0.0597***	-0.225***	-0.0263**	-0.0964***	-0.342***
	(0.00602)	(0.00852)	(0.0621)	(0.0116)	(0.0193)	(0.127)
Had flat round				-0.0561**	-0.0684	-1.199***
				(0.0256)	(0.0438)	(0.409)
Had down round				-0.0497***	-0.0944***	-0.414***
				(0.0126)	(0.0204)	(0.152)
First capital raised	0.00189***	0.00262***	0.0403***	0.00730***	0.00681***	0.0568***
	(0.000428)	(0.000543)	(0.00444)	(0.00104)	(0.00121)	(0.00852)
Constant	0.166*	0.186*	1.814**	0.108	0.173	1.155
	(0.0887)	(0.101)	(0.793)	(0.161)	(0.180)	(0.855)
Observations	8600	8600	4410	1724	1724	984
R^2	0.0809	0.0817	0.125	0.204	0.170	0.260
Year$x$Industry FE?	Y	Y	Y	Y	Y	Y
Round # FE?	Y	Y	Y	Y	Y	Y
State FE?	Y	Y	Y	Y	Y	Y

Table 17: Differences in returns: gross multiple

Notes: Table reports regressions of a the log of the gross multiple when known on a set of observables. The dependendent variable is the financing-level return (logged) assuming common equity for a dollar invested in the round. If the company exits via an acquisition and the reported price is less than total capital raised, we assume that the last investors receive all their capital back before earlier investors share in the return. For failures, we assume that the final investors received 25% of the capital invested back, with all previous financings recieving 15%. "Full inside round " is a dummy equal to to one if all the investors were insiders. "Log total capital" is the log of the sum of total capital raised. "Log raised (m USD)" is the log of capital raised in the current round. "Big exit last 2 years" is a dummy variable equal to one if at last one syndicate member have a large exit (IPO or big acquisition) in the previous two years. This last variable is interacted with the inside round dummy. "YearXIndustry FE" and the interaction of the firm's industry and current financing year FE. Robust standard errors clustered at the financing year reported in parentheses. * , **, *** represent significance at the 10%, 5% and 1% level respectively.

	All returns	Inside $2X$ Outside $1X$	Missing is $2X$ Outside $1X$	All Returns
	(1)	(2)	(3)	(4)
Full inside round	-0.204***	-0.154**	-0.0613	-0.170
	(0.0549)	(0.0595)	(0.0575)	(0.117)
Log raised	0.156***	0.144***	0.141***	0.152***
	(0.0428)	(0.0427)	(0.0353)	(0.0437)
Years since last fin.	-0.0727**	-0.0680*	-0.0510	-0.0720**
	(0.0343)	(0.0352)	(0.0322)	(0.0340)
Inside round X Big exit last 2 years				-0.0408
				(0.122)
Big exit last 2 years				0.130
				(0.0841)
Log total capital	0.149***	0.167***	0.106**	0.146***
	(0.0466)	(0.0453)	(0.0445)	(0.0465)
Constant	1.872***	2.682***	2.404***	1.380**
	(0.575)	(0.599)	(0.504)	(0.650)
Observations	9722	9722	10637	9610
R^2	0.133	0.130	0.114	0.133
Founding Year$x$Industry FE?	Y	Y	Y	Y
Industry FE ?	Y	Y	Y	Y
Round # FE?	Y	Y	Y	Y
State FE?	Y	Y	Y	Y

Table 18: Inside rounds and string contract features

Notes: The table reports the correlations between inside rounds and strong contract features. Column (1) has a dependent variable equal to one if the financing had senior equity. Column (2) has a dependent variable equal to one if the contract has a liquidation preference greater than 1X. Column (3) has a dependent variable equal to 1 if the contract had participating preferred. The last column has a dependent variable equal to one if any of these contract types exist.

	Senior	> 1X?	Part. Pref.?	Any?
	(1)	(2)	(3)	(4)
Full inside round	-0.0729	0.102	0.0866	0.0296
	(0.0873)	(0.115)	(0.0902)	(0.0957)
Log raised	-0.0160	-0.105*	-0.224***	-0.173***
	(0.0419)	(0.0549)	(0.0441)	(0.0463)
Years since last fin.	0.0263	-0.0638	-0.0325	
	(0.0425)	(0.0581)	(0.0440)	
Observations	1309	1291	1314	1267
Pseudo-R^2	0.0695	0.110	0.0646	0.0532
Num. firms	945	940	951	912
Mean dep. var	0.442	0.111	0.608	0.755
Mean dep. var. — Inside	0.434	0.141	0.673	0.793
Founding Year	Y	Y	Y	Y
Industry FE ?	Y	Y	Y	Y
Round # FE?	Y	Y	Y	Y

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