Public Market Institutions in Venture Capital: Value Creation for Entrepreneurial Firms[1]

Shiyang Huang
The University of Hong Kong
huangsy@hku.hk

Yifei Mao
Cornell University
ym355@cornell.edu

Cong (Roman) Wang
Emory University
cwan229@emory.edu

Dexin Zhou
Baruch College
dexin.zhou@baruch.cuny.edu

This version: March, 2017

[1]We thank helpful comments from Linda Canina, Lily Fang, Byoung-Hyoun Hwang, Clifton Green, Stijn Van Nieuwerburgh, Scott Yonker and seminar participants at Cornell University and Fordham University. Remaining errors and omissions are our own responsibility.

Public Market Institutions in Venture Capital: Value Creation for Entrepreneurial Firms

Abstract

Institutions that traditionally focus on the public equity market are making an increasing number of venture capital (VC) investments in the private market. Examining these investments, we find that an institution-backed entrepreneurial firm is more likely to have a successful exit, either through an IPO or through an acquisition. Meanwhile, these institution-backed entrepreneurial firms tend to be more mature, require higher amount of financing and attract more reputable VC investors. Our baseline results continue to hold in a propensity score matching analysis. Furthermore, there is a strong positive association between prior public equity market performance of an institution and successful exits of entrepreneurial firms backed by the institution. Finally, we show that the issuing firms with the presence of institutions have lower IPO underpricing and higher net proceed, which suggest that the presence of institutions certifies the value of entrepreneurial firms to the public.

JEL Classification: G24, O31, G23, G34

Keywords: venture capital, institution, entrepreneurial firm, certification

1. Introduction

Traditionally, each type of financial intermediaries has its own areas of expertise and focuses on ts own market of interest. For example, asset management companies typically invest in publicly traded firms, while venture capital firms focus on entrepreneurial firms in the private market. However, in recent years, institutions that traditionally invest in the public equity market (in the rest of the paper, we will refer to this category of financial intermediaries simply as "institutions") are making an increasing number of venture capital investments in entrepreneurial firms.[1] Since these institutions' features are distinctive from traditional independent venture capitals (IVC), their cross-market investments may bring significant impacts to the venture capital industry and the growth of entrepreneurial firms. Therefore, it is important to understand the economic consequences of institutions' venture capital investments and their implications for the entrepreneurial firms. However, the research on this topic is limited and we attempt to fill the gap.

How institutions' venture capital investments affect entrepreneurial firms is ultimately an empirical question. On one hand, institutions may have superior abilities in identifying entrepreneurial firms with high growth potential and nurturing them. First, institutions conduct in-depth research on their portfolio companies in the public market, which may provide them with insights about the industries of the entrepreneurial firms. These insights could help them evaluate the prospects of the entrepreneurial firms, which lack public track records. Second, institutions with public equity market experience have advantages over IVCs on evaluating IPOs and assessing the popularity of entrepreneurial firms after they go public. In sum, institutions' participation could provide credible certification about entrepreneurial firms' opaque fundamentals, and thus potentially contribute to the firms' subsequent financing and development.

On the other hand, the traditional business model of institutions may hamper their abilities in nurturing entrepreneurial firms. Institutions, such as mutual funds, typically hold large portfolios in the public market and venture capital investment only accounts for a small portion of their

[1] Large mutual funds, such as Fidelity, T. Rowe Price and Blackrock, are increasingly showing a keen interest in young tech private firms ("*Mutual funds are bypassing IPOs and going straight for the main course*", QUARTZ, April 2014). For example, while venture capitalists poured 11.3 billion US dollars into startups in the first quarter of 2015, up only 11% from a year ago, the non-traditional funds including hedge funds, mutual funds invested 6.4 billion US dollar, a 167% increase ("*Hedge Fund Money Going to Venture-Backed Startups Is Skyrocketing*", Yahoo Finance April 2015).

portfolios.[2] As a result, institutions may not have enough incentives to monitor entrepreneurial firms. In contrast, IVCs are typically heavily involved in the operations of entrepreneurial firms, such as professionalizing the management teams and assisting the founders. Thus, institutions' roles in entrepreneurial firms' development may be limited compared with IVCs.

To address our research question, we first compare the exit outcomes of institution-backed entrepreneurial firms and non-institution-backed ones.[3] We find institution-backed entrepreneurial firms are more likely to exit successfully, either by going public or being acquired. Specifically, compared with non-institution-backed entrepreneurial firms, institution-backed entrepreneurial firms enjoy a 4.6% higher probability of successful exits, which accounts for 8.5% of the average successful exit rate in our sample. Overall, institutional investments are associated with better entrepreneurial firm performance in terms of exit outcomes. Furthermore, we find that the effects are more pronounced on the IPO exits: institution-backed entrepreneurial firms enjoy an 8.1% higher probability of IPO than that of acquisition.

However, institution-backed and non-institution-backed entrepreneurial firms may be vastly different in nature, and the difference in their exit outcomes may be driven by the entrepreneurial firms' characteristics rather than the presence of institutions. To address this concern, we use propensity score matching method to minimize the differences in the observed characteristics between institution-backed and non-institution-backed entrepreneurial firms. Indeed, a pre-match comparison between institution-backed and non-institution-backed entrepreneurial firms shows that the former group is generally more mature, associated with a higher amount of financing, more financing stages and more reputable VC investors. Nonetheless, after controlling for the observed differences in the characteristics of the two samples using propensity score matching, the results suggest that institution-backed entrepreneurial firms enjoy an average of 6.5% higher successful exit rates.[4] Although propensity score matching cannot control for unobserved firm characteristics, our analysis suggests at least not all the superior performance of institution-backed entrepreneurial firms is driven by observed firm characteristics.

We further explore the mechanisms through which institutional investment leads to higher probabilities of successful exits. Given that institutions typically make in-depth research on their

[2] The median ratio of amount invested in entrepreneurial firms to institution public equity market holding is 0.1%.
[3] We define an institution-backed entrepreneurial firm as one with at least one institution serving as a general partner (GP) in its financing.
[4] The increases in probability of IPO and acquisition are indistinguishable.

portfolio companies and accumulate industry expertise from public trading, we expect that institutions with superior public market investment experiences may make better investments in entrepreneurial firms. Indeed, we find that institutions' public market expertise is strongly predictive of successful exits, using institutions' performance in the public market as a proxy for institutions' expertise. The economic magnitude is also sizable. A one standard deviation (1.19) increase in the overall raw 36-month performance leads to a 5.1% increase in the probability of successful exits.[5]

Furthermore, we conjecture that institutions' industry-specific performance is more relevant for entrepreneurial firms' successful exits. Consistent with this view, we find that the DGTW-adjusted returns of the institution in the industry of the entrepreneurial firm have significant positive association for the successful exits. The economic magnitude is meaningful. For the entrepreneurial firms backed by institutions, a one standard deviation increase (0.72) in institutional industry DGTW-adjusted performance leads to a 5.4% increase in successful exit rate.[6] To reinforce our conjecture, we conduct placebo tests and find that performance in the industries outside of the entrepreneurial firm's industry has little power in predicting the rate of successful exits.

In the previous analysis, we have established a positive association between the presence of institutions and the successful exits of their portfolio entrepreneurial firms. As a next step, we examine the mechanisms through which institutions contribute to the venture deals. Since venture capital investment only accounts for a small portion of institutions' portfolios, institutions are unlikely to have enough time or incentives to nurture entrepreneurial firms. Therefore, we hypothesize that the positive association is driven by institutions' ability to identify entrepreneurial firms with good growth potential. If this is the case, we expect to see the presence of institutions signal the value of the firms to outside investors. IPO sample provides an excellent laboratory to test the hypothesis, given that institutions' public market expertise could play an important role in mitigating information asymmetry and signaling the value of the firm to outside investors during the IPO process.

[5] The increase in the probability of successful exits accounts for 9.44% of the mean successful exit rate (0.54). Our results are qualitatively similar when we use 12 or 24 months returns.
[6] The increase in the probability of successful exits accounts for 10% of the mean successful exit rate (0.54). Our results are qualitatively similar when we use 12 or 24 months returns.

To test the certification effect, we compare the IPO performance of institution-backed entrepreneurial firms and non-institution-backed entrepreneurial firms.[7] Indeed, we find evidence that suggests the presence of institutions serves as a certification for IPO firms. First, institution backing leads to significantly lower IPO underpricing. Second, institution participation lowers the total costs of going public and increases the net proceeds of the issuing firms. Overall, our results imply that institutions help resolve the asymmetric information inherent in the IPO process.

To reinforce the argument about institutions' certification effects, we examine institutions' limited partner (LP) investment as a placebo test. LPs, unlike general partners (GPs), do not directly participate in venture deals and as a result their presence is unlikely to send a strong signal to the market certifying deal quality. Therefore, if our results are indeed driven by certification effects, there should be no significant differences for IPOs with and without institutions acting as limited partners in the deal. Our findings are consistent with the conjecture. First, we find that entrepreneurial firms invested by venture capital with institutions acting as limited partners are more likely to experience successful exits. Second, institutions' participation as limited partners does not have significant impact on IPO underpricing, costs, or proceeds. These empirical results indicate that although institutional LPs appear to have superior abilities in selecting GPs, their indirect investment generally does not carry certification effect as institutional GPs.

Our paper contributes to several strands of literature. First, our paper contributes to the growing literature on cross-market investment. Some of these studies examine the information flow from the private market to the public market. For example, Ozemel, Yavuz and Trombley (2016) find that access to information of entrepreneurial firms prior to IPOs gives a trading advantage to the limited partners of venture capital funds. Ivashina and Sun (2011) show that institutional investors benefit from trading companies' stocks based on their loan market information. Another line of studies, which is closely related to ours, examines the information flow from the public market to the private market. Liu and Tian (2016) argue that VCs actively learn information in secondary market stock prices when designing investment structures in their entrepreneurial firm ventures. Our paper contributes to this strand of literature by examining a new type of cross-market investment, and finds that the public market investment expertise facilitates institutions' investment in entrepreneurial firms in the private market.

[7] We follow the literature and test the certification effect on the IPO sample, such as Megginson and Weiss (1990).

Second, this paper contributes to a large body of literature that studies the institutions' investment. Daniel, Grinblatt, Titman and Wermers (1997) find that mutual funds have the abilities to select superior stocks. More recently, Berk and Van Binsbergen (2015) find that average mutual funds generate added value for their investors. Sun, Wang and Zheng (2012) show that hedge funds that use less common strategies deliver superior returns. Kempf, Manconi and Spalt (2016) show that mutual fund managers demonstrate stock-picking skills in an industry after experiencing difficult industry environment. Kacperczyk and Seru (2007) find that mutual funds relying less on public information tend to outperform. Fang, Ivashina and Lerner (2015) investigate direct investments in private equity from institutional investors, and find that solo investment by institutional investors outperforms the investment by the traditional private equity partnerships. Our paper contributes to this strand of the literature by suggesting that public market institutional investors have abilities to select private firm investment with good potential.

Third, our paper contributes to the studies on venture capital investment. While most prior studies focus on the independent venture capital investment, there is a growing literature on alternative organizational structures of venture capital investment. These studies mainly focus on corporate venture capital (e.g., Chemmanur, Loustikina and Tian (2014), Gompers and Lerner (2000) and Ma (2016)), bank-owned venture capital firms (e.g., Hellmann, Lindsey and Puri (2008)), and government-sponsored venture capital firms (e.g., Brander, Du and Hellmann (2015)). Our paper proposes a new organizational structure: the participation of institutions in venture capital.

The rest of the paper will proceed as follows. Section 2 describes the data. Section 3 discusses the empirical results. Section 4 concludes.

2. Data and Variables Construction

2.1 Data

We compile our sample from VentureExpert and Thomson Financial Institutional Holdings databases. We collect investments made by U.S.-based VC firms in private companies headquartered in the U.S from VentureExpert. Our primary sample includes entrepreneurial firms that receive first round of investment between the beginning of 1980 to the end of 2012.[8] Companies that go IPO or are acquired are classified as those with successful exits, and companies

[8] We exclude private equity investment in leveraged buyouts.

that do not exit successfully by July of 2016 are classified as those with unsuccessful exits. This process provides a minimum of four and half year before exit, consistent with Gompers and Lerner (2000a), Hochberg, Ljungqvist, and Lu (2007), and Nahata (2008).

We identify the public market institutions among the VC investors using a matching program based on the13F holdings data. For each VC investor, the program finds the longest common strings between the VC name and the 13-F institution names. We require that this common string has to be at least 90% of the average length of the two names to be considered a match. For non-unique matches, we further double check using the available information from the investor's website and the relevant financial websites such as Bloomberg to identify the accurate links. The final sample has 19,494 VC investments, and 1,078 of them are institution-backed.

2.2 Measure of Successful Exits

We consider a portfolio company as having a successful exit if it goes public or is acquired during our sample period. One potential issue is that some entrepreneurial firms stay "alive" for a long time without any explicit exit outcomes, such as going public, being acquired or written-off. However, the companies are operationally not functioning. Following the literature, such as Nahata (2008), Gompers and Lerner (2000), and Hochberg, Ljungqvist and Lu (2007), we classify such companies as written-offs. Specifically, we mark a company as a written-off if the company has been alive for more than four years or if the company has not exited as of July 2016. The exit date of such long-term inactive companies is set to be four years after the date of the first-round investment.

2.3 Measure of Institutions' Performance in the Public Equity Market

To capture the institution's performance in the equity market, we choose a relatively long window to measure their performances (36 months), as short-term returns are volatile and more susceptible to the influence of luck rather than skill.[9] We take several steps to construct an overall raw performance measure to capture institutions' overall public market performance in the past 36 months. For each quarter, we first compound monthly returns of stocks into quarterly returns. Using the stock holdings reported at the end of the previous quarter in the Thomson Financial's S13 file, we calculate the portfolio returns using the average returns for all the stocks held by the

[9] Our results are robust using different return horizons such as 12 and 24 months.

institution. Specifically, we use the following formula to calculate monthly raw returns for institutions:

$$R_{j,t-1} = \sum w_{j,i,t-1} R_{i,t} \tag{1}$$

where $w_{j,i,t-1}$ is the weight of the stock *i* in the portfolio of institution j in the previous quarter. To calculate the 36-month return, we compound the quarterly performance of the institution over the past 12 quarters.

Similarly, we also construct an industry-level performance measure. To gauge an institution's equity market performance in the SIC-2 industry of the entrepreneurial firm, we construct a DGTW performance measure within the SIC-2 industry of the entrepreneurial firm, using the benchmark proposed in Daniel, Grinblatt, Titman and Wermers (1997). The industry DGTW measure is constructed using the following steps. First, for each stock in every month held by institution *i* in the quarter *t-1* with a SIC-2 code identical to the entrepreneurial firm, we construct a DGTW return by subtracting the DGTW benchmark returns from the raw returns. Here, we use the DGTW portfolio assignment of previous quarter. Second, we compound the monthly-level stock DGTW returns into quarterly returns. Third, we aggregate these stock returns into an industry DGTW returns by:

$$R_{j,t}^{DGTW} = \sum w_{i,j,t-1}^{SIC2} R_{i,t}^{DGTW} \tag{2}$$

where the $w_{j,i,t-1}^{SIC2}$ is the weight of the stock *i* in all the stocks held in portfolio *j* at the end of quarter t with the same SIC-2 code. Fourth, we compound the quarterly returns in the past 12 quarters to form Industry DGTW Return measure in the past 3 years. Similarly, we also construct a placebo performance measure that measures the institution's expertise outside of the entrepreneurial firm's industry or Placebo DGTW performance. Here, we use stocks that are outside of the entrepreneurial firm's SIC-2 industry. If there are multiple institutions in the same entrepreneurial firm, we use weighted average returns of these institutions. The summary statistics of these variables are reported in Table 1.

2.4 IPO Variables

We obtain our IPO-related variables from Global New Issues Databases. Following Megginson and Weiss (1990) and Hanley and Hoberg (2010), we consider only US IPOs from 1980 to 2016, excluding closed-end fund/trusts, depositary issues, dual class IPOs (list provided by Jay Ritter) and unit IPOs. We also restrict our attention to common shares, ordinary shares, and

class A common shares issuance. In addition to our previous sample selection of VC-backed companies, we follow the literature to require IPO firms to have at least 5 dollars as IPO offer price and more than 3 million dollar total proceed.

2.5 Control Variables

In addition to our institution participation variables, we control for a set of variables that are associated with the likelihood of successful exit. We complement our primary data source with Compustat, Global New Issues, and Mergers & Acquisition. Following Nahata (2008), Hochberg, Ljungqvist and Lu (2007), Lindsey (2008), and Cumming (2008), we control for lead VC reputation, entrepreneurial firm characteristics, exit market condition, as well as a set of fixed effects.

We define the lead VC as the VC with the earliest investment date, largest investment amount, and highest number of rounds participated with descending order of importance. For example, if two VCs both invest during the first round, the one with highest dollar amount investment is the lead VC. We measure VC reputation as the dollar amount invested by a given VC in all entrepreneurial companies before this specific entrepreneurial firm investment, scaled by total amount raised by all entrepreneurial companies. To make sure that the reputation variable is up to date, we use a three-year rolling window.

We control for the natural log of company age at first round, the natural log of total number of rounds, the natural log of total number of VCs, the natural log of total dollar amount raised by the entrepreneurial firm, and an early-stage dummy that equals 1 if the entrepreneurial firm is at seeding or startup stage at first round. To capture the market timing effect, we control for the exit market condition. For exit market condition, we control for the natural log of total number of IPOs, the natural log of total number of M&As as well as the average Market to Book ratio of the entrepreneurial firm's industry. All three exit market condition variables are constructed using the data from the quarter prior to the entrepreneurial firms' exit date. Finally, we add exit year fixed effects, company’s state fixed effects, and company's industry fixed effects. We report the detailed variable descriptions in Appendix Table A1, and the summary statistics in Table 1.

2.6 Summary Plots

Figure 1 illustrates the time-series variation of institutional investment. Panel A shows the annual total amount of VC investments made by institutions. As we can see from the figure, there is a clear upward trend, which becomes particularly salient after mid-2000. It suggests that the dollar amount of institutional VC investment is increasing over years. Panel B plots the annual number of the entrepreneurial firms invested by at least one institution. As shown from the Panel, the number of companies backed by institutions peaks around early year 2000. Figure 2 displays the exit rates. The dash line represents entrepreneurial firms backed by at least one institution. The solid line represents entrepreneurial firms backed entirely by IVCs. Panel A plots the exit rates over time through both the M&A outcome and the IPO outcome. We find that overall, the institution-backed entrepreneurial firms tend to have higher successful exit rates than non-institution-backed ones. Panel B and Panel C plot the exit rate through M&A and the IPO respectively. The overall pattern indicates that the institutional participation leads to higher rate of exit in IPO or M&A, though the difference seems to be more salient for the IPO. The plots support the general idea that institutions' participation tends to lead to higher rates of successful exits for the entrepreneurial firms.

3. Results

3.1 Baseline Findings

We first examine whether the public market institutions better investments in entrepreneurial firms. Our hypothesis is that investors with secondary market expertise may have advantages over IVCs on investing in entrepreneurial firms. We measure the success of an investment in an entrepreneurial firm using an indicator variable: *Successful Exit*. A successful exit is defined as an exit through either IPO or M&A (the Successful Exit indicator variable equals to 1 in these situations). Given that it is not clear whether institutional participation has a linear effect on successful exits, we use both linear model and probit model for our analyses. Our empirical specification is in the form of the following equation:

$$Prob(Successful\ Exit_i = 1) = f\left(\alpha + \beta Institutional\ Participation_i + \gamma X_{i,t}\right). \quad (3)$$

We measure the participation of the institutions using two variables. First, we measure the percentage of dollar amount invested from all the institutions by the variable *Institution Share*. Second, we construct a dummy variable, *Institution Backing Dummy*, to indicate whether there is at least one institution investing in the entrepreneurial firm. Specifically, when there is at least one

institution investing in the entrepreneurial firm, the variable *Institution Backing Dummy* takes the value of 1. In addition to the variable of interests, we follow the previous literature to control for a set of variables (denoted by the variable X), including: *Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit) and Exit Year, Industry, and State Fixed Effects*. Standard errors are clustered at the lead VC level. The results for this analysis are reported in Table 2.

We first examine the effect of *Institution Share*. From the univariate analysis reported in column 1 and 5, we find significant and positive coefficients in both the OLS regression (linear probability model) and the probit regression, indicating that higher institution participation leads to a higher likelihood of successful exit. In terms of the economic magnitude implied by the OLS coefficient, we find that one standard deviation increase in the institution share leads to a 1.5% increase in the probability of successful exit. The marginal effects estimated from the probit regression have a similar economic magnitude. In the second specification, we include aforementioned control variables in our regression. Our main results remain robust with the inclusion of these variables. The economic magnitude of the coefficients drop by 50 percent, but remain significant at the 5 percent level for both the OLS and the probit regressions.

For a more direct comparison between the entrepreneurial firms with and without the presence of institution. We conduct a second set of tests using the *Institution Backing Dummy* as our key independent variable. In both OLS and probit specifications, the coefficients of *Institution Backing Dummy* have strong positive signs, confirming our previous results that the participation of institutions lead to higher rates of successful exit. Even after including the full set of control variables, our coefficients are still significant at *1%* level. Thus, our results suggest that the effect of institution backing is not driven by other known variables. The economic magnitude of these coefficients is also sizable. For instance, the coefficient of *Institution Backing Dummy* is *0.041*, implying that having institutions' backing leads to a 4.6% increase in the success rate of exit from the entrepreneurial firm. Compared with the unconditional mean of successful exit (54%), the institution backing improves the chance of successful exit by 8.5%. Overall, these results indicate that the involvement of institutions leads to higher probabilities of successful exit.

We further investigate how institution participation affects the ways of exits. We run a multinomial-logit model with exit category as the dependent variable. We use “written-off” cases

as our benchmark case. We denote IPO exit with 1 and acquisition exit with 2. “written-off” to exit is denoted by 3 (omitted in the tables). The results are reported in Table 3. The main independent variable of interest in the first set of results is *Institution Share*. We find that a high *Institution Share* is strongly associated with successful exit through Exit Category 1, or exit through IPO. While *Institution Share* is positively associated with the probability of exit through acquisition, this relation is statistically insignificant. In the second set of results, we use *Institution Backing Dummy* as our main independent variable. The main difference between using *Institution Backing Dummy* and *Institution Share* is that when using *Institution Backing Dummy* as the independent variable, we also find significant evidence for an increased chance of exiting through acquisition (with a 5% in significance level). It is worth noting, however, even when *Institution Backing Dummy* is used, we still see that the coefficient is stronger in Exit Category 1 than Category 2.

Taken together, our evidence shows that participation of institutions is strongly associated with successful exit through IPOs or acquisitions. The overall effect of institution participation is stronger when the exit outcome is IPO. These results suggest that institutions' public equity market expertise is most helpful for an IPO exit.

3.2 Propensity Score Matching Analysis

So far, we have established a positive association between institutions’ participation and entrepreneurial firms’ successful exits. However, institution-backed and non-institution-backed firms may be vastly different in nature, and the difference in their exit outcomes may be driven by their characteristics rather than the presence of institutions. Thus, we use propensity score matching method to minimize the observed characteristics between institution-backed and non-institution-backed entrepreneurial firms following the procedure in Lemmon and Roberts (2010). We match the sample based on the following characteristics: *Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit)* and *Ln (Lagged number of MA at exit).* In particular, we run logistic regression of *Institutional Backed Dummy* on the aforementioned set of control variables. In addition, we also add exit year, entrepreneurial firms' industry, and state fixed effects. We construct the matching sample using the nearest-neighbor

method. For each institution-backed entrepreneurial firm, we use the four non-institution-backed entrepreneurial firms with the closest propensity score as the matching group.

The sample statistics of the pre- and post-matched samples are reported in Table 4. Numbers reported in our Panel A are the means of different characteristics in our pre-match and post-match sample. In the pre-match sample, entrepreneurial firms backed by institutions differ significantly from entrepreneurial firms without institutions in all considered aspects but the company age at the first round. However, none of the characteristics differ significantly between treated and propensity score-matched control groups. In the first column of Panel B, we report the logistic regression result from which we generate propensity scores. Again, 6 out of nine characteristics load significantly, showing entrepreneurial firms with and without institution are associated with different characteristics. Our set of characteristics explain roughly 16 percent of variation in the outcome variables, as indicated by the pseudo-R^2. In contrast, none of the characteristics load significantly when we perform the same Logistic regression using our matched sample, as presented in the second column of Panel B. Less than 1 percent of the variation of the outcome variables is explained by the set of characteristics for the matched sample. Finally, we illustrate the accuracy of our matching process in Panel C. The mean propensity score differences are less than 0.1 percent for all four nearest-neighbor groups. Overall, although there are significant differences between institution-backed and non-institution-backed entrepreneurial firms, the propensity score matching method is effectively controlling for the differences in the observed characteristics.

We repeat our prior analyses based on the propensity score-matched sample. The results using the propensity score-matched sample are reported in Table 5. We first repeat the analyses that examine the rate of successful exit using the specification indicated in equation (3). We find that the economic magnitude of the *Institution Backing Dummy* remains comparable with our previous analyses. The economic magnitude of *Institution Share* coefficient has dropped, but the coefficient is still highly significant. The overall results from the propensity score matching confirm our prior finding that institution participation is positively associated with the chance of successful exit and the results are unlikely to be driven by the observed difference in entrepreneurial firms' characteristics. We also repeat the multinomial logit analysis reported in Table 3 using our propensity score matched sample. The results are reported in the panel C of Table 5. Our results are also analogous to those reported previously. The overall observation is

that institutional participation improves the chance of exit through both IPO and acquisition. The effect is stronger for the IPO outcome.

3.3 Institutions' Public Market Performances

The results documented previously indicate that the participation of institutions predicts a higher probability of successful exit. In this section, we examine whether institutions' expertise in the public equity market translate into their investments in entrepreneurial firms. If institutions benefit from their expertise in the public market, we expect that the performance of institutions' entrepreneurial firm investments would be positively associated with their secondary market performance. We also expect that this relationship will be strongest when we measure performance of the institution using the stocks held in the SIC-2 industry of the entrepreneurial firm. In this analysis, we limit our sample to those entrepreneurial firms with at least one institutional investor. We first examine how the performance of the institution's overall portfolio relates to the successful exit. We conduct analysis in the form of the following specification:

$$Prob(Successful\ Exit_i = 1) = f\left(\alpha + \beta Overall\ Performance_i + \gamma X_{i,t}\right). \qquad (4)$$

Our first variable of interest is *Overall Raw Performance*. We also include a vector of control variables indicated using X in our equation. These control variables include *Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit)* and *Ln (Lagged number of MA at exit)*. The exit year, industry and state fixed effects are included as additional controls. We conduct our analyses in both OLS and probit specifications. The results are reported in column 1, 2 for OLS and 5 and 6 for probit regression in Table 6. We find that the overall performance is strongly positively predictive of successful exits. The economic magnitude of the coefficient from the OLS regression implies that a one standard deviation increase in the overall raw performance is associated to a 5.1% increase in the probability of successful exit.

Our second set of results use industry DGTW returns as the key independent variable. The reason to use *Industry DGTW Performance* is that we hypothesize that the institutions should have the good private investment when they exhibit superior abilities in picking stocks of the entrepreneurial firms' industry in the secondary market. Superior public equity market performance in a certain industry indicates the institution possesses deep insights and expertise of that industry, which would translate into successful investments in entrepreneurial firms. Indeed,

we find evidence supporting our idea. The industry DGTW performance is strongly and positively correlated with future successful exits, as reported in column 3, 4 (OLS regression) and 7, 9 (probit regression) in Table 6. For example, controlling for other characteristics, the coefficient estimate for institution performance is 0.045, significant at 1 percent level. These results are consistent with the idea that institutions' industry expertise in the public market improves the chance of successful investments in the entrepreneurial firms.

We further analyze whether the institutions' industry expertise leads to the differing exit outcomes for investing in the entrepreneurial firm. We conduct multinomial logit model to investigate how the institution's performances relate to the exit channels. The results are reported in Table 7 with similar regression setting as before. Our key finding is that a high industry performance leads to a high probability of successful exit both through IPO and acquisitions. However, the coefficients indicate that the backing by a high industry performance seems to have a higher probability to exit through IPO than acquisitions.

To strengthen the previous argument, we use institutions' past returns in other industries (excluding the SIC-2 industry of the entrepreneurial firm) to conduct placebo tests. The rationale is that institutions' expertise outside of the industry of the entrepreneurial firm is less relevant and does little help to the success of their investment. We use *Placebo DGTW Performance* as our independent variable to predict the probability of a successful exit. If our result is driven by institutions' industry-specific expertise, we should not find any significant relation between the returns on the other industries and the probability of a successful exit. The regression setting is similar to Table 7. Reported in Table 8, we find that the coefficients for placebo DGTW is positive, but statistically indistinguishable from zero in both the OLS and the probit regressions. This result is consistent with the intuition that high returns in the industries outside of the entrepreneurial firm's industry have little power in predicting the rate of success. Thus, we find support for the idea that institutions use their public equity market industry-specific expertise to improve their chance of successful investment in the entrepreneurial firms.

3.4 Institutions' Private Market Reputation

We examine whether the association between the institution performance and the successful exit rate is driven by institutions' reputation over their VC investment, an explanation for superior VC investment performance originally proposed in Nahata (2008). To examine the possibility that our

result are driven by a similar effect among the institutions, we construct a measure that serves as a proxy for the VC reputation among the institutions (see Section 2.2). In Table 9, we repeat the analysis in Table 6, controlling for *Institution reputation*. We present results both using the OLS regression and the probit regression. We find that neither *VC reputation* nor *Institution VC reputation* is significant in this subsample. More importantly, our results indicate that the institution performance positively predicts startup exits remain robust after the additional control variables. Taken together, this set of results indicates that our prior results are unlikely to be driven by the reputation of institutions' investments in entrepreneurial firms.

3.5 The Certification Effect of Institutions

Our analysis so far shows that institution-backed firms are more likely to have a successful exit than non-institution-back firms, the institutions' prior public market expertise is positively correlated with the likelihood of successful exits. The natural question is what are the economic mechanisms that allow institutions to contribute to the exits of entrepreneurial firms. In this section, we examine a potential mechanism: the certification effect of institutions. In particular, we conjecture that institutions' participation may certify the value of the portfolio entrepreneurial firms to outside investors.

We use the IPO sample to test the certification effect for the following two reasons. First, our prior results indicate that the entrepreneurial firms invested by institutions have higher rates of successful exit, which suggests the preferred exit channel of the entrepreneurial firms invested by institutions is through an IPO. Second, because the information asymmetry is severe during the IPO, the third-party's certification effect is particularly important. Megginson and Weiss (1990) document that IVC firms play an important role in certifying entrepreneurial firms in the IPO process by reducing the information asymmetry between firms' insider and outside investors.

Our empirical design is in the spirit of Megginson and Weiss (1990) and Hanley and Hoberg (2010). First, we examine if the participation of institutions reduces IPO underpricing. Both theoretical (e.g., Allen and Faulhaber (1989)) and empirical research (e.g., Hanley and Hoberg (2010)) suggest that information asymmetry is the first-order reason for the IPO underpricing. Thus, third-party investors are able to reduce the information asymmetry by providing certification (Megginson and Weiss (1990)). Furthermore, we hypothesize that because of the expertise of institutions in the public market, their investment may provide a strong signal

on the superior quality of the issuing firms. As a result, the IPO underpricing and the cost in the IPO process would be reduced.

Table 10 reports IPO underpricing results. The dependent variable is IPO underpricing, measured by the IPO first day return. We use two variables as proxies for the institution participation. In the first two regressions, we use *Institution Shares* as our proxy for institution participation. The first regression is univariate and we add additional controls in the second regression. We find that a high *Institution Shares* is associated with low IPO underpricing. The coefficients are significant at a 5% level. Our second set of regressions uses *Institution Backing Dummy* as the proxy for institution participation. The results are consistent with *Institution Shares*. The *Institution Backing Dummy* has a negative coefficient, which indicates institution backing leads to a low underpricing.

Following Megginson and Weiss (1990) and Hanley and Hoberg (2010), we also examine how institution backing affects the cost in the IPO process of entrepreneurial firms. We use two variables as proxies for IPO costs: *Gross Spread* and *Proceeds Retention.* We also use both *Institution Shares* and *Institution Backing Dummy* as proxies for institution participation. If institution participation helps the entrepreneurial firm mitigate the information asymmetry in the IPO process, we should expect that their presence leads to lower cost in the IPO process. Thus, institution participation should lead to a lower *Gross Spread* and a higher *Proceeds Retention*. The results are reported in Table 11. First, our results in the Panel A indicate that institution participation leads to lower *Gross Spread*, as both *Institution Share* and *Institution Backing Dummy* are significantly and negatively related to *Gross Spread*. These results are robust both with and without additional control variables. In Panel B, the dependent variable is the *Proceeds Retention*. In all regressions in Panel B, our results show that institution participation in the entrepreneurial firm's round financing leads to significantly higher *Proceeds Retention*.

Taken together, our results are consistent with the conjecture that institutions' investments in entrepreneurial firms provide certification for their qualities. Thus, their participations reduce the costs in the IPO process and the IPO underpricing.

3.6 Investing as Limited Partners

Finally, we compare the effects of institutions' investment in entrepreneurial firms as GPs and as LPs to further the understanding of the certification effects. We argue that institutions'

participations as LPs could predict the successful exits of entrepreneurial firms through two channels. First, as institutions possess the ability to select entrepreneurial firms with high growth potential, they may succeed in their entrepreneurial firm investments through indirect participation through GPs. Second, institutions may identify the GPs with superior abilities and leave the other responsibilities to the GPs. Although both channels could lead to a positive relation between institutions' participations and successful exits of their portfolio entrepreneurial firms, their ability of certification differs from institutions' direct investment. Specifically, because of indirect investment via GPs, LPs' investment in a venture deal could not send a strong signal about the quality of portfolio entrepreneurial firms during the IPO process. Thus, it is useful to carry out placebo tests to identify the channel of institutions' certification effect.

We present two tests to compare the effects of institutions' investment in entrepreneurial firms as GPs and that as LPs. First, we evaluate the exit outcomes of entrepreneurial firms with institutions acting as LPs. Our dependent variable is an indicator variable that shows whether entrepreneurial firms exit successfully through an acquisition or through an IPO. Our results are reported in the Panels A and B of Table 12. The key independent variable is *Institution LP Backing Dummy*, which equals to one if the deal is backed by at least one institutional LP. The analysis shows that institutions' participation through LPs leads to a higher rate of successful exits in both the OLS regression and the probit regression, consistent with the idea that institution participation reduces the information asymmetry in the IPO process.

Next, we examine IPO performance of the entrepreneurial firms with institutional LPs. It is natural to expect that there is no certification effect if institutions only select skilled GPs and do not actively participate in the investment. We report this set of tests in the Panel C of Table 12. Our results show that the relation between *Institution LP Participation* and the three IPO performance variables is indeed statistically insignificant. Moreover, the economic magnitudes of these coefficients are small, implying no relations between institution participation as LP and the entrepreneurial firm's IPO performance. Thus, our placebo tests confirm that institutions contribute to the success of entrepreneurial firms through certification effect, which manifest only when they directly participate in venture capital as GPs.

4. Conclusion

This paper investigates a new phenomenon: institutions that traditionally focus on the public equity market make an increasing number of VC investment in the private market in recent years. We find that, compared with an entrepreneurial firm backed by IVCs, an institution-backed entrepreneurial firm tends to be more mature, require higher amount of financing and attract more reputable VCs. Furthermore, institution-backed entrepreneurial firms are more likely to have successful exits, either through IPOs or through acquisitions. Our results continue to hold after we use propensity score matching to control for the observed differences in the observed characteristics of the institution-backed and non-institution-backed VC deals.

To understand the superior performance of institution-backed entrepreneurial firms, we study the association between institutions' public equity market performance and the exit outcome of their portfolio firms. We find that entrepreneurial firms backed by institutions with superior public equity market performance tend to enjoy higher rates of successful exit. Additionally, we show institutions' investments lead to lower IPO costs and higher IPO net proceeds for the issuing firms, suggesting institutions' investments may serve as certifications about the quality of these firms. Finally, we find that institutions' participation as limited partners predicts a higher rate of successful exit, but provides little certification value to entrepreneurial firms. Overall, our results suggest that institutions' industry expertise in the public equity market helps with their venture capital investment in the private market.

References:

Admati, Anat R., and Paul Pfleiderer. 1994. “Robust Financial Contracting and the Role of Venture Capitalists.” *The Journal of Finance* 49(2): 371–402.

Bergemann, Dirk, and Ulrich Hege. 1998. “Venture Capital Financing, Moral Hazard, and Learning.” *Journal of Banking & Finance* 22(6–8): 703–35.

Berk, Jonathan B., and Jules H. van Binsbergen. 2015. “Measuring Skill in the Mutual Fund Industry.” *Journal of Financial Economics* 118(1): 1–20.

Bernstein, Shai, Xavier Giroud, and Richard R. Townsend. 2016. “The Impact of Venture Capital Monitoring.” *The Journal of Finance* 71(4): 1591–1622.

Boehmer, Ekkehart, and Eric K. Kelley. 2009. “Institutional Investors and the Informational Efficiency of Prices.” *Review of Financial Studies* 22(9): 3563–94.

Bottazzi, Laura, Marco Da Rin, and Thomas Hellmann. 2008. “Who Are the Active Investors?: Evidence from Venture Capital.” *Journal of Financial Economics* 89(3): 488–512.

Brander, James A., Qianqian Du, and Thomas Hellmann. 2015. “The Effects of Government-Sponsored Venture Capital: International Evidence.” *Review of Finance* 19(2): 571–618.

Chemmanur, Thomas J., Yingzhen Li, and Yuyuan Zhu. 2016. *Institutional Investors as Information Producers around Open-Market Share Repurchase Programs*. Rochester, NY: Social Science Research Network. SSRN Scholarly Paper. https://papers.ssrn.com/abstract=2543397 (November 16, 2016).

Chemmanur, Thomas J., Elena Loutskina, and Xuan Tian. 2014. “Corporate Venture Capital, Value Creation, and Innovation.” *Review of Financial Studies* 27(8): 2434–73.

Chen, Hsiu-Lang, Narasimhan Jegadeesh, and Russ Wermers. 2000. “The Value of Active Mutual Fund Management: An Examination of the Stockholdings and Trades of Fund Managers.” *The Journal of Financial and Quantitative Analysis* 35(3): 343–68.

Coval, Joshua D., and Tobias J. Moskowitz. 1999. “Home Bias at Home: Local Equity Preference in Domestic Portfolios.” *The Journal of Finance* 54(6): 2045–73.

———. 2001. “The Geography of Investment: Informed Trading and Asset Prices.” *The Journal of Political Economy* 109(4): 811–41.

Cumming, Douglas. 2008. “Contracts and Exits in Venture Capital Finance.” *Review of Financial Studies* 21(5): 1947–82.

Daniel, Kent, Mark Grinblatt, Sheridan Titman, and Russ Wermers. 1997. “Measuring Mutual Fund Performance with Characteristic-Based Benchmarks.” *The Journal of Finance* 52(3): 1035–1058.

DeCambre, Mark. “Mutual Funds Are Bypassing IPOs and Going Straight for the Main Course.” *Quartz*. http://qz.com/199833/mutual-funds-are-bypassing-ipos-and-going-straight-for-the-main-course/ (November 16, 2016).

Elfenbein, Daniel W., and Josh Lerner. 2003. “Ownership and Control Rights in Internet Portal Alliances, 1995-1999.” *The RAND Journal of Economics* 34(2): 356–69.

Fang, Lily, Victoria Ivashina, and Josh Lerner. 2015. “The Disintermediation of Financial Markets: Direct Investing in Private Equity.” *Journal of Financial Economics* 116(1): 160–78.

Fluck, Zsuzsanna, Kedarn Garrison, and Stewart Myers. 2007. *Venture Capital Contracting: Staged Financing and Later-Stage Syndication of Venture Capital Investments*. MIT Working paper.

Gompers, Paul A. 1995. “Optimal Investment, Monitoring, and the Staging of Venture Capital.” *The Journal of Finance* 50(5): 1461–89.

Gompers, Paul, and Josh Lerner. 2000. “Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuation.” *Journal of Financial Economics* 55(2): 281–325.

Hellman, T, and M Puri. 2000. “The Interaction between Product Market and Financing Strategy: The Role of Venture Capital.” *Review of Financial Studies* 13(4): 959–84.

Hellmann, Thomas, Laura Lindsey, and Manju Puri. 2008. “Building Relationships Early: Banks in Venture Capital.” *Review of Financial Studies* 21(2): 513–41.

Hellmann, Thomas, and Manju Puri. 2002. “Venture Capital and the Professionalization of Start-Up Firms: Empirical Evidence.” *The Journal of Finance* 57(1): 169–97.

Hochberg, Yael V., Alexander Ljungqvist, and Yang Lu. 2007. “Whom You Know Matters: Venture Capital Networks and Investment Performance.” *The Journal of Finance* 62(1): 251–301.

Ivashina, Victoria, and David Scharfstein. 2010. “Bank Lending during the Financial Crisis of 2008.” *Journal of Financial Economics* 97(3): 319–38.

Ivashina, Victoria, and Zheng Sun. 2011. “Institutional Stock Trading on Loan Market Information.” *Journal of Financial Economics* 100(2): 284–303.

Kacperczyk, Marcin, and Amit Seru. 2007. “Fund Manager Use of Public Information: New Evidence on Managerial Skills.” *The Journal of Finance* 62(2): 485–528.

Kacperczyk, Marcin, Clemens Sialm, and Lu Zheng. 2005. “On the Industry Concentration of Actively Managed Equity Mutual Funds.” *The Journal of Finance* 60(4): 1983–2011.

Kaplan, Steven N., and Per Strömberg. 2003. “Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts.” *The Review of Economic Studies* 70(2): 281–315.

———. 2004. “Characteristics, Contracts, and Actions: Evidence from Venture Capitalist Analyses.” *The Journal of Finance* 59(5): 2177–2210.

Kempf, Elisabeth, Alberto Manconi, and Oliver G. Spalt. 2016. *Learning by Doing: The Value of Experience and the Origins of Skill for Mutual Fund Managers*. Rochester, NY: Social Science Research Network. SSRN Scholarly Paper. https://papers.ssrn.com/abstract=2124896 (November 18, 2016).

Lemmon, Michael, and Michael R. Roberts. 2010. “The Response of Corporate Financing and Investment to Changes in the Supply of Credit.” *Journal of Financial and Quantitative Analysis* 45(3): 555–87.

Lerner, Josh. 1995. “Venture Capitalists and the Oversight of Private Firms.” *The Journal of Finance* 50(1): 301–18.

Lindsey, Laura. 2008. “Blurring Firm Boundaries: The Role of Venture Capital in Strategic Alliances.” *The Journal of Finance* 63(3): 1137–68.

Liu, Bibo, and Xuan Tian. 2016. *Is the Stock Market Just a Side Show? Evidence From Venture Capital*. Rochester, NY: Social Science Research Network. SSRN Scholarly Paper. https://papers.ssrn.com/abstract=2780890 (November 16, 2016).

Loughran, T., & Ritter, J. (2004). Why Has IPO Underpricing Changed Over Time?. Financial Management, 5-37.

Ma, Song. 2016. *The Life Cycle of Corporate Venture Capital*. Rochester, NY: Social Science Research Network. SSRN Scholarly Paper. https://papers.ssrn.com/abstract=2691210 (November 16, 2016).

Megginson, W. L., & Weiss, K. A. (1991). Venture capitalist certification in initial public offerings. *The Journal of Finance*, 46(3), 879-903.

Nahata, Rajarishi. 2008. “Venture Capital Reputation and Investment Performance.” *Journal of Financial Economics* 90(2): 127–51.

Ozmel, Umit, M. Deniz Yavuz, Ranjay Gulati, and Timothy E. Trombley. 2016. *The Effect of Inter-Firm Ties on Performance in Financial Markets*. Rochester, NY: Social Science Research Network. SSRN Scholarly Paper. https://papers.ssrn.com/abstract=2717691 (November 16, 2016).

Petersen, Mitchell A., and Raghuram G. Rajan. 2002. “Does Distance Still Matter? The Information Revolution in Small Business Lending.” *The Journal of Finance* 57(6): 2533–70.

Sun, Zheng, Ashley Wang, and Lu Zheng. 2012. “The Road Less Traveled: Strategy Distinctiveness and Hedge Fund Performance.” *Review of Financial Studies* 25(1): 96–143.

Yan, Dong. 2016. *Do Private Firms (Mis)Learn from the Stock Market?* Rochester, NY: Social Science Research Network. SSRN Scholarly Paper. https://papers.ssrn.com/abstract=2647707 (November 16, 2016).

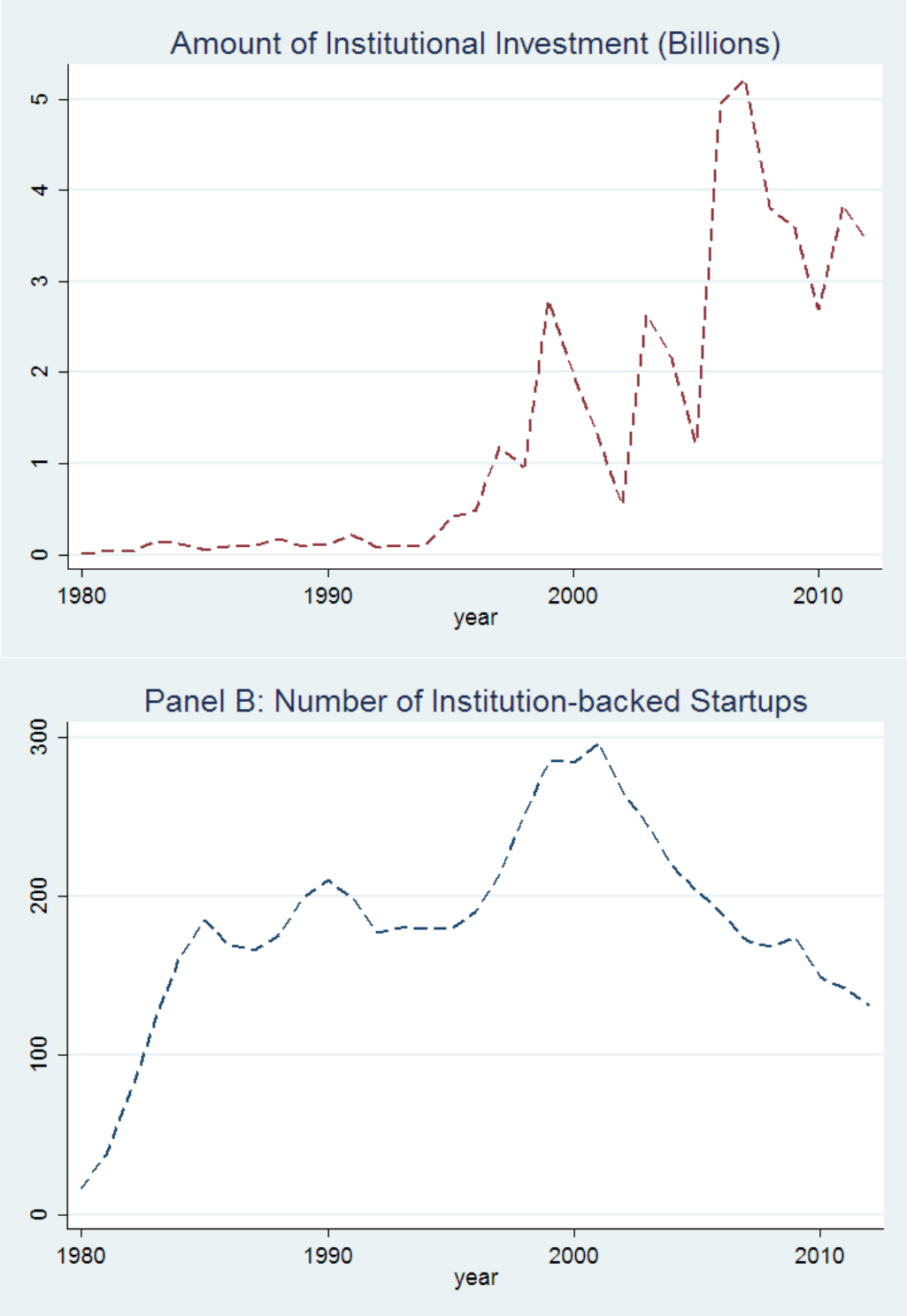

Figure 1 Time-series Variation of Institution Investment

This figure presents the time-series variation of investments made by institutions. Panel A plots the annual total dollar amount of investment made by institutions. Panel B plots the annual total number of startup companies backed by institutions.

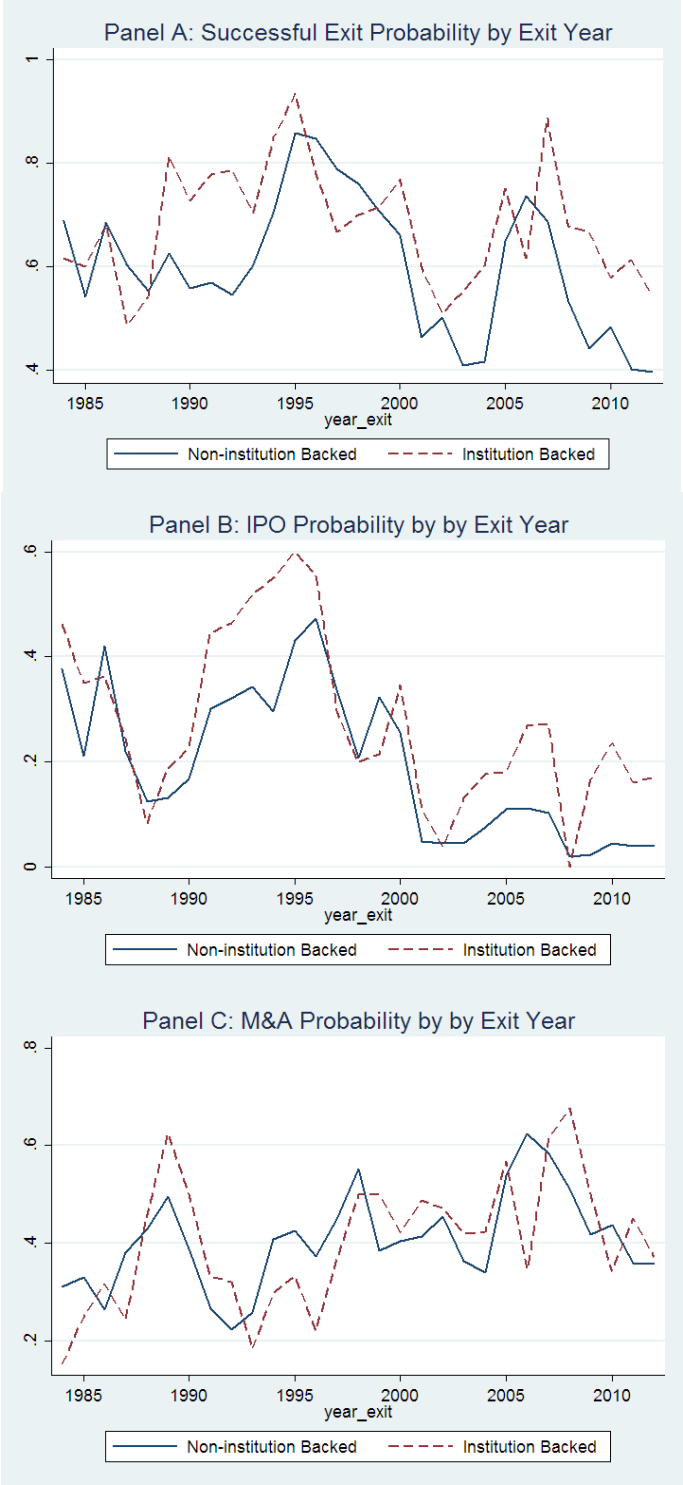

Figure 2 Time-series Variation of Startup Successful Exit Rate

This figure presents the time-series variation of startups' successful exit rate. The dash line plots the successful exit rate of startup companies with at least one institution investor. The solid line plots the successful exit rate of startup companies with no institution investor. Panel A plots probability of successful exit by year. Panel B plots the probability of startups going public by year. Panel C plots the probability of startups being acquired by year.

Table 1 Summary Statistics

This table presents the summary statistics of variables in our analyses. Successful Exit Dummy is a dummy variable equal 1 if the startup company goes public or is acquired, and 0 if the startup company is liquidated. Exit category is a categorical variable equal 1 if a company goes public, 2 if a company is acquired, and 3 if a company is liquidated. Institution share is the total dollar amount invested by all institutions, scaled by the total dollar amount invested by all investors. Institution Backing Dummy is dummy variable equal 1 if there is at least one institution investor, and 0 otherwise. Startup Age at First Round is the entrepreneurial firm's age at first round. Number of Rounds is the total number of rounds. Number of VCs is the total number of VC firms. Total Amount Raised is the total dollar amount of VC investment raised by the entrepreneurial firm. Early-stage Dummy is dummy variable equal 1 if the startup company is at seeding or startup stage at the first round, and 0 otherwise. VC reputation is the dollar amount invested by a given VC for all entrepreneurial firms during the previous three years, scaled by total amount raised by all entrepreneurial firms. Industry MB is the average market-to-book ratio in the SIC-2 industry of the entrepreneurial firm in the quarter prior to company's exit. Lagged number of IPO at Exit is the total number of IPOs in the quarter prior to entrepreneurial firm's exit. Lagged Number of MA at exit is the total number of M&As in the quarter prior to entrepreneurial firm's exit. Overall Raw Performance is the overall raw performance is the weighted average of three-year raw return of all institution investors. Industry DGTW Performance is the industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors in the entrepreneurial firm's industry. Placebo DGTW performance is the industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors outside the entrepreneurial firm's industry. More detailed definitions of variables are reported in the appendix Table A1.

	N	Mean	Standard Deviation	Quartile 1	Median	Quartile 3
Successful Exit Dummy	19494	0.540	0.500	0.000	1.000	1.000
Exit Category	19494	2.330	0.700	2.000	2.000	3.000
Institution Share	19494	0.010	0.0600	0.000	0.000	0.000
Institution Backing Dummy	19494	0.060	0.230	0.000	0.000	0.000
Ln (Startup Age at First Round)	19494	1.130	1.090	0.000	0.000	0.000
Ln (Number of Rounds)	19494	1.150	0.770	0.690	0.690	1.790
Ln (Number of VCs)	19494	1.640	0.640	1.100	1.100	1.790
Ln (Total Amount Raised)	19494	9.490	1.710	8.500	1.610	2.080
Early-stage Dummy	19494	0.420	0.490	0.000	9.680	10.68
VC Reputation	19494	0.170	0.420	0.000	0.000	1.000
Industry MB	19494	0.430	0.900	0.030	0.030	0.160
Ln (Lagged number of IPO at exit)	19494	2.620	0.870	2.200	0.100	0.360
Ln (Lagged number of MA at exit)	19494	7.440	0.290	7.360	2.560	3.090
Overall RAW Performance	699	1.180	1.190	0.490	7.470	7.630
Industry DGTW Performance	604	0.420	0.720	0.000	0.800	1.450
Placebo DGTW Performance	604	0.230	0.310	0.030	0.150	0.700

Table 2 Institutional Participation and Successful Exit Rate

This table presents the test of whether institution participation predicts higher chance of successful exits. We report both Probit and OLS regression results. The dependent variable is the Successful Exit Dummy. The key independent variables are Institutional Share, which measures the total dollar amount invested by all institutions, scaled by the total dollar amount invested by all investors and Institution Backing Dummy, a dummy variable equal 1 if there is at least one institution investor, and 0 otherwise. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). The definitions of the control variables are reported in the appendix Table A1. We also include Exit Year Fixed Effects, Industry Fixed Effects, and State Fixed Effects. The standard errors are clustered by Lead VC. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: OLS				Panel B: Probit			
Institution Share	0.014***	0.009**			0.039***	0.025**		
	(3.029)	(2.350)			(2.924)	(2.216)		
Institution Backing Dummy			0.104***	0.041***			0.294***	0.117**
			(6.458)	(2.590)			(6.209)	(2.424)
Ln (Startup Age at First Round)		0.005		0.005		0.015		0.014
		(1.215)		(1.174)		(1.221)		(1.175)
Ln (Number of Rounds)		-0.078***		-0.078***		-0.228***		-0.228***
		(-14.447)		(-14.468)		(-14.223)		(-14.243)
Ln (Number of VCs)		0.052***		0.050***		0.146***		0.140***
		(9.233)		(8.847)		(8.718)		(8.375)
Ln (Total Amount Raised)		0.090***		0.090***		0.265***		0.265***
		(17.897)		(17.833)		(16.600)		(16.527)
Early-stage Dummy		-0.022***		-0.022***		-0.061***		-0.061***
		(-5.816)		(-5.819)		(-5.708)		(-5.713)
VC Reputation		0.020***		0.020***		0.059***		0.058***
		(4.022)		(3.980)		(3.650)		(3.601)
Industry MB		-0.021***		-0.021***		-0.064***		-0.063***
		(-5.222)		(-5.218)		(-5.155)		(-5.148)
Ln (Lagged number of IPO at exit)		0.017***		0.017***		0.049***		0.049***
		(3.147)		(3.159)		(3.199)		(3.205)
Ln (Lagged number of MA at exit)		-0.006		-0.006		-0.013		-0.013
		(-0.398)		(-0.403)		(-0.322)		(-0.319)
Observations	19,495	19,495	19,495	19,495	19,495	19,495	19,495	19,495
Exit Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.100	0.143	0.102	0.143	0.0827	0.119	0.0839	0.119

Table 3 Institutional Participation and Exit Channel

This table presents the results of how institutions' participation affect the channel of exit. The specification for this table is a Multinomial-Logit model. The dependent variable, Exit Category, equals 1 if a company goes public, 2 if a company is acquired, and 3 if a company is liquidated. The key independent variables are Institutional Share, which measures the total dollar amount invested by all institutions, scaled by the total dollar amount invested by all investors and Institution Backing Dummy, a dummy variable equal 1 if there is at least one institution investor, and 0 otherwise. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). The definitions of the control variables are reported in the appendix Table A1. We also include Exit Year Fixed Effects, Industry Fixed Effects, and State Fixed Effects. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Multi-Logit			
	Exit Category = 1	Exit Category = 2	Exit Category = 1	Exit Category = 2
Institution Share	0.083***	0.024		
	(3.737)	(1.340)		
Institution Backing Dummy			0.229**	0.154*
			(2.299)	(1.938)
Ln (Startup Age at First Round)	0.105***	0.004	0.104***	0.003
	(3.744)	(0.224)	(3.710)	(0.180)
Ln (Number of Rounds)	-0.415***	-0.359***	-0.416***	-0.358***
	(-10.969)	(-14.792)	(-11.016)	(-14.768)
Ln (Number of VCs)	0.208***	0.243***	0.195***	0.238***
	(5.197)	(9.115)	(4.814)	(8.839)
Ln (Total Amount Raised)	1.149***	0.292***	1.151***	0.291***
	(27.001)	(12.027)	(27.020)	(11.972)
Early-stage Dummy	-0.189***	-0.087***	-0.189***	-0.087***
	(-6.500)	(-4.828)	(-6.497)	(-4.839)
VC Reputation	0.095***	0.108***	0.094***	0.108***
	(3.973)	(5.528)	(3.951)	(5.510)
Industry MB	-0.108**	-0.105***	-0.109**	-0.105***
	(-2.453)	(-4.834)	(-2.471)	(-4.830)
Ln (Lagged number of IPO at exit)	0.121***	0.067**	0.121***	0.068***
	(2.667)	(2.544)	(2.662)	(2.595)
Ln (Lagged number of MA at exit)	-0.071	-0.000	-0.077	-0.002
	(-0.699)	(-0.005)	(-0.762)	(-0.034)
Observations	19,495		19,495	
Exit Year Fixed Effects	YES		YES	
Industry Fixed Effects	YES		YES	
State Fixed Effects	YES		YES	
Adjusted/Pseudo R-Square	0.156		0.156	

Table 4 Propensity Score Matching Diagnostics

This table presents the statistics from a propensity score matching analysis. The treatment effect is having at least one institution investor. We construct propensity score using the following characteristics: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit), and Ln (Lagged number of MA at exit). Panel A reports the pairwise comparisons between the treatment and control groups for both pre-match and post-match samples. Panel B reports the Probit regression with Institution Backing Dummy as the dependent variable for the pre-match and post-match samples. Panel C reports the estimated propensity score distributions for the treatment group and 4 nearest-neighboring control groups. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Pairwise comparisons

	Pre-match				Post-match			
Variables	Control	Treatment	t-stat	P-value	Control	Treatment	t-stat	P-value
Ln (Startup Age at First Round)	1.126	1.171	-1.348	0.178	1.196	1.171	0.607	0.544
Ln (Number of Rounds)	1.134	1.468	-13.961	0.000	1.447	1.468	-0.860	0.390
Ln (Number of VCs)	1.619	2.109	-24.967	0.000	2.097	2.109	-0.547	0.585
Ln (Total Amount Raised)	9.444	10.336	-16.816	0.000	10.310	10.336	-0.534	0.594
Early-stage Dummy	0.425	0.304	7.843	0.000	0.301	0.304	-0.193	0.847
VC Reputation	0.166	0.253	-6.873	0.000	0.245	0.253	-0.424	0.671
Industry MB	0.443	0.246	6.907	0.000	0.234	0.246	-0.616	0.538
Ln (Lagged number of IPO at exit)	2.609	2.722	-4.184	0.000	2.732	2.722	0.322	0.748
Ln (Lagged number of MA at exit)	7.449	7.364	9.457	0.000	7.365	7.364	0.082	0.935

Panel B: Logit Rregression Results		
Variables	Pre-Match	Post_Match
Ln (Startup Age at First Round)	0.240***	-0.026
	(6.612)	(-0.699)
Ln (Number of Rounds)	-0.135***	0.031
	(-2.699)	(0.593)
Ln (Number of VCs)	0.866***	0.002
	(16.086)	(0.032)
Ln (Total Amount Raised)	0.421***	-0.010
	(7.641)	(-0.167)
Early-stage Dummy	-0.099***	-0.007
	(-2.625)	(-0.173)
VC Reputation	0.087***	0.018
	(3.080)	(0.690)
Industry MB	-0.053	0.026
	(-0.958)	(0.429)
Ln (Lagged number of IPO at exit)	-0.049	0.001
	(-0.918)	(0.018)
Ln (Lagged number of MA at exit)	-0.126	-0.061
	(-1.015)	(-0.469)
Observations	19,269	5,393
Exit Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
State Fixed Effects	YES	YES
Adjusted/Pseudo R-Square	0.161	0.007

Panel C: Estimated Propensity Score Distributions

	No. of Obs.	Mean	SD	P5	Median	P95
Match Number 1						
Difference	1079	0.000	0.009	0.000	0.000	0.000
Control	1079	0.151	0.135	0.016	0.110	0.432
Treatment	1079	0.151	0.137	0.016	0.110	0.432
Match Number 2						
Difference	1079	0.000	0.009	-0.001	0.000	0.000
Control	1079	0.151	0.135	0.016	0.110	0.432
Treatment	1079	0.151	0.137	0.016	0.110	0.432
Match Number 3						
Difference	1079	-0.001	0.012	-0.001	0.000	0.001
Control	1079	0.151	0.134	0.016	0.110	0.432
Treatment	1079	0.151	0.137	0.016	0.110	0.432
Match Number 4						
Difference	1079	-0.001	0.013	-0.001	0.000	0.001
Control	1079	0.150	0.133	0.016	0.110	0.432
Treatment	1079	0.151	0.137	0.016	0.110	0.432

Table 5 Institutional Participation and Exit Channel

This table presents the results from the propensity score matched sample. We repeat the analysis in table 3 and 4 using a propensity score matched sample. Panel A and B presents the results of whether institution participation predicts higher chance of successful exits. Our key dependent variable is the Successful Exit Dummy and the key independent variables are Institutional Share and Institution Backing Dummy. The standard errors are clustered by Lead VC. Panel C presents the results of how institutions' participation affect the channel of exit. The dependent variable, Exit Category, equals 1 if a company goes public, 2 if a company is acquired, and 3 if a company is liquidated. The key independent variables are also Institutional Share and Institution Backing Dummy. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). The definitions of the control variables are reported in the appendix Table A1. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: OLS		Panel B: Probit	
Institution Share	0.012***		0.034***	
	(2.595)		(2.587)	
Institution Backing Dummy		0.059***		0.177***
		(3.230)		(3.244)
Ln (Startup Age at First Round)	0.005	0.005	0.014	0.013
	(0.588)	(0.534)	(0.546)	(0.479)
Ln (Number of Rounds)	-0.090***	-0.091***	-0.270***	-0.272***
	(-7.743)	(-7.851)	(-7.842)	(-7.956)
Ln (Number of VCs)	0.077***	0.072***	0.225***	0.210***
	(6.137)	(5.730)	(6.005)	(5.617)
Ln (Total Amount Raised)	0.041***	0.041***	0.126***	0.124***
	(3.008)	(2.955)	(3.109)	(3.050)
Early-stage Dummy	-0.022**	-0.022**	-0.065**	-0.067**
	(-2.468)	(-2.516)	(-2.493)	(-2.554)
VC Reputation	0.017***	0.016***	0.047**	0.046**
	(2.783)	(2.726)	(2.566)	(2.492)
Industry MB	-0.031**	-0.031**	-0.085**	-0.087**
	(-2.165)	(-2.184)	(-2.173)	(-2.192)
Ln (Lagged number of IPO at exit)	0.023	0.023	0.065	0.066
	(1.588)	(1.597)	(1.610)	(1.616)
Ln (Lagged number of MA at exit)	-0.009	-0.010	-0.023	-0.023
	(-0.308)	(-0.324)	(-0.265)	(-0.262)
Observations	5,395	5,395	5,395	5,395
Exit Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.124	0.125	0.119	0.120

Panel C: Multi-Logit				
	Exit Category = 1	Exit Category = 2	Exit Category = 1	Exit Category = 2
Institution Share	0.094***	0.040**		
	(3.975)	(2.055)		
Institution Backing Dummy			0.330***	0.298***
			(3.230)	(3.478)
Ln (Startup Age at First Round)	0.054	0.009	0.048	0.008
	(1.211)	(0.240)	(1.075)	(0.205)
Ln (Number of Rounds)	-0.434***	-0.474***	-0.442***	-0.479***
	(-6.869)	(-9.015)	(-7.004)	(-9.090)
Ln (Number of VCs)	0.190***	0.515***	0.150**	0.500***
	(2.887)	(9.115)	(2.321)	(8.950)
Ln (Total Amount Raised)	1.042***	-0.194***	1.044***	-0.197***
	(13.502)	(-3.279)	(13.512)	(-3.343)
Early-stage Dummy	-0.108**	-0.107***	-0.110**	-0.109***
	(-2.273)	(-2.750)	(-2.320)	(-2.801)
VC Reputation	0.094***	0.078***	0.092***	0.077***
	(3.030)	(2.622)	(2.955)	(2.581)
Industry MB	-0.120	-0.159***	-0.127	-0.161***
	(-1.417)	(-2.624)	(-1.485)	(-2.656)
Ln (Lagged number of IPO at exit)	0.189**	0.098*	0.186**	0.099*
	(2.576)	(1.856)	(2.532)	(1.873)
Ln (Lagged number of MA at exit)	-0.057	-0.021	-0.065	-0.021
	(-0.375)	(-0.168)	(-0.426)	(-0.163)
Observations	5,395		5,395	
Exit Year Fixed Effects	YES		YES	
Industry Fixed Effects	YES		YES	
State Fixed Effects	YES		YES	
Adjusted/Pseudo R-Square	0.178		0.178	

Table 6 Institutional Investor Performance and Exit Rate

This table reports the results of how institutions' performance relates to the exit rate of the entrepreneurial firms they invest in. We restrict our sample to the startups with at least one institution investor. We report both OLS and Probit regression results. The dependent variable is the Successful Exit Dummy. The key independent variables are Overall RAW Performance, which measures the overall raw performance is the weighted average of three-year raw return of all institution investors, and Industry DGTW Performance, which measured the industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors in the entrepreneurial firm's industry. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). The definitions of the control variables are reported in the appendix Table A1. We also include Exit Year Fixed Effects, Industry Fixed Effects, and State Fixed Effects. The standard errors are clustered by Lead VC. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: OLS				Panel B: Probit			
Overall RAW Performance	0.045**	0.052***			0.152**	0.186***		
	(2.365)	(2.604)			(2.401)	(2.706)		
Industry DGTW Performance			0.058***	0.053***			0.215***	0.204***
			(2.827)	(2.658)			(2.891)	(2.703)
Ln (Startup Age at First Round)		-0.033		-0.034		-0.117		-0.149*
		(-1.374)		(-1.308)		(-1.527)		(-1.656)
Ln (Number of Rounds)		-0.077**		-0.075**		-0.307***		-0.315***
		(-2.586)		(-2.561)		(-3.302)		(-3.431)
Ln (Number of VCs)		0.012		0.023		0.029		0.088
		(0.361)		(0.609)		(0.284)		(0.718)
Ln (Total Amount Raised)		0.078**		0.056		0.324***		0.239**
		(2.584)		(1.622)		(3.388)		(2.057)
Early-stage Dummy		0.006		0.012		0.031		0.042
		(0.263)		(0.482)		(0.438)		(0.548)
VC Reputation		-0.001		0.038		-0.001		0.163*
		(-0.057)		(1.591)		(-0.011)		(1.921)
Industry MB		-0.051		-0.045		-0.172*		-0.161
		(-1.462)		(-1.159)		(-1.745)		(-1.520)
Ln (Lagged number of IPO at exit)		-0.041		-0.047		-0.157*		-0.192**
		(-1.325)		(-1.413)		(-1.772)		(-2.013)
Ln (Lagged number of MA at exit)		0.059		0.149*		0.262		0.660**
		(0.771)		(1.779)		(1.087)		(2.263)
Observations	700	700	605	605	700	700	605	605
Exit Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.056	0.074	0.075	0.095	0.216	0.247	0.237	0.274

Table 7 Institutional Investor Performance and Exit Category

This table presents the results of how institution investors' performance affect the channel of exit. The specification for this table is a Multinomial-Logit model. The dependent variable, Exit Category, equals 1 if a company goes public, 2 if a company is acquired, and 3 if a company is liquidated. The key independent variables are Overall RAW Performance, which measures the overall raw performance is the weighted average of three-year raw return of all institution investors, and Industry DGTW Performance, which measured the industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors in the entrepreneurial firm's industry. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). The definitions of the control variables are reported in the appendix Table A1. We also include Exit Year Fixed Effects, Industry Fixed Effects, and State Fixed Effects. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Multi-Logit			
	Exit Category = 1	Exit Category = 2	Exit Category = 1	Exit Category = 2
Overall RAW Performance	0.522***	0.238*		
	(3.500)	(1.902)		
Industry DGTW Performance			0.536***	0.286*
			(2.967)	(1.939)
Ln (Startup Age at First Round)	-0.202	-0.198	-0.161	-0.315*
	(-1.232)	(-1.466)	(-0.835)	(-1.859)
Ln (Number of Rounds)	-0.461**	-0.598***	-0.372	-0.682***
	(-2.124)	(-3.362)	(-1.517)	(-3.406)
Ln (Number of VCs)	-0.064	0.241	-0.127	0.401*
	(-0.287)	(1.290)	(-0.479)	(1.797)
Ln (Total Amount Raised)	1.197***	0.150	1.126***	-0.092
	(4.884)	(0.772)	(3.912)	(-0.397)
Early-stage Dummy	0.106	0.047	0.084	0.037
	(0.681)	(0.359)	(0.499)	(0.261)
VC Reputation	-0.013	-0.015	0.336**	0.259*
	(-0.130)	(-0.170)	(1.987)	(1.737)
Industry MB	-0.335	-0.207	-0.328	-0.180
	(-1.395)	(-1.107)	(-1.322)	(-0.918)
Ln (Lagged number of IPO at exit)	-0.236	-0.286*	-0.263	-0.362*
	(-0.896)	(-1.648)	(-0.912)	(-1.897)
Ln (Lagged number of MA at exit)	0.290	0.424	1.205*	1.066*
	(0.479)	(0.830)	(1.773)	(1.802)
Observations	700		605	
Exit Year Fixed Effects	YES		YES	
Industry Fixed Effects	YES		YES	
State Fixed Effects	YES		YES	
Adjusted/Pseudo R-Square	0.315		0.342	

Table 8 Institutional Investor Placebo Performance

This table presents the result from a placebo test. We report both OLS and Probit regression results. The dependent variable is the Successful Exit Dummy. The key independent variable is Placebo DGTW Performance, which measures industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors outside the entrepreneurial firm's industry. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). The definitions of the control variables are reported in the appendix Table A1. We also include Exit Year Fixed Effects, Industry Fixed Effects, and State Fixed Effects. The standard errors are clustered by Lead VC. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	OLS	Probit
Placebo DGTW Performance	0.022	0.081
	(1.132)	(1.285)
Ln (Startup Age at First Round)	-0.035	-0.152*
	(-1.371)	(-1.719)
Ln (Number of Rounds)	-0.082***	-0.347***
	(-2.753)	(-3.748)
Ln (Number of VCs)	0.026	0.099
	(0.670)	(0.819)
Ln (Total Amount Raised)	0.059*	0.251**
	(1.680)	(2.154)
Early-stage Dummy	0.012	0.044
	(0.514)	(0.567)
VC Reputation	0.039	0.171**
	(1.647)	(2.058)
Industry MB	-0.048	-0.167
	(-1.247)	(-1.589)
Ln (Lagged number of IPO at exit)	-0.048	-0.185**
	(-1.449)	(-1.970)
Ln (Lagged number of MA at exit)	0.138*	0.602**
	(1.660)	(2.133)
Observations	605	605
Exit Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
State Fixed Effects	YES	YES
Adjusted/Pseudo R-Square	0.086	0.267

Table 9 Intuitional Investor Reputation

This table presents the results of whether our previous results are driven by institution VC reputation. We repeat the test in table 6 and 7 controlling for Institution VC reputation, which measures the number of IPOs backed by a given institution investor during the previous three years, scaled by total number of IPOs. Panel A and B presents the results of how institutions' performance relates to the exit rate of the entrepreneurial firms they invest in. Our key dependent variable is the Successful Exit Dummy. The key independent variables are Overall RAW Performance, which measures the overall raw performance is the weighted average of three-year raw return of all institution investors, and Industry DGTW Performance, which measured the industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors in the entrepreneurial firm's industry. The standard errors are clustered by Lead VC. Panel C presents the results of how institution investors' performance affect the channel of exit. The dependent variable, Exit Category, equals 1 if a company goes public, 2 if a company is acquired, and 3 if a company is liquidated. The key independent variables are also Overall RAW Performance and Industry DGTW Performance. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). The definitions of the control variables are reported in the appendix Table A1. We also include Exit Year Fixed Effects, Industry Fixed Effects, and State Fixed Effects. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: OLS		Panel B: Probit	
Overall RAW Performance	0.049**		0.173**	
	(2.388)		(2.452)	
Industry DGTW Performance		0.052***		0.202***
		(2.592)		(2.656)
Institution VC Reputation	0.021	0.010	0.074	0.027
	(1.095)	(0.433)	(1.164)	(0.341)
Ln (Startup Age at First Round)	-0.032	-0.034	-0.118	-0.150*
	(-1.376)	(-1.330)	(-1.555)	(-1.675)
Ln (Number of Rounds)	-0.080***	-0.077***	-0.320***	-0.319***
	(-2.744)	(-2.661)	(-3.517)	(-3.540)
Ln (Number of VCs)	0.011	0.022	0.024	0.084
	(0.316)	(0.569)	(0.239)	(0.687)
Ln (Total Amount Raised)	0.082***	0.058*	0.338***	0.245**
	(2.728)	(1.692)	(3.535)	(2.122)
Early-stage Dummy	0.008	0.012	0.035	0.045
	(0.325)	(0.507)	(0.502)	(0.575)
VC Reputation	-0.007	0.032	-0.021	0.147
	(-0.423)	(1.105)	(-0.414)	(1.540)
Industry MB	-0.050	-0.044	-0.166*	-0.157
	(-1.424)	(-1.120)	(-1.682)	(-1.473)
Ln (Lagged number of IPO at exit)	-0.041	-0.047	-0.156*	-0.191**
	(-1.335)	(-1.416)	(-1.770)	(-2.014)
Ln (Lagged number of MA at exit)	0.061	0.148*	0.261	0.654**
	(0.795)	(1.765)	(1.087)	(2.247)
Observations	700	605	700	605
Exit Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.075	0.094	0.248	0.274

Panel C: Multi-Logit				
	Exit Category = 1	Exit Category = 2	Exit Category = 1	Exit Category = 2
Overall RAW Performance	0.511***	0.211*		
	(3.426)	(1.667)		
Industry DGTW Performance			0.544***	0.277*
			(3.005)	(1.879)
Institution VC Reputation	0.039	0.165	-0.125	0.099
	(0.304)	(1.439)	(-0.824)	(0.749)
Ln (Startup Age at First Round)	-0.203	-0.195	-0.167	-0.320*
	(-1.233)	(-1.446)	(-0.859)	(-1.883)
Ln (Number of Rounds)	-0.467**	-0.622***	-0.354	-0.699***
	(-2.131)	(-3.474)	(-1.437)	(-3.474)
Ln (Number of VCs)	-0.067	0.225	-0.109	0.384*
	(-0.299)	(1.197)	(-0.408)	(1.715)
Ln (Total Amount Raised)	1.209***	0.192	1.123***	-0.053
	(4.893)	(0.972)	(3.876)	(-0.224)
Early-stage Dummy	0.113	0.063	0.081	0.042
	(0.722)	(0.480)	(0.476)	(0.297)
VC Reputation	-0.020	-0.067	0.422**	0.207
	(-0.195)	(-0.648)	(2.175)	(1.241)
Industry MB	-0.337	-0.197	-0.333	-0.172
	(-1.397)	(-1.050)	(-1.346)	(-0.869)
Ln (Lagged number of IPO at exit)	-0.247	-0.280	-0.303	-0.358*
	(-0.936)	(-1.610)	(-1.042)	(-1.874)
Ln (Lagged number of MA at exit)	0.285	0.455	1.175*	1.060*
	(0.468)	(0.887)	(1.730)	(1.788)
Observations	699		604	
Exit Year Fixed Effects	YES		YES	
Industry Fixed Effects	YES		YES	
State Fixed Effects	YES		YES	
Adjusted/Pseudo R-Square	0.320		0.346	

Table 10 IPO Initial Return

This table reports the results of how institutions' participation affect IPO initial returns. We report OLS regression results. The dependent variable is the Initial Return, which measures the percentage return from the offer price to the first trading day closing price. The key independent variables are Institutional Share, which measures the total dollar amount invested by all institutions, scaled by the total dollar amount invested by all investors and Institution Backing Dummy, a dummy variable equal 1 if there is at least one institution investor, and 0 otherwise. We also include the following control variables: Tech Dummy, Underwriter Reputation, 30-day Market Return Prior to IPOs, Ln (Firm Age at IPO Date), and Ln (Gross Proceeds in Mil). The definitions of the control variables are reported in the appendix Table A1. We also include IPO Year Fixed Effects and Industry Fixed Effects. The standard errors are clustered at IPO year level. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

Institution Shares	-0.247**	-0.214**		
	(-2.687)	(-2.663)		
Institution Backing Dummy			-0.031*	-0.032*
			(-1.790)	(-1.845)
Tech Dummy		0.069**		0.070**
		(2.119)		(2.174)
Underwriter Reputation		-0.014		-0.014
		(-1.569)		(-1.524)
30-day Market Return Prior to IPOs		0.021*		0.021*
		(1.918)		(1.926)
Ln (Firm Age at IPO Date)		-0.059**		-0.060**
		(-2.662)		(-2.678)
Ln (Gross Proceeds in Mil)		0.128**		0.127**
		(2.658)		(2.667)
Observations	1,866	1,843	1,866	1,843
IPO Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.255	0.264	0.254	0.263

Table 11 IPO Cost

This table reports the result of how institutions' participation affect IPO costs. We report OLS regression results. The dependent variable is Gross Spread, which measures the gross underwriting spread, scaled by gross proceeds dollar amount of issuance and Proceeds Retention, which measures the ratio of the net proceeds to the gross proceeds. Net Proceeds is measured as the gross proceeds excluding the overallotment option minus the underwriter compensation and legal and accounting expenses. The key independent variables are Institutional Share, which measures the total dollar amount invested by all institutions, scaled by the total dollar amount invested by all investors and Institution Backing Dummy, a dummy variable equal 1 if there is at least one institution investor, and 0 otherwise. We also include the following control variables: Tech Dummy, Underwriter Reputation, 30-day Market Return Prior to IPOs, and Ln (Firm Age at IPO Date). The definitions of the control variables are reported in the appendix Table A1. We also include IPO Year Fixed Effects and Industry Fixed Effects. The standard errors are clustered at IPO year level. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: Gross Spread				Panel B: Proceeds Retention			
Institution Shares	-0.659**	-0.599*			3.644**	3.552**		
	(-2.221)	(-2.012)			(2.683)	(2.662)		
Institution Backing Dummy			-0.220***	-0.215***			0.861***	0.846***
			(-4.319)	(-4.164)			(2.892)	(2.910)
Tech Dummy		-0.050		-0.042		0.057		0.030
		(-0.575)		(-0.491)		(0.251)		(0.134)
Underwriter Reputation		-0.063***		-0.062***		0.190**		0.191**
		(-2.945)		(-2.823)		(2.154)		(2.175)
30-day Market Return Prior to IPOs		0.025		0.025		0.018		0.014
		(1.243)		(1.241)		(0.260)		(0.206)
Ln (Firm Age at IPO Date)		-0.109***		-0.111***		0.168		0.172
		(-3.425)		(-3.440)		(1.525)		(1.580)
Observations	1,864	1,841	1,864	1,841	1,284	1,266	1,284	1,266
IPO Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.088	0.104	0.090	0.106	0.254	0.286	0.251	0.281

Table 12 Institutional LP Participation

This table presents the results of whether institution LP participation predicts higher chance of successful exits and how institutions' participation affect IPO initial return and costs. We report both OLS and Probit regression results. The key independent variable is Institution LP Backing Dummy, a dummy variable equal 1 if there is at least one institution LP, and 0 otherwise. In Panel A and B, the dependent variable is the Successful Exit Dummy. We also include the following control variables: Ln (Startup Age at First Round), Ln (Number of Rounds), Ln (Number of VCs), Ln (Total Amount Raised), Early-stage Dummy, VC Reputation, Industry MB, Ln (Lagged number of IPO at exit) and Ln (Lagged number of MA at exit). We also include Exit Year Fixed Effects, Industry Fixed Effects, and State Fixed Effects. The standard errors are clustered by Lead VC. In Panel C, the dependent variable are Initial Return, Gross Spread, and Proceeds Retention. We also include the following control variables: Tech Dummy, Underwriter Reputation, 30-day Market Return Prior to IPOs, Ln (Firm Age at IPO Date), and Ln (Gross Proceeds in Mil). The definitions of the control variables are reported in the appendix Table A1. We also include IPO Year Fixed Effects and Industry Fixed Effects. The standard errors are clustered by IPO year. T-statistics are reported in the parentheses. Significance Level: *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: OLS	Panel B: Probit
Institution LP Backing Dummy	0.057***	0.155***
	(5.203)	(4.999)
Ln (Startup Age at First Round)	0.006	0.017
	(1.428)	(1.406)
Ln (Number of Rounds)	-0.080***	-0.231***
	(-14.883)	(-14.656)
Ln (Number of VCs)	0.051***	0.141***
	(8.959)	(8.507)
Ln (Total Amount Raised)	0.088***	0.259***
	(17.090)	(15.892)
Early-stage Dummy	-0.022***	-0.061***
	(-5.894)	(-5.793)
VC Reputation	0.019***	0.056***
	(4.009)	(3.686)
Industry MB	-0.021***	-0.064***
	(-5.249)	(-5.175)
Ln (Lagged number of IPO at exit)	0.017***	0.048***
	(3.072)	(3.130)
Ln (Lagged number of MA at exit)	-0.007	-0.016
	(-0.480)	(-0.394)
Observations	19,463	19,463
Exit Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
State Fixed Effects	YES	YES
Adjusted/Pseudo R-Square	0.145	0.120

Panel C: LP Certification Effect

	Initial Return	Gross Spread	Proceeds Retention
Institution LP Backing Dummy	-0.011	-0.023	0.286
	(-0.364)	(-0.411)	(1.290)
LN (Gross Proceeds in Mil)	0.126**		
	(2.697)		
Underwriter Reputation	-0.013	-0.063***	0.173*
	(-1.421)	(-2.809)	(1.937)
30-day Market Return Prior to IPOs	0.024**	0.027	0.008
	(2.250)	(1.300)	(0.104)
Ln (Firm Age at IPO Date)	-0.060***	-0.113***	0.161
	(-2.831)	(-3.412)	(1.508)
Tech Dummy	0.070**	-0.058	0.072
	(2.130)	(-0.647)	(0.284)
Observations	1,801	1,799	1,234
IPO Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Adjusted/Pseudo R-Square	0.265	0.0991	0.277

Table A1: Variable Definition

	Exit Variables
Successful Exit Dummy	A dummy variable equal 1 if the startup company goes public or is acquired, and 0 if the startup company is liquidated, including Bankruptcy Chapter 11/7, Defunct and active for more than 4 years.
Exit Category	A categorical variable equal 1 if a company goes public, 2 if a company is acquired, and 3 if a company is liquidated.
	Institution Participation Variables
Institution Shares	The total dollar amount invested by all institutions, scaled by the total dollar amount invested by all investors.
Institution Backing Dummy	A dummy variable equal 1 if there is at least one institution investor, and 0 otherwise.
Institution LP Backing Dummy	A dummy variable equal 1 if there is at least one institution LP, and 0 otherwise.
	Institution Performance Variables
Overall Raw Performance	The overall raw performance is the weighted average of three-year raw return of all institution investors. More specifically, we first calculate the quarterly raw returns using average returns for all the stocks held by the institution, weighted by the beginning-of-quarter holding value. We then compound the quarterly institution return to 12 quarters. If there are more than one institution investor for a given startup, we average across all institution investors, weighted by institutions' investment amounts.
Industry DGTW Performance	The industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors in the entrepreneurial firm's industry. More specifically, we first calculate monthly DGTW-adjusted returns for stocks held by the institution, which are in the same SIC-2 industry as the entrepreneurial firm. Each stock's DGTW group is assigned at the beginning of each quarter. We then compound the monthly-level stock returns into quarterly returns. We average stock returns, weighted by the beginning-of-quarter holding value and compound the quarterly DGTW-adjusted industry return to 12 quarters. If there are more than one institution investor for a given entrepreneurial firm, we average across all institution investors, weighted by institutions' investment amounts.
Placebo DGTW Performance	The industry DGTW performance is the weighted average of three-year DGTW-adjusted return of all institution investors outside the entrepreneurial firm's industry. We first calculate monthly DGTW-adjusted returns for stocks held by the institution, which are not in the same SIC-2 industry as the entrepreneurial firm. Each stock's DGTW group is assigned at the beginning of each quarter. We then compound the monthly-level stock returns into quarterly returns. We average stock returns, weighted by the beginning-of-quarter holding value and compound the quarterly DGTW-adjusted industry return to 12 quarters. If there are more than one institution investor for a given entrepreneurial firm, we average across all institution investors, weighted by institutions' investment amount.
	Entrepreneurial Firms and Exit Market Characteristics
VC Reputation	The dollar amount invested by a given VC for all entrepreneurial firms during the previous three years, scaled by total amount raised by all entrepreneurial firms.
Ln (Startup Age at First Round)	The natural log of the entrepreneurial firm's age at first round.
Ln (Number of Rounds)	The natural log of total number of rounds.

Ln (Number of VCs)	The natural log of total number of VC firms.
Early-stage Dummy	A dummy variable equal 1 if the startup company is at seeding or startup stage at the first round, and 0 otherwise.
Industry MB	The average market-to-book ratio in the SIC-2 industry of the entrepreneurial firm in the quarter prior to company's exit.
Ln (Lagged number of IPOs at exit)	The natural log of total number of IPOs in the quarter prior to entrepreneurial firm's exit.
Ln (Lagged number of MA at exit)	The natural log of total number of M&As in the quarter prior to entrepreneurial firm's exit.
Institution VC reputation	The number of IPOs backed by a given institution investor during the previous three years, scaled by total number of IPOs.
	IPO Related Variables
Initial Return	The percentage return from the offer price to the first trading day closing price.
Gross Spread	The gross underwriting spread, scaled by gross proceeds dollar amount of issuance.
Proceeds Retention	The ratio of the net proceeds to the gross proceeds. Net Proceeds is measured as the gross proceeds excluding the overallotment option minus the underwriter compensation and legal and accounting expenses, defined as in Megginson and Weiss (1991)
Tech Dummy	A dummy variable equal 1 if the startup company is an internet or technology firm, defined as in Loughran and Ritter (2004), and 0 otherwise.
Ln (Gross Proceeds)	The natural log of proceeds amount of issue, in millions of dollars, calculated as the offer price multiplied by number of the shares offered.
Underwriter Reputation	The underwriter Rank for IPOs, defined as in Loughran and Ritter (2004).
30-day Market Return Prior to IPOs	The market return for the thirty trading days preceding the IPO date.
Ln (Firm Age at IPO Date)	The natural log of the IPO year minus the firm's founding year, where founding dates are obtained from the Field–Ritter dataset, as used in Loughran and Ritter (2004).
	Fixed Effects
Exit Year Fixed Effects	Dummy variables for the year of the entrepreneurial firm's exit.
State Fixed Effects	Dummy variables for the state of the entrepreneurial firm.
Industry Fixed Effects	Dummy variables for the SIC-2 industry of the entrepreneurial firm.
IPO Year Fixed Effects	Dummy variables for the SIC-2 industry of the year of IPOs.