Public Market Players in the Private World: Implications for the Going Public Process*

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December 6, 2017

Preliminary draft

Abstract

Recent years have seen a dramatic increase of investment from public market institutions (e.g., mutual funds, hedge funds, etc.) in the private market. This phenomenon is puzzling, particularly with two currently documented trends: (1) Startups stay private longer; (2) The amount of private money from the VC and PE funds has increased significantly. We propose a demand-side explanation to this phenomenon: As public market institutions directly participate in pre-IPO startups, startups rely less on underwriters with all-star analysts and hence IPO underpricing becomes less severe. Consistent with this argument, we have two main findings: (1) Public market institutions' participation in startups reduces IPO underpricing, while their indirect participation as limited partners does not; (2) There is substitution effect between public market institutions and all-star analysts on IPO underpricing. In the cross section, the IPO underpricing reduction is more pronounced under higher industry uncertainty, and on more active institutional investors with better prior performance. Last, we provide evidence on the matching between startups with higher successful exit likelihood and public market institutions in the equilibrium.

Keywords: IPO Underpricing, Venture Capital, Institutions
JEL Classification: G23; G24; L13.

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*We thank helpful comments from seminar participants at Cornell University, Emory University and Fordham University. Remaining errors and omissions are our own responsibility.

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1 Introduction

Recent years have seen a dramatic rise of public market players in the private world. Specifically, startups that used to be financed primarily by venture capitals (VCs) also receive increasing capital from public market institutional investors, such as mutual funds, hedge funds and pension funds (we will refer to them as "institutions" for the rest of the paper).[1] This phenomenon is puzzling, particularly with two concurrent trends: (1) startups stay private longer (Doidge, Karolyi, and Stulz, 2013, 2017; Gao, Ritter, and Zhu, 2013); (2) The amount of private money from the VC and PE funds has increased dramatically recently (Ewens and Farre-Mensa, 2017). On the supply side, given that liquidating shares is difficult in primary markets, investment in startups, especially in those have delayed going public, is not compatible with institutions' liquidity requirement. On the demand side, given abundant funding from the VC and PE funds, startups do not necessarily demand financing from institutions, who are not specialized in nurturing startups, as opposed to traditional VCs.

Recent studies shed some light on the supply side. Increased private capital (e.g., due to regulatory changes) and technological improvement could make it easier for institutions to find counter-parties when liquidating shares in primary markets (Ewens and Farre-Mensa, 2017).[2] Meanwhile, private markets may provide higher returns or diversification benefit to public market institutions. However, these arguments are not enough to justify the increase in institutions' involvement in startups. If startups do not demand institutions, the financing from institutions does not necessarily increase even if institutions are willing to invest in startups. Our paper attempts to complete the picture from a demand-side perspective.

We propose a novel demand-side explanation on how institutions' participation benefits startups. That is, institutions' public market expertise potentially plays an important role on the subsequent IPO process, which is one of the most important steps in startups' development.

[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).

[2]Ewens and Farre-Mensa (2017) does not explicitly explain why institutions are involved in the startups, but find that some regulatory changes, such as National Securities Markets Improvement Act of 1996, largely increase private capital and allow late-stage startup to stay private longer.

Some early investors in startups, especially VCs, are concerned about post-IPO stock prices as they are generally restricted from liquidating their shares until several months after IPO. Since influential analysts (i.e. all-star analysts) could attract large institutional investors and then support the stock prices in post-IPO markets, VC-backed startups have a greater lust for underwriters bundled with coverage from these analysts, and would reward these underwriters with greater IPO underpricing (see analyst lust theory in Liu and Ritter (2011)). When these analysts' public market clients (i.e. hedge and mutual funds) cross the border to participate directly in pre-IPO startups and potentially stay longer to support the post-IPO markets, the importance of bundling with influential analysts becomes weakened and IPO underpricing becomes less severe.[3]

Following the aforementioned argument, we have two key predictions. First, there is less IPO underpricing for VC deals with institutions' participation . Second, there is substitution effect between institutions and all-star analysts in IPO underpricing. That is, the IPO underpricing with institutions' participation is less sensitive to all-star analysts than those without institutions' participation.[4]

To test our hypothesis, we focus on the VC-backed startups that eventually go IPO. In the baseline analysis, we examine how institutions' direct pre-IPO participation in the startups is associated with IPO underpricing. Consistent with our first prediction, we find that institutions' pre-IPO participation reduces IPO underpricing. The economic magnitude is sizable: a one standard deviation increase in the proportion of institutional investment in the startups reduces IPO underpricing by 1.7%, which accounts for 6.8% of the mean IPO underpricing.[5]

[3] Institutions' participation could substitute influential analysts by supporting post-IPO markets of startups via various channels. First, as media always intensively report public market institutions' participation in startups, institutions' participation could potentially increase the publicity of startups. Second, institutions play important roles in lowering cost of capital through their impact on price discovery. Third, as institutional investors have herding behavior (Wermers (1999)), especially mutual funds, some institutions' participation in pre-IPO startups could potentially be followed by other institutions after IPO.

[4] Our predictions are consistent with some anecdotal evidence. For example, a Wall Street Journal article of February 2nd, 2017, More Mutual Funds Are Pumping Money into Small Firms, mentions that "...**IPO prep**. The advice is not just there when there is a misstep. Perhaps most important, the advice and coaching can help companies with their debut on the stock market, aka the IPO....Mr. Kalra says he and his team try to prepare company managers for what to expect when their stock is listed. They hold mock earnings conference calls, and mock roadshows where company leaders will talk with investors.....**Longer-term capital.** Venture-capital investors are typically involved for only a small part of a companys life cycle. As soon as the company goes public the VC exits, meaning they sell their stake, says Mr. Kalra. Whereas when the company goes public well probably invest more capital. In other words, the relationship continues beyond the IPO.".

[5] In untabulated results, we use institution-back dummy and find that institutions' pre-IPO participation reduces IPO underpricing by 3.2%. This magnitude is comparable to the underpricing effect generated by top-

To strengthen our argument that IPO underpricing reduction effect is due to the institutions' public market expertise, we use institutional Limited Partners (LPs) as a placebo test. Different from General Partners (institutions' direct investment in startups), institutional LPs only provide funding without any direct activities in startups. Therefore, institutions' participation in the VC deals as LPs does not necessarily mitigate IPO underpricing. In the placebo test, we associate IPO underpricing with institutions' indirect participation as LPs, and indeed find no significant correlation between the two variables.

To help further pin down how institutions help startups on the public market, we carry out cross-sectional studies. First, we consider uncertainty associated with startups. When uncertainty of the startups is high, the demand of post-IPO shares will be low and institutions' participation will become more important to support the post-IPO prices. In this sense, the institutions play a relatively more important role in the IPO underpricing for startups with higher uncertainties. Consistent with our conjecture, we find that institutions' participation predicts greater IPO underpricing reduction when there is higher analyst forecast error or return volatility in the industry that the startup belongs to.

Second, we examine how the association between the institutions' participation and the IPO underpricing varies with institutions' characteristics. Institutions would be more likely to support post-IPO market prices when they have better prior performance, or are more active in the public market. Indeed, we find greater IPO underpricing reduction when institutions have higher prior DGTW returns, or for non-indexers (dedicated and transient investors according to the definition in Bushee and Noe (2000)).

Next, we provide evidence for our second prediction: institutions can substitute all-star analyst coverage, which in turn reduce IPO underpricing. Under the analyst lust theory Liu and Ritter (2011), because all-star analyst coverage could support the post-IPO stock prices via increasing publicity and attracting institutional investors, VC-backed startups reward underwriters with all-star analysts with greater IPO underpricing. When institutions (i.e. all-star analysts' target clients in public markets) participate directly in primary markets, the role of all-star analysts in attracting institutional investors following in post-IPO markets becomes

tier underwriters or underwriters with all-star analysts. For example, Liu and Ritter (2011) find that issue firms using top-tier underwriters are subject to 2.4% more IPO underpricing and those using a bookrunner that bundles underwriting with influential analyst coverage are subject to 9% more underpricing.

weakened. Therefore, we should observe a weaker relation between IPO underpricing and all-star analyst coverage when there is institutions' pre-IPO participation. Furthermore, because VCs generally liquidate their original shares after several months of IPO (i.e. due to lock-up period), the effect of all-star analysts is only mitigated by institutions with long investment horizons. Thus, we expect that there only exists a substitution between all-star analysts and dedicated institutions, not transient investors or indexers. This exactly what we find.

The above cross-sectional tests further lend credence to our inferences of institutions' post-IPO market support effect. While it is possible that some omitted variables drive the documented results, it is difficult to conceive of an omitted variable that biases our results equally along all dimensions including market uncertainty, institutions' prior performance, activeness, and all-star analyst coverage. The differential prediction of institutions' participation on IPO underpricing reduction along these dimensions indicates our results are unlikely to be entirely driven by endogenous matching between institutions and startups. Instead, it appears to suggest that institutions' post-IPO market support effect is at least partially in play.

A natural question that follows from the above results is: What do institutions get by providing secondary market price support to startups? In the equilibrium, startups need to reciprocate institutions in order to receive the secondary market benefits. We argue that startups that desire secondary market support are the ones that are more likely to successfully exit, and they induce institutions' investment with a higher promise of share liquidation in the near future. Consistent with our conjecture, we find that institutions tend to participate in late-stage deals, and their investments are indeed associated with higher likelihood of successful exits via IPO or merger and acquisition. The successful exists are especially salient on IPOs.

There are several other potential demand-side explanations. First, as startups become staying private longer, startups do not have access to capital from public equity market and may require capital from other sources for further development. However, as shown in Figure 10 of Ewens and Farre-Mensa (2017), there are simultaneous increases in the capital from venture capital, PE funds, corporate venture capital and institutions. And more importantly, institutions are always not the major contributor of the capital for startups. Therefore, the pure capital demand seems not a major role in startups' need of institutions' financing. Second, different from VCs, institutions specialize on public market and might be able to better prepare startups for the public market arena by advising them. While this explanation is very plausible, there is little supporting evidence so far. Second, institutions may be actively involved in the corporate governance or daily activities within startups. While this explanation is very plausible, there is little supporting evidence so far. As shown by Chernenko, Lerner, and Zeng (2017), in the startups the institutions have weaker cash flows rights, are less involved in terms of corporate governance, and are under-represented on boards of directors. While we do not intend to completely rule out the aforementioned two explanations, we attempt to show that secondary market price support is one non-negligible factor that drives institutional investment in startups.

Our paper makes contribution mainly to two strands of the literature. First, we shed light on the nascent literature on institutions' investment in private startups. Ewens and Farre-Mensa (2017) show that the increase in the supply of private capital, especially from the VC and PE funds, enables startups to stay private longer with sufficient late-stage financing, which are rational choices of the startup founders/mangers. Kwon, Lowry, and Qian (2017) also argue that mutual fund investments allow startups to stay private longer. Chernenko, Lerner, and Zeng (2017) document the consequences of mutual funds' investment on startups for corporate governance provisions. Although these papers do not explicitly explain why institutions become more interested in startups, they suggest that the increased capital from institutions in primary markets could be due to two supply-side reasons:(1) Increased private capital and technological improvement could make it easier to liquidate shares in primary markets (Ewens and Farre-Mensa (2017)); (2) private markets may provide higher returns or diversification benefit to institutions (Kwon, Lowry, and Qian (2017)). Our paper complements the existing studies, by providing a demand-side explanation to institutions' investment in startups, arguing that institutions provide post-IPO market price support and could reduce IPO underpricing for startups.

Second, we contribute to the literature on IPO underpricing. Most of the studies in this literature focus on the interactions between the underwrites and investors, or the interactions between the underwriter and the issuer firms. One strand of studies argue that underwriters needs to underprice shares in order to induce investors to participate in IPOs ((Rock, 1986; Benveniste and Spindt, 1989; Welch, 1992)). The other strand of studies assume that underwriters want to underprice IPOs more than is needed, and issuers desire to minimize underpricing

((Baron, 1982; Loughran and Ritter, 2002, 2004; Ljungqvist and Wilhelm, 2003)). Liu and Ritter (2011) provides a new theory based on differentiated underwriting services and localized competition, and derives excessive underpricing in the equilibrium. Our argument builds upon Liu and Ritter (2011), and we argue that institutions as a substitute for the secondary market services of the underwrites, which reduces IPO underpricing.

This paper proceeds as follows. Section 2 discusses data and sample construction. Section 3 demonstrates empirical results. Section 4 concludes.

2 Data and Summary Statistics

2.1 IPO Data

We obtain our IPO-related variables from SDC Global New Issues Databases. We consider only VC-backed US IPOs from 1980 to 2016 and we exclude closed-end fund/trusts, depositary issues, dual class IPOs (used in Loughran and Ritter (2004)) and unit IPOs. We also restrict our attention to common shares, ordinary shares, and class A common shares issuance. We merge our IPO list from Global New Issues Database with VentureXpert to identify VC-backed IPOs. Following prior studies examining IPO underpricing (e.g., Megginson and Weiss (1991), Hanley and Hoberg (2010), and Liu and Ritter (2011)), we require IPO offer price to be at least 5 dollars and have more than 3 million dollar total proceed. We obtain IPO underwriter reputation IPO firm founding dates (used in Loughran and Ritter (2004)) and IPO All-star analyst coverage (used in Liu and Ritter (2011)) from Prof. Jay Ritter's website.

2.2 IPO Underpricing

Our primary dependent variable is the level of IPO underpricing, measured by the percentage change from the offer price to the first trading day closing price (IR). In appendix, we also examine the effect of institutional participation on IPO cost. We measure IPO cost using the gross underwriting spread, scaled by gross proceeds dollar amount of issuance (Gross Spread) and the ratio of the net proceeds to the gross proceeds (Proceed Retention).

2.3 Institutional Participation

Our primary independent variable is the level of public market institution participation from the venture capital market. For each IPO startup, we obtain a list of all VC investors from VentureXpert. We identify the public market institutions among the VC investors using a matching algorithm to Thomson Financial Institutional Holdings databases. For each VC investor, the program finds the longest common strings between the VC name and the 13-F institution names. We require that the length of this common string has to be at least 90 percent 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. We measure public market institution participation as the total dollar amount invested by all institutions, scaled by the total dollar amount invested by all VC investors (Institution Shares) and the total number of institutional investors, scaled by the total number of investors (Institution Numbers).

2.4 Institutions' Performance in the Public Equity Market

To capture an institution's performance in the equity market, we choose a relatively long window to measure their performances (24 months), as short-term returns are volatile and more susceptible to the influence of luck rather than skill. We measure institution's performance using both excess return and DGTW adjusted return. We take several steps to construct performance measures to capture institution's overall public market performance in the past 24 months. In each quarter, we first compound monthly excess return over risk-free rate of stocks into quarterly excess returns. Using the stock holdings reported at the end of the previous quarter in the Thomson Financial's S13 file, we calculate the quarterly portfolio returns using the average excess returns for all the stocks held by the institution. Specifically, we use the following formula to calculate monthly raw returns for institutions:

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

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 24-month return, we compound the quarterly performance of the institution over the past 8 quarters. Similarly, We construct DGTW adjusted performance using DGTW adjusted stock return. If there are multiple institutions in the same entrepreneurial firm, we use weighted average returns of these institutions.

2.5 Measure of Successful Exit

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We extended our IPO sample to include both successful and unsuccessful startups using VentureExpert. We restrict our observations to U.S. headquartered startups with U.S. based VC firms. Our sample includes startups that receive first round of investment between the beginning of 1980 to the end of 2012. We consider a startup as having a successful exit if it goes public or is acquired during our sample period. One potential issue is that some startups 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.

2.6 Control Variables

We follow the IPO literature (e.g. Liu and Ritter (2011)) and construct a number of firm characteristics that are related to IPO underpricing. These control variables include a dummy variable indicating that the IPO firm is a technology firms (Tech Dummy), a dummy variable indicating when an IPO firm is associated with a top-tier underwriter (Top-tier Dummy)[6], the ratio of retained shares to the total shares offered (Share Overhang), the natural log of the firm's age at IPO (Ln(age)) and the natural log of gross proceeds in millions of dollars (Ln(Proceeds)).

We also control for market condition at the time of the IPO, measured as 30-day Market Return Prior to IPOs (Prior Market Return). In addition, we control for lead VC reputation, measured as the dollar amount invested by a given VC for all startups during the previous

[6]Since we only examine VC-backed IPOs, we define a top-tier underwriter as an underwriter as a 9 as oppose to 8 or higher as in Ritter and Liu (2011).

three years, scaled by total amount raised by all startups (Lead VC Reputation). 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. Finally, we include IPO year fixed effects and IPO firm industry fixed effects, using Fama French 12 industry classification.

When examining startup exit probability, we follow the VC literature and construct a number of firm characteristics that affect likelihood of successful exit. We complement our primary data source with Compustat and Mergers & Acquisition. In addition to Lead VC Reputation, we control for the natural log of company age at first round (Ln (Startup Age at First Round)), the natural log of the total number of rounds (Ln (Number of Rounds)), the natural log of total number of VCs (Ln (Number of VCs)), the natural log of total dollar amount raised by the startup (Ln (Total Amount Raised)), and an early-stage dummy that equals 1 if the startup is at seeding or startup stage at first round (Early-stage Dummy). 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 (Ln(Lagged Number of IPOs at Exit), the natural log of total number of M&As(Ln(Lagged Number of IPOs at Exit), and the average Market to Book ratio of the startup's industry (Industry MB). All three exit market condition variables are constructed using the data from the quarter prior to the startups' 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.

2.7 Summary Statistics

Panel A of Table 1 report summary statistics on our IPO sample, which consists 1,904 VC-back IPOs from 1980 to 2016. These IPOs are backed by with 2,281 non-institutional VC firms and 46 institutional VC firms. Nearly half of our sample is technology firm, 20 percent are covered by an all-star analyst and more than one third of IPO firms are associated with a top-tier underwriter. The average issuing firm goes public at the age of 13 and raise 90 million dollars. 203 out of the 1904 IPOs have at least one institutional investor. Focusing on those

203 IPOs (untabulated), the average IPO firm raise 132 million dollars and retain 30 percent of total shares offered at the age of 15.

Panel B of Table 1 report summary statistics on our extended IPO sample to include both successful and unsuccessful startups. This sample consist 19,495 startups, of which 1,079 startups have at least one institutional investors. 13 percent of 19,495 startups eventually go public, 40 percent are acquired, and the rest are written-off. The average startup has 5.36 unique investors and raise \$40,000 in 4.17 rounds. 42 percent of startups are at early stage at the time of the first financing round.

3 Empirical Results

3.1 IPO Underpricing

We first assess whether institutions' investments in startups could benefit the startup in the IPO process. We argue that institutions are able to substitute bundled services provided by underwriters, in particular, price support services in the secondary market. As a result, their participation reduces the bargaining power of underwriters. Accompanied by the reduced bargaining power, underwriters are also less likely to excessively underprice the issues. To assess how institutions' participation in pre-IPO VC deals predicts IPO underpricing, we estimate the following model:

$$\text{IR}_i = \alpha + \beta \text{Institution Participation}_i + \gamma Z_i + \text{IPO Year}_t + \text{Industry}_j + \epsilon_i, \tag{2}$$

where i is the index for the startup. The dependent variable in Eq. (2) is the first-day return of IPO. Our main variable of interest is Institution Participation. We use two proxies to capture the institutions' participation: Institution Shares and Institution Numbers. Institution Shares is the proportion of total investment in the startup invested by all institutions. Institution Numbers is the proportion of investors in the startup that are institutions. Z_i is a vector of controls that includes Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Ln (Age), and Ln(Proceeds). IPO Year_t and Industry_j capture IPO year and industry fixed effects, respectively. For industry classification, we use Fama-French 12 industries.[7] We cluster standard errors by IPO year.

Table 2 reports estimates of various specifications of Eq. (2). Columns (1) and (2) present the baseline results without IPO year fixed effects but with industry fixed effects, using Institution Shares and Institution Numbers as independent variables, respectively. For both Institution Shares and Institution Numbers, the coefficient estimates are -0.024 and are significant at the 1 percent level. Columns (3) and (4) demonstrate results without industry fixed effects but with IPO year fixed effects. For both Institution Shares and Institution Numbers, the coefficient estimates are -0.017, significant at the 5 percent confidence level. In columns (5) and (6), we include both IPO year fixed effects and industry fixed effects. Including both fixed effects increases R square to 28.1%, from R-squared of 16.5% in columns (1) and (2), and R-squared of 26.9% in columns (3) and (4). The coefficient of Institution Shares is -0.018. The economic magnitude is sizable: a one standard deviation increase in Institution Shares reduces IPO underpricing by 1.8%, which accounts for 7.2% of the mean IPO underpricing in our sample. The coefficient estimate on Institution Numbers is -0.017. The economic magnitude is similar: a one standard deviation increase in Institution Shares reduces IPO underpricing by 1.7%, which accounts for 6.8% of the mean IPO underpricing in our sample. The results are consistent with our hypothesis that institutions' pre-IPO participation in VC deals reduces startups' IPO underpricing.[8]

3.1.1 Placebo tests

We argue that the reason institutions' investments in startup could reduce the IPO underpricing is because of the price support institutions provide. Thus, we hypothesize that only the direct participation from institutions should effectively reduce IPO underpricing. Empirically, we make use of institutions' participation as limited partners (LP) as a placebo test. When investing as LPs, institutions do not directly participate in venture deals and therefore are unlikely to be directly involved in the IPO process. Thus, if the reduction of IPO underpricing is indeed driven by institutions' heavy involvement in service provision, we should expect no significant change in IPO underpricing when institutions only participate as LPs. We use the

[7] The choice of Fama-French 12 industry is based on our data availability. Given the limited data, as a narrower industry definition decreases the degree of freedom significantly.

[8] We also find that institutions' participation helps reduce other costs in the IPO process, such as gross spreads. Institutions' participation also increases proceeds retention. These results are reported in Table A2 of the appendix.

regression specification of Eq. (2) and measure Institution Participation calculated using the GPs with at least one institution LP investor. Table 3 reports the placebo tests results. Similar to the previous analysis, the dependent variable in our regressions are IPO underpricing. We capture institutions' participation in VC deals as LPs by LP Institution Shares and LP Institution Numbers. The coefficient estimates are insignificantly different from zero, indicating institutions' indirect participation in VC deals as LPs does not reduce IPO underpricing. The results are consistent with our conjecture.

3.1.2 Cross-sectional Analyses

Our evidence so far shows a robust negative effect of intuitions' pre-IPO investment on IPO underpricing. In this section, we explore a number of cross-sectional analyses in both market condition and the characteristics of the institutions to shed further light on the mechanism of our previous finding.

Market Uncertainties We first examine how market uncertainties affect the relation between institutions' participation and IPO underpricing. If institutions' participation could substitute the price support service provided by underwriter, this service should be more important when there is higher uncertainty in the market. Thus, we expect the relation between institutions' participation and IPO underpricing to be stronger when there is high uncertainty in the market.

We test this conjecture with the following specification:

$$\begin{aligned} \text{IR}_i = \alpha + \beta_1 \text{Institution Participation}_i + \beta_2 \text{Institution Participation} \\ \times \text{Uncertainty} + \beta_3 \text{Uncertainty} + \gamma Z_i + \text{IPO Year}_t + \text{Industry}_j + \epsilon_i, \end{aligned} \tag{3}$$

We measure the level of market uncertainty using two variables: absolute forecast error and the stock return volatility. We measure these quantities using industry averages. Market uncertainty leads to imprecise estimation of earnings and high return volatility also indicates an uncertain environment. Table 4 reports how institutions' participation in pre-IPO venture investment affects IPO underpricing under various market conditions. In the columns (1) and (2), we examine the interaction of forecast error and the institutions' participation. The interaction terms between Forecast Error and both proxies for Institution Participation show negative signs and they are significant at the 1% and 5% level, respectively. In columns (3) and (4), we investigate how industry return volatility affects the relation between institutions' participation and IPO underpricing. Similar to the first two regressions, we find negative and significant coefficients in both regressions. In both regression, the relations between IPO underpricing and institutions' participation become stronger when industry uncertainty is higher. These results support our conjecture that institutions' participation becomes more important for startup firms in the IPO process under uncertain market conditions.

Institution Characteristics We explore how institution characteristics associate with the IPO underpricing. Since institutions' secondary market participation is crucial in reducing startup's IPO underpricing, we hypothesize that institutions with a more successful track-record would be able to reduce IPO underpricing more effectively. We further interact these performance measures with the intensity of institutions' participation, as intense participation by institutions with high past performances are most likely to reduce IPO underpricing. We modify our specification to the following form:

$$\begin{aligned}\text{IR}_i = \alpha + \beta_1 \text{Institution Participation}_i + \beta_2 \text{Institution Participation}_i \\ \times \text{PERF}_{i,t} + \beta_3 \text{PERF}_{i,t} + \gamma Z_i + \text{IPO Year}_t + \text{Industry}_j + \epsilon_i,\end{aligned} \tag{4}$$

where PERF represents the institution's past performances, which are measured by either excess returns or DGTW returns. If there are multiple institutions investing in the startup, we value-weight their performances. The results are reported in Table 5. In all four regressions, the coefficients of the interaction term (Institution Participation$_i$ $\times$ PERF$_{i,t}$) are negative and significant at the 5% level. These results support our conjecture that heavy investments from institutions with good past performance leads to reduced IPO underpricing.

Next, we examine how different types of institutions affect IPO underpricing. We rely on institution classification proposed in Bushee and Noe (2000). According to our hypothesis, active institution participation is crucial in reducing IPO underpricing, as active investors provide significant services such as secondary market price support. Based on Bushee's classification, we classify transient and dedicated institutions as active institutions, as these institutions do not have strong tendency to track index, which lends them the flexibility to command secondary market price support for startups. We classify quasi-indexers as passive institutions. We construct our Institution Participation variables separately using institutions from each category.

We report our results based on this dichotomy in columns (1) and (2) of Table 6. Consistent with our hypothesis, we find that only Institution Shares and Institution Numbers in active institution category have a significant negative relation with IPO underpricing. While the coefficients are negative for non-active institutions, they are not significant at conventional levels. We further the three-category defined in Bushee and Noe (2000) to classify institutions and our results are reported in columns (3) and (4) of Panel A in Table 6. We find that both dedicated and transient investors are significantly associated reduced IPO underpricing. In contrast, the quasi-indexers' participation has little effect in reducing the IPO underpricing.

We also explore if independent investment advisors (IIA) and other institutions have differential impact to IPO underpricing. Our classification of institutions are based on Thomson Financial Institutional Holding data.[9] These results are reported in Panel B of Table 6. We use both Institution Shares and Institution Numbers as proxies for IIA institutions' participation (reported in Column (1)) and non-IIA institutions' participation (reported in Column (2)). These results indicate that only IIA invest investors significantly reduce IPO underpricing. Overall, the institution classification results indicate that only pre-IPO investments from active investors are significantly associated with reduced IPO underpricing.

3.1.3 Institutions, Underwriter Service Provision, and IPO Underpricing

Our results so far indicate that active institutions' investments in startup reduce their underpricing. Next, we explore a specific mechanism in which investments from institutions provide substitutive services to startups. Liu and Ritter (2011) document that issuing firms are willing to accept additional underpricing if underwriters are able to provide coverage by all-star analysts. They argue that since all-star analysts are able to attract broad interests to these newly listed firms and attract large institutions, issuing firms are better able to maintain their secondary market prices if they are covered by all-star analysts of the underwriter. This is particularly important for startups invested by venture capital firms, as venture capitalists focus on share prices when they distribute the shares to limited partners (generally six month to 1 year after the IPO). Since all firms in our sample are invested by venture capital firms, we expect that all-star analysts coverage should play an important role in IPO underpricing. The reason that

[9] We obtain the classification data from Prof. Brian Bushee's website.

institutions' investments in startup firms are associated with lower IPO underpricing is due to their ability to provide secondary market price support to issuing firm, which could substitute the service provided by all-star analysts. The empirical implication is that institutions' participation should reduce the relation between star analyst coverage and IPO underpricing. In particular, to support the secondary prices, an institution needs to be committed in the long-run. Thus, we should expect our results to be most significant for dedicated investors.

We report these results in Table 8. In column (1) and (2), we confirm the analyst lust effect documented in Liu and Ritter (2011), as we document a significant negative relation between All-star Dummy and IPO underpricing both with and without additional control variables. Next, we interact Institution Shares of dedicated, indexer, and transient institutions. This result is reported in column (3) of Table 8. We find that the interaction between Dedicated Institution Numbers and All-star Dummy is negative and significant at the 5% level. A one standard deviation increase in Dedicated Institution Shares reduces the All-star Dummy by 0.022, or more than 20% of the economic magnitude of the star analyst coverage coefficient. We also use Institutions Numbers as proxies for participation from each category of institutions. This result is reported in column (4) of Table 8. We find that the coefficient is -0.021 and is significant at the 5% level. This result is consistent with the analysis using Institution Shares as the proxy for participation. In contrast, the interaction between star analyst and dedicated institutions or quasi-indexers do not have significant relation with IPO underpricing. This result suggests that institutions with long-horizon is able to reduce startups' reliance on star analyst coverage.

3.2 Institutions' Investment and Successful Exit

The negative relation between institutions' participation and IPO underpricing documented in the previous subsection highlights the economic benefit of institutions' investments for startups. However, it is important to note that institutions face many costs and constraints when investing in startups. For example, mutual funds and, to a lesser extent, hedge funds need to hold liquid securities in order to meet the potential redemption from investors. Making illiquid pre-IPO investments in startups limits their ability to meet the liquidity demand. Additionally, most institutions focus on secondary market and have relatively little expertise in making pre-IPO venture capital investments. Thus, it is equally important for us understand what entices institutions to make investments in these startups.

One reason may be a decreasing number of newly listed companies available for institutions to invest in the secondary market (e.g., Doidge, Karolyi, and Stulz (2013)), which forces institutions to consider investment opportunities outside of the secondary market. Ewens and Farre-Mensa (2017) also point to the reduced regulation and improved technology as potential factors in reducing the constraints for institutions to invest in startups. We argue that, in order to attract institutions' investments, independent venture capital firms may partner with institutions only on high quality startup firms. Given the evidence that venture capital firms and institutions tend to build long-term partnership (e.g., Kwon, Lowry, and Qian (2017)), it becomes even more important for venture capital firms to offer high quality startup investment opportunities to institutions.

3.2.1 Exit Probability

We measure the quality of the deal by the probability of a successful exit. This measure has been widely used in the past literature (e.g., Nahata (2008)). The associated empirical prediction is that firms with more institutions' involvements have a higher likelihood to exit. We use both OLS and Probit regressions to investigate how institutions' participation affects the probability of successful exit. The specification of our regressions is:

$$\begin{aligned}\text{Successful Exit Dummy}_i = f(\alpha + \beta\text{Institution Participation}_i + \gamma Z_i + \text{Exit Year}_t \\ + \text{Industry}_j + \text{State}_k + \epsilon_i),\end{aligned} \tag{5}$$

where Successful Exit Dummy takes a value of 1 if the startup is eventually acquired or if it goes public. X is a set of control variables, including Ln(Startup Age), Ln(Number of Rounds), Ln(Number of VCs), Ln(Total Amount Raised), Early-stage Dummy, VC Reputation, Industry M/B, Ln(Lagged Number of IPOs), and Ln(Number of MAs). Additionally, we include Exit Year, Industry, and State Fixed Effects. Standard errors are clustered by Lead VC. The results from this analysis is reported in Table 9. Our results from the OLS regression and the Probit model are consistent. In both specifications, we find a reliable positive association between institutions' participation and the probability of successful exit. For example, the OLS regression result reported in column (1) of Table 9 indicates that a one-standard deviation increase in Institution Share is associated with a 1% increase in the probability of successful exit. Similar to the OLS specification, the marginal effect of Institution Shares in the Probit regression (see column (2)) is also 1%. We also use Institution Numbers as another proxy for institutions' participation in VC deals. These results are reported in columns (2) and (4) of Table 9. Using this alternative proxy for institutions' participation, we obtain analogous results. The OLS regression indicates a coefficient of 0.008 and the Probit regression coefficient is 0.022. Both coefficients are significant at the 5% level.[10]

This result is consistent with a number of explanations. First, it is consistent with our hypothesis that venture capital firms are likely to partner with institutions on high quality deals. Second, it is possible that institutions have superior ability in identifying promising startups. However, given institutions' expertise is largely in the secondary market, it would require strong assumption that institutions are superior to independent venture capital firms in selecting startups.

3.2.2 Exit Channel

Since institutions' participation benefit startup in the IPO process, we argue that the positive relation between institutions' participation and the probability of successful exit should concentrate on the startups that aim for an IPO exit. In contrast, VC firms may be less incentivized to share a good startup investment with institutions if the startup is looking to be acquired. To test this conjecture, we implement a multinomial logistic regression with the dependent variable indicating the exit outcome. Three outcomes are considered: IPO, M&A, and the third baseline case of failure to exit. The results from this multinomial logistic regression is reported in Table 10. We first use Institution Shares as a proxy for institutions' participation. Reported in columns (1) and (2) of Table 10, our results indicate that participation of institution significantly increase the probability of exit through IPO. In contrast, these investments are not significantly associated with a higher probability of exit through the M&A channel. To validate these results, we also use Institution Numbers as an alternative proxy for institutions' participation. These results are reported in columns (3) and (4) in Table 9. These results are similar to our Institution Shares results analyses. We observe a significant positive relation between Insti-

[10]Our results are robust to a number of alternative specifications. Using a propensity score matching analyses (see Table A4 in the appendix), which further indicates that the relation between institutions' participation and successful exit cannot be explained by observed characteristics. We also find that our results are not driven by institutions which are reputable VC investors (see Table A5 in the appendix).

tution Numbers and IPO exit and there is no significant relation between Institution Numbers and M&A exit. This result supports the idea that venture capital firms are more likely to share high quality venture investment opportunities with institutions if the invested firm aiming for an IPO exit, as institutions' investments benefit startups and venture capital firms not only as a capital provider, but also as an effective force in reducing the cost of IPO.

4 Conclusion

Our paper provides the first demand-side explanation to a new phenomenon that attracts a lot of academic and media attention in the recent years: institutions that traditionally focus on the public market increasingly investing in VC-backed startups. We argue that as institutions directly participate in pre-IPO startups, startups rely less on underwriters with all-star analysts for secondary market support. As a result, startups reward underwriters with less IPO underpricing. Consistent with this argument, we find that: (1) Public market institutions' participation in startups reduces IPO underpricing, while their indirect participation as limited partners does not ; (2) There is substitution effect between public market institutions and all-star analysts coverage on IPO underpricing. In the cross section, the IPO underpricing reduction is more pronounced under higher industry uncertainty, and on more active institutional investors with better prior performance. Last, we provide evidence on the matching between startups with higher successful exit likelihood and public market institutions in the equilibrium.

Our study provides a complement to the nascent literature on institutions' investment in startups, by arguing that institutions provide post-IPO market price support to the startups. We also contribute to the IPO underpricing literature by building upon Liu and Ritter (2011) and introducing institutions as a substitute for the secondary market services of the underwriters.

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Table 1 Summary Statistics

This table presents the summary statistic of variables in our analyses. Panel A Reports summary statistics from our IPO sample, used in Table 2 to Table 7. Panel B reporst summary statistics from our all startup sample, used in Table 8 and Table 9. Variable definitions are in the Appendix.

Panel A

	Obs	Mean	Std Dev	Quartile 1	Median	Quartile 3
Initial Return	1902	0.25	0.44	0.00	0.10	0.29
Institution Shares	1902	0.02	0.11	0.00	0.00	0.00
Institution Numbers	1902	0.02	0.09	0.00	0.00	0.00
Forecast Error	1756	0.00	0.00	0.00	0.00	0.00
Industry Volatility	1893	0.00	0.00	0.00	0.00	0.00
Excess Return	1840	0.04	0.21	0.00	0.00	0.00
DGTW Return	1840	0.01	0.06	0.00	0.00	0.00
IIA Institution Shares	1159	0.01	0.07	0.00	0.00	0.00
Dedicated Institution Shares	1159	0.00	0.02	0.00	0.00	0.00
Indexer Institution Shares	1159	0.00	0.02	0.00	0.00	0.00
Transient Institution Shares	1159	0.00	0.01	0.00	0.00	0.00
IIA Institution Numbers	1159	0.02	0.07	0.00	0.00	0.00
Dedicated Institution Numbers	1159	0.01	0.03	0.00	0.00	0.00
Indexer Institution Numbers	1159	0.00	0.02	0.00	0.00	0.00
Transient Institution Numbers	1159	0.01	0.03	0.00	0.00	0.00
All-star Dummy	1902	0.13	0.33	0.00	0.00	0.00

Panel B

	Obs	Mean	Std Dev	Quartile 1	Median	Quartile 3
Successful Exit Dummy	19495	0.54	0.50	0.00	1.00	1.00
IPO Dummy	19495	0.13	0.34	0.00	0.00	0.00
M&A Dummy	19495	0.40	0.49	0.00	0.00	1.00
Institution Shares	19495	0.01	0.10	0.00	0.00	0.00
Institution Numbers	19495	0.02	0.09	0.00	0.00	0.00
Startup Age at First Round	19495	5.74	13.52	0.00	1.00	5.00
Number of Rounds	19495	4.17	3.18	2.00	3.00	6.00
Number of VCs	19495	5.36	4.40	2.00	4.00	7.00
Total Amount Raised	19495	40696	77242	4901	16054	43562
Early-stage Dummy	19495	0.42	0.49	0.00	0.00	1.00
VC Reputation	19495	0.17	0.42	0.00	0.03	0.16
Industry MB	19495	0.43	0.90	0.03	0.10	0.36
Lagged Number of IPOs at Exit	19495	19.24	17.42	9.00	13.00	22.00
Lagged Number of MAs at Exit	19495	1772	423	1565	1746	2051

Table 2 IPO Upderpricing

This table reports the results of how institution participation affect IPO underpricing. 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 Shares, which measures the total dollar amount invested by all institutional investors, scaled by the total dollar amount invested by all investors and Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors. We also include the following control variables: Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Age, Proceeds. 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: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Institution Shares	-0.024**		-0.017**		-0.018**	
	(0.009)		(0.008)		(0.008)	
Institution Numbers		-0.024**		-0.017**		-0.017**
		(0.009)		(0.008)		(0.008)
Lead VC Reputation	-0.012	-0.013	-0.014	-0.014	-0.011	-0.012
	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)
Tech Dummy	0.090**	0.090**	0.129***	0.129***	0.070*	0.070*
	(0.036)	(0.036)	(0.042)	(0.042)	(0.035)	(0.035)
Top-tier Dummy	0.098**	0.099**	0.035	0.036	0.038	0.039
	(0.043)	(0.043)	(0.026)	(0.026)	(0.027)	(0.027)
Prior Market Return	0.022	0.022	0.022	0.022	0.023*	0.023*
	(0.016)	(0.015)	(0.013)	(0.013)	(0.013)	(0.013)
Share Overhang	-0.048*	-0.048*	-0.010	-0.010	-0.018	-0.018
	(0.027)	(0.027)	(0.019)	(0.019)	(0.020)	(0.020)
Ln (Age)	-0.080***	-0.080***	-0.041***	-0.041***	-0.048***	-0.048***
	(0.022)	(0.022)	(0.011)	(0.011)	(0.011)	(0.011)
Ln (Proceeds)	0.094***	0.094***	0.080**	0.080**	0.085***	0.085***
	(0.028)	(0.028)	(0.030)	(0.030)	(0.031)	(0.031)
Observations	1,902	1,902	1,902	1,902	1,902	1,902
IPO Year Fixed Effects	NO	NO	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	NO	NO	YES	YES
Adjusted R-Square	0.165	0.165	0.269	0.269	0.281	0.281

Table 3 Institutional LP Participation and IPO Underpricing

This table presents the results of how institution participation as limit partners affects IPO underpricing. 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 LP Institutional Shares, which measures the total dollar amount invested by all institutional investors with at least one institutional LP, scaled by the total dollar amount invested by all investors and LP Institutional Numbers, which measures the total number of investors with at least one institutional LP, scaled by the total number of investors. We also include the following control variables: Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Age, Proceeds. 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: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)
Institution Shares	0.005	
	(0.013)	
Institution Numbers		0.002
		(0.006)
Lead VC Reputation	-0.012	-0.011
	(0.013)	(0.013)
Tech Dummy	0.069*	0.069*
	(0.035)	(0.035)
Top-tier Dummy	0.038	0.038
	(0.026)	(0.027)
Prior Market Return	0.023*	0.023*
	(0.013)	(0.013)
Share Overhang	-0.018	-0.018
	(0.020)	(0.020)
Ln (Age)	-0.050***	-0.050***
	(0.012)	(0.012)
Ln (Proceeds)	0.082**	0.082**
	(0.030)	(0.030)
Observations	1,902	1,902
IPO Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
Adjusted R-Square	0.279	0.279

Table 4 Cross-sectional Analysis: Uncertainty and IPO Underpricing

This table presents the results of how the institution participations effect on IPO underpricing varies across different market sections. We report OLS regression results. Panel A presents how to institution participation effect varies with industry-level analyst Forecast Error, measured as the industry value-weighted average forecast error of quarterly earnings. Panel B presents how the institution participation effect varies with industry-level return Volatility, measured as the 24-month industry return volatility. 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 Shares, which measures the total dollar amount invested by all institutional investors, scaled by the total dollar amount invested by all investors and Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors. We also include the following control variables: Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Age, Proceeds. 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: Forecast Error		Panel B: Industry Volatility	
	(1)	(2)	(3)	(4)
Institution Shares X Forecast Error	-0.002***			
	(0.001)			
Institution Numbers X Forecast Error		-0.003**		
		(0.001)		
Institution Shares X Industry Volatility			-0.008*	
			(0.004)	
Institution Numbers X Industry Volatility				-0.008**
				(0.004)
Forecast Error	-0.004	-0.004		
	(0.005)	(0.005)		
Industry Volatility			0.037*	0.035*
			(0.020)	(0.019)
Institution Shares	-0.018**		-0.019**	
	(0.009)		(0.008)	
Institution Numbers		-0.017*		-0.019**
		(0.009)		(0.008)
Observations	1,756	1,756	1,893	1,893
Controls	YES	YES	YES	YES
IPO Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.282	0.282	0.283	0.283

Table 5 Cross-sectional Analysis: Institutional Investor Performance and IPO Underpricing

This table presents the results of how the institution participation effect on IPO underpricing varies with public market performance of institutions. We report OLS regression results. Public market performance are measured by Excess Return, the excess return is the weighted average of 24-month excess return over risk-free rate of all institution investors and DGTW Return, the DGTW return is the weighted average of 24-month DGTW adjusted return of all institution investors. 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 Shares, which measures the total dollar amount invested by all institutional investors, scaled by the total dollar amount invested by all investors and Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors. We also include the following control variables: Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Age, Proceeds. 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: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)
Institution Shares X Excess Return	-0.008**			
	(0.003)			
Institution Numbers X Excess Return		-0.011**		
		(0.005)		
Institution Shares X DGTW Return			-0.006**	
			(0.002)	
Institution Numbers X DGTW Return				-0.007**
				(0.003)
Excess Return	0.017	0.037*		
	(0.011)	(0.019)		
DGTW Return			0.016*	0.026**
			(0.009)	(0.013)
Institution Shares	-0.017*		-0.022**	
	(0.009)		(0.011)	
Institution Numbers		-0.025**		-0.025***
		(0.010)		(0.009)
Observations	1,840	1,840	1,840	1,840
Control Variables	YES	YES	YES	YES
IPO Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.284	0.285	0.284	0.284

Table 6 Institutional Investor Classification and IPO Underpricing

This table presents the results of how the institution participation effect on IPO underpricing varies across different classifications of institutional investors. We report OLS regression results. Panel A presents how institution participation effect varies across IIA and non-IIA investors, defined by Spectrum. Panel B presents how institution participation effect varies with institutional investors investment horizon, defined in Bushee and Noe (2000). 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 Shares, which measures the total dollar amount invested by all institutional investors, scaled by the total dollar amount invested by all investors and Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors. We calculate both Institutional Shares and Institutional Numbers separately by institutional investor classification. We also include the following control variables: Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Age, Proceeds. 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: Investment Horizon

	(1)	(2)	(3)	(4)
Active Institution Shares	-0.016***			
	(-3.105)			
Non-Active Institution Shares	-0.010			
	(-1.345)			
Active Institution Numbers		-0.015***		
		(-3.753)		
Non-Active Institution Numbers		-0.008		
		(-0.975)		
Dedicated Institution Shares			-0.009**	
			(-2.317)	
Indexer Institution Shares			-0.003	
			(-0.448)	
Transient Institution Shares			-0.014***	
			(-2.902)	
Dedicated Institution Numbers				-0.009**
				(-2.318)
Indexer Institution Numbers				0.001
				(0.248)
Transient Institution Numbers				-0.011**
				(-2.565)
Observations	1,902	1,902	1,902	1,902
Control Variables	YES	YES	YES	YES
IPO Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.281	0.280	0.280	0.279

Panel B: Investor Type

	(1)	(2)
IIA Institution Shares	-0.020***	
	(-3.110)	
Non-IIA Institution Shares	-0.001	
	(-0.106)	
IIA Institution Numbers		-0.019***
		(-2.972)
Non-IIA Institution Numbers		-0.000
		(-0.024)
Observations	1,902	1,902
Control Variables	YES	YES
IPO Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
Adjusted/Pseudo R-Square	0.281	0.281

Table 7 Substitution Effect: Institutional Investors and All-star Analysts

This table presents the results of whether institution participation alleviate analyst lust effect of IPO underpricing. We report OLS regression results. All-star dummy equal 1 if the IPO is covered by an Institutional Investor all-star analyst (top 3) from the bookrunner within 1 year of the IPO and 0 otherwise. 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 Shares, which measures the total dollar amount invested by all institutional investors, scaled by the total dollar amount invested by all investors and Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors. We calculate both Institutional Shares and Institutional Numbers separately by institutional investor classification. We also include the following control variables: Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Age, Proceeds. 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: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)
All-star Dummy	0.159***	0.103***	0.108***	0.104***
	(0.037)	(0.027)	(0.027)	(0.027)
Dedicated Institution Shares X All-star Dummy			-0.022**	
			(0.010)	
Indexer Institution Shares X All-star Dummy			0.005	
			(0.021)	
Transient Institution Shares X All-star Dummy			0.053	
			(0.045)	
Dedicated Institution Numbers X All-star Dummy				-0.021**
				(0.010)
Indexer Institution Numbers X All-star Dummy				0.006
				(0.026)
Transient Institution Numbers X All-star Dummy				0.036
				(0.040)
Dedicated Institution Shares			-0.006	
			(0.008)	
Indexer Institution Shares			-0.016	
			(0.011)	
Transient Institution Shares			-0.019*	
			(0.009)	
Dedicated Institution Numbers				-0.008
				(0.006)
Indexer Institution Numbers				-0.005
				(0.010)
Transient Institution Numbers				-0.016
				(0.009)
Observations	1,159	1,159	1,159	1,159
Control Variables	No	YES	YES	YES
IPO Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.256	0.293	0.293	0.292

Table 8 Institutions' 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 Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors.. 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	
	(1)	(2)	(3)	(4)
Institution Shares	0.009**		0.025**	
	(0.004)		(0.011)	
Institution Numbers		0.008**		0.022**
		(0.003)		(0.010)
Ln (Startup Age at First Round)	0.007*	0.007	0.020*	0.020*
	(0.004)	(0.004)	(0.012)	(0.012)
Ln (Number of Rounds)	-0.079***	-0.079***	-0.228***	-0.228***
	(0.006)	(0.006)	(0.016)	(0.016)
Ln (Number of VCs)	0.051***	0.051***	0.143***	0.143***
	(0.006)	(0.006)	(0.017)	(0.017)
Ln (Total Amount Raised)	0.092***	0.092***	0.266***	0.266***
	(0.005)	(0.005)	(0.016)	(0.016)
Early-stage Dummy	-0.020***	-0.020***	-0.056***	-0.056***
	(0.004)	(0.004)	(0.011)	(0.011)
VC Reputation	0.018***	0.018***	0.052***	0.052***
	(0.005)	(0.005)	(0.017)	(0.017)
Industry MB	-0.018***	-0.018***	-0.054***	-0.054***
	(0.004)	(0.004)	(0.012)	(0.012)
Ln (Lagged Number of IPOs at Exit)	0.017***	0.017***	0.047***	0.047***
	(0.005)	(0.005)	(0.015)	(0.015)
Ln (Lagged Number of MAs at Exit)	-0.003	-0.003	-0.006	-0.006
	(0.014)	(0.014)	(0.040)	(0.040)
Observations	19,495	19,495	19,495	19,495
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	0.140	0.140	0.114	0.114

Table 9 Institutions' 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 Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors. 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: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	IPO	M&A	IPO	M&A
	(1)	(2)	(3)	(4)
Institution Shares	0.080***	0.024		
	(0.022)	(0.018)		
Institution Numbers			0.074***	0.019
			(0.022)	(0.018)
Ln (Startup Age)	0.121***	0.014	0.119***	0.014
	(0.028)	(0.019)	(0.028)	(0.019)
Ln (Number of Rounds)	-0.421***	-0.353***	-0.422***	-0.354***
	(0.037)	(0.024)	(0.037)	(0.024)
Ln (Number of VCs)	0.216***	0.238***	0.217***	0.238***
	(0.040)	(0.027)	(0.040)	(0.027)
Ln (Total Amount Raised)	1.149***	0.289***	1.148***	0.289***
	(0.042)	(0.024)	(0.042)	(0.024)
Early-stage Dummy	-0.169***	-0.081***	-0.168***	-0.081***
	(0.029)	(0.018)	(0.029)	(0.018)
VC Reputation	0.083***	0.099***	0.083***	0.099***
	(0.024)	(0.019)	(0.024)	(0.019)
Industry MB	-0.109**	-0.088***	-0.108**	-0.088***
	(0.043)	(0.021)	(0.043)	(0.021)
Ln (Lagged Number of IPOs)	0.120***	0.066**	0.120***	0.066**
	(0.045)	(0.026)	(0.045)	(0.026)
Ln (Lagged Number of MAs)	-0.049	0.010	-0.054	0.010
	(0.101)	(0.069)	(0.101)	(0.069)
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	0.149		0.149	

Table A1: Variable Definition

IPO Related Variables	
Initial Return	The percentage return from the offer price to the first trading day closing price.
Lead 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.
Tech Dummy	A dummy variable equal 1 if the startup company is an internet or technology firm and 0 otherwise, defined as in Loughran and Ritter (2004).
Top-tier Dummy	A dummy variable equal 1 if there is at least one underwriter has a rank of 9 and 0 otherwise, defined as in Loughran and Ritter (2004).
Prior Market Return	The market return for the thirty trading days preceding the IPO date.
Share Overhang	Share Overhand is the ratio of retained shares to the total shares offered. Retained shares are calculated as the difference between total shares offered and secondary shares offered.
Ln(Age)	The natural log of the IPO year minus the firms founding year, where founding dates are obtained from the FieldRitter dataset, as used in Loughran and Ritter (2004). If the founding year is missing in the FieldRitter dataset, we use the founding year obtained from VentureExpert.
Ln(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.
Institution Participation Variables	
Institution Shares	The total dollar amount invested by all institutional investors, scaled by the total dollar amount invested by all VC investors.
Institution Numbers	The total number of institutional investors, scaled by the total number of VC investors.
LP Institution Shares	The total dollar amount invested by all institutions with at least one institutional LP, scaled by the total dollar amount invested by all investors.
LP Institution Numbers	The total number of investors with at least one institutional LP, scaled by the total number of investors.

Cross-section Variables

Forecast Error	The industry forecast error is the industry value-weighted average forecast error of quarterly earnings, weighted by market capitalization at the beginning of the earnings announcement month. Firm-level forecast error is calculated as the absolute difference between the most consensus forecast and actual earning, scaled by lagged share price. Consensus forecast is measured as the median forecast within 90 days of earnings release using the IBES unadjusted detail-history file.
Industry Volatility	Industry volatility is the 24-month industry return volatility, using the monthly Fama-French 12 industry return obtained from Kenneth Frenchs website.
All-star Dummy	A dummy variable equal 1 if the IPO is covered by an Institutional Investor all-star analyst (top 3) from the bookrunner within 1 year of the IPO and 0 otherwise, as defined in Ritter and Liu (2011).
Excess Return	The excess return is the weighted average of 24-month excess return over risk-free rate of all institution investors. More specifically, we first calculate the quarterly excess returns using average excess returns for all the stocks held by the institution, weighted by the beginning-of-quarter holding value. We then compound the quarterly institution excess return to 8 quarters. If there are more than one institution investor for a given startup, we average across all institution investors, weighted by institutions investment amounts.
DGTW Return	The DGTW return is the weighted average of 24-month DGTW adjusted return of all institution investors. The More specifically, we first calculate the quarterly DGTW adjusted return using average DGTW adjusted return for all the stocks held by the institution, weighted by the beginning-of-quarter holding value. We then compound the quarterly institution DGTW adjusted return to 8 quarters. If there are more than one institution investor for a given startup, we average across all institution investors, weighted by institutions investment amounts.

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.

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 firms 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.
Ln (Total Amount Raised)	The natural log of total dollar amount raised by the entrepreneurial firm
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 MAs 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.

Fixed Effects

IPO Year Fixed Effects	Dummy variables for the year of IPO.
Industry Fixed Effects	Dummy variables for the Fama-French 12 industry.
Exit Year Fixed Effects	Dummy variables for the year of the entrepreneurial firms 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.

Table A2 Institutions' Participation and 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. The key independent variables are Institutional Shares, which measures the total dollar amount invested by all institutional investors, scaled by the total dollar amount invested by all investors and Institutional Numbers, which measures the total number of institutional investors, scaled by the total number of VC investors. We also include the following control variables: Lead VC Reputation, Tech Dummy, Top-tier Dummy, Prior Market Return, Share Overhang, Age, Proceeds. 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	
	(1)	(2)	(3)	(4)
Institution Shares	-0.043**		0.299***	
	(0.020)		(0.081)	
Institution Numbers		-0.051**		0.329***
		(0.021)		(0.077)
VC Reputation	-0.037***	-0.038***	0.042	0.049
	(0.013)	(0.013)	(0.104)	(0.104)
Tech Dummy	0.095	0.096	0.004	0.001
	(0.067)	(0.067)	(0.447)	(0.446)
Top-tier Dummy	-0.233***	-0.231***	1.266***	1.252***
	(0.034)	(0.033)	(0.409)	(0.408)
Prior Market Return	0.012	0.012	0.349**	0.349**
	(0.014)	(0.014)	(0.155)	(0.154)
Share Overhang	-0.091***	-0.090***	0.135	0.135
	(0.026)	(0.026)	(0.163)	(0.164)
Ln (Firm Age at IPO Date)	-0.078***	-0.077***	0.675***	0.668***
	(0.024)	(0.024)	(0.219)	(0.219)
Observations	1,899	1,899	1,452	1,452
IPO Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Adjusted/Pseudo R-Square	0.160	0.161	0.036	0.036

Table A3 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)	1.129	1.171	-1.233	0.218	1.178	1.171	0.173	0.863
Ln (Number of Rounds)	1.131	1.468	-14.072	0.000	1.463	1.468	-0.233	0.815
Ln (Number of VCs)	1.617	2.109	-25.116	0.000	2.102	2.109	-0.332	0.740
Ln (Total Amount Raised)	9.443	10.336	-16.838	0.000	10.307	10.336	-0.604	0.546
Early-stage Dummy	0.423	0.304	7.747	0.000	0.315	0.304	0.731	0.465
VC Reputation	0.167	0.253	-6.573	0.000	0.266	0.253	0.561	0.575
Industry MB	0.439	0.246	6.806	0.000	0.237	0.246	-0.445	0.656
Ln (Lagged Number of IPOs at Exit)	2.609	2.722	-4.171	0.000	2.720	2.722	-0.079	0.937
Ln (Lagged Number of MAs at Exit)	7.449	7.364	9.365	0.000	7.365	7.364	0.112	0.911

Panel B: Logit Rregression Results

Variables	Pre-Match	Post_Match
Ln (Startup Age at First Round)	0.252***	-0.009
	(7.092)	(-0.237)
Ln (Number of Rounds)	-0.129***	-0.005
	(-2.620)	(-0.095)
Ln (Number of VCs)	0.830***	-0.011
	(15.676)	(-0.212)
Ln (Total Amount Raised)	0.436***	0.043
	(8.052)	(0.788)
Early-stage Dummy	-0.108***	-0.031
	(-2.884)	(-0.804)
VC Reputation	0.081***	-0.018
	(3.047)	(-0.747)
Industry MB	-0.063	0.018
	(-1.159)	(0.312)
Ln (Lagged Number of IPOs at Exit)	-0.046	0.002
	(-0.862)	(0.038)
Ln (Lagged Number of MAs at Exit)	-0.108	0.016
	(-0.877)	(0.131)
Observations	19,435	6,474
Exit Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
State Fixed Effects	YES	YES
Adjusted/Pseudo R-Square	0.148	0.004

Panel C: Estimated Propensity Score Distributions

	No. of Obs.	Mean	SD	P5	Median	P95
Match Number 1						
Difference	1079	0.000	0.008	0.000	0.000	0.000
Control	1079	0.140	0.121	0.016	0.104	0.379
Treatment	1079	0.140	0.122	0.016	0.104	0.379
Match Number 2						
Difference	1079	0.000	0.010	0.000	0.000	0.000
Control	1079	0.140	0.121	0.016	0.104	0.381
Treatment	1079	0.140	0.122	0.016	0.104	0.379
Match Number 3						
Difference	1079	-0.001	0.013	-0.001	0.000	0.001
Control	1079	0.139	0.118	0.016	0.104	0.381
Treatment	1079	0.140	0.122	0.016	0.104	0.379
Match Number 4						
Difference	1079	-0.001	0.016	-0.001	0.000	0.001
Control	1079	0.139	0.118	0.016	0.104	0.376
Treatment	1079	0.140	0.122	0.016	0.104	0.379
Match Number 5						
Difference	1079	-0.001	0.018	-0.002	0.000	0.001
Control	1079	0.139	0.117	0.016	0.104	0.381
Treatment	1079	0.140	0.122	0.016	0.104	0.379

Table A4 Propensity Score Matching Robustness Test

This table presents the results from the propensity score matched sample. We repeat the analysis in table 8 and 9 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 Shares and Institutional Numbers. 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 Shares and Institutional Numbers. 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	
	(1)	(2)	(3)	(4)
Institution Shares	0.012***		0.034***	
	(0.004)		(0.012)	
Institution Numbers		0.011***		0.033***
		(0.004)		(0.012)
Ln (Startup Age at First Round)	-0.010	-0.010	-0.031	-0.032
	(0.009)	(0.009)	(0.026)	(0.026)
Ln (Number of Rounds)	-0.105***	-0.106***	-0.311***	-0.312***
	(0.011)	(0.011)	(0.033)	(0.033)
Ln (Number of VCs)	0.076***	0.076***	0.223***	0.224***
	(0.012)	(0.012)	(0.036)	(0.036)
Ln (Total Amount Raised)	0.050***	0.050***	0.146***	0.145***
	(0.014)	(0.014)	(0.040)	(0.040)
Early-stage Dummy	-0.018**	-0.018**	-0.054**	-0.054**
	(0.008)	(0.008)	(0.024)	(0.024)
VC Reputation	0.008	0.008	0.023	0.023
	(0.009)	(0.009)	(0.024)	(0.024)
Industry MB	-0.032***	-0.032***	-0.091***	-0.090***
	(0.012)	(0.012)	(0.033)	(0.033)
Ln (Lagged number of IPO at exit)	0.039***	0.039***	0.110***	0.110***
	(0.012)	(0.012)	(0.035)	(0.035)
Ln (Lagged number of MA at exit)	-0.016	-0.016	-0.042	-0.043
	(0.030)	(0.030)	(0.084)	(0.084)
Observations	6,474	6,474	6,474	6,474
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	0.114	0.114	0.103	0.103

Panel C: Multi-Logit

	IPO	M&A	IPO	M&A
	(1)	(2)	(3)	(4)
Institution Shares	0.090***	0.042**		
	(0.022)	(0.019)		
Institution Numbers			0.087***	0.043**
			(0.023)	(0.019)
Ln (Startup Age at First Round)	-0.035	-0.072**	-0.038	-0.072**
	(0.039)	(0.033)	(0.039)	(0.033)
Ln (Number of Rounds)	-0.495***	-0.528***	-0.497***	-0.528***
	(0.055)	(0.046)	(0.055)	(0.046)
Ln (Number of VCs)	0.256***	0.450***	0.259***	0.452***
	(0.058)	(0.050)	(0.059)	(0.050)
Ln (Total Amount Raised)	0.876***	-0.080	0.876***	-0.080
	(0.064)	(0.051)	(0.064)	(0.051)
Early-stage Dummy	-0.105**	-0.085**	-0.104**	-0.084**
	(0.042)	(0.034)	(0.042)	(0.034)
VC Reputation	0.028	0.047**	0.028	0.047**
	(0.024)	(0.021)	(0.024)	(0.021)
Industry MB	-0.099	-0.179***	-0.097	-0.178***
	(0.069)	(0.054)	(0.069)	(0.054)
Ln (Lagged Number of IPOs at Exit)	0.212***	0.171***	0.212***	0.170***
	(0.065)	(0.047)	(0.065)	(0.047)
Ln (Lagged Number of MAs at Exit)	-0.011	-0.077	-0.019	-0.078
	(0.130)	(0.112)	(0.130)	(0.112)
Observations	6,474		6,474	
Exit Year Fixed Effects	YES		YES	
Industry Fixed Effects	YES		YES	
State Fixed Effects	YES		YES	
Adjusted/Pseudo R-Square	0.147		0.146	

Table A5 Intuitional Investor Reputation and Successful Exit

This table reports the result of how institutions participation successful exit, controlling for institutional investor reputation. We repeat the analysis in table 8 and 9. institutional investor reputation 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 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 Numbers. 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 Numbers. 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	
	(1)	(2)	(3)	(4)
Institution Shares	0.009**		0.024**	
	(0.004)		(0.010)	
Institution Numbers		0.007**		0.021**
		(0.003)		(0.010)
Institution Reputation	0.019**	0.019**	0.057**	0.057**
	(0.008)	(0.008)	(0.024)	(0.024)
Ln (Startup Age at First Round)	0.007*	0.007	0.021*	0.020*
	(0.004)	(0.004)	(0.012)	(0.012)
Ln (Number of Rounds)	-0.078***	-0.078***	-0.226***	-0.226***
	(0.006)	(0.006)	(0.016)	(0.016)
Ln (Number of VCs)	0.050***	0.050***	0.139***	0.139***
	(0.006)	(0.006)	(0.017)	(0.017)
Ln (Total Amount Raised)	0.091***	0.091***	0.264***	0.264***
	(0.005)	(0.005)	(0.016)	(0.016)
Early-stage Dummy	-0.020***	-0.020***	-0.056***	-0.056***
	(0.004)	(0.004)	(0.011)	(0.011)
VC Reputation	0.009*	0.009*	0.025	0.025
	(0.005)	(0.005)	(0.016)	(0.016)
Industry MB	-0.018***	-0.018***	-0.054***	-0.054***
	(0.004)	(0.004)	(0.012)	(0.012)
Ln (Lagged number of IPO at exit)	0.017***	0.017***	0.047***	0.047***
	(0.005)	(0.005)	(0.015)	(0.015)
Ln (Lagged number of MA at exit)	-0.004	-0.004	-0.007	-0.007
	(0.014)	(0.014)	(0.040)	(0.040)
Observations	19,495	19,495	19,495	19,495
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	0.141	0.141	0.115	0.115

Panel C: Multi-Logit

	IPO	M&A	IPO	M&A
	(1)	(2)	(3)	(4)
Institution Shares	0.079***	0.023		
	(0.022)	(0.018)		
Institution Numbers			0.073***	0.017
			(0.022)	(0.018)
Institution Reputation	0.094***	0.104***	0.094***	0.104***
	(0.028)	(0.021)	(0.028)	(0.021)
Ln (Startup Age at First Round)	0.121***	0.015	0.119***	0.015
	(0.027)	(0.019)	(0.028)	(0.019)
Ln (Number of Rounds)	-0.418***	-0.350***	-0.418***	-0.350***
	(0.037)	(0.024)	(0.037)	(0.024)
Ln (Number of VCs)	0.207***	0.230***	0.208***	0.230***
	(0.040)	(0.027)	(0.040)	(0.027)
Ln (Total Amount Raised)	1.148***	0.287***	1.147***	0.287***
	(0.042)	(0.024)	(0.042)	(0.024)
Early-stage Dummy	-0.169***	-0.081***	-0.169***	-0.081***
	(0.029)	(0.018)	(0.029)	(0.018)
VC Reputation	0.032	0.041*	0.032	0.041*
	(0.026)	(0.022)	(0.026)	(0.022)
Industry MB	-0.108**	-0.088***	-0.108**	-0.088***
	(0.043)	(0.021)	(0.043)	(0.021)
Ln (Lagged Number of IPOs at Exit)	0.120***	0.066**	0.121***	0.066**
	(0.045)	(0.026)	(0.045)	(0.026)
Ln (Lagged Number of MAs at Exit)	-0.052	0.008	-0.056	0.008
	(0.101)	(0.069)	(0.101)	(0.069)
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	0.150		0.150	

Table A6 Institutional Investor Performance and Success Exit

This table reports the results of how institutions performance relates to the successful exit. We restrict our sample to the startups with at least one institution investor. The key independent variables are Excess Return, which measures the weighted average of 24-month excess return over risk-free rate of all institution investors, DGTW Return, which measures the weighted average of 24-month DGTW adjusted return of all institution investors, Industry Excess Return, which measures the weighted average of 24-month excess return over risk-free rate return in the startups industry of all institution investors, and Industry DGTW Return, which measures the weighted average of 24-month DGTW adjusted return in the startups industry of all institution investors. 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. 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. 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			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Excess Return	0.017***				0.055***			
	(0.005)				(0.016)			
DGTW Return		0.007				0.020		
		(0.004)				(0.013)		
Industry Excess Return			0.012***				0.042**	
			(0.004)				(0.017)	
Industry DGTW Return				0.010**				0.032**
				(0.005)				(0.016)
Observations	746	746	746	746	746	746	746	746
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
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	0.086	0.074	0.081	0.080	0.186	0.178	0.184	0.182

Panel C: Multi-Logit

	IPO	M&A	IPO	M&A	IPO	M&A	IPO	M&A
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Excess Return	0.141***	0.071**						
	(0.037)	(0.032)						
DGTW Return			0.075**	0.019				
			(0.029)	(0.024)				
Industry Excess Return					0.133***	0.052*		
					(0.036)	(0.030)		
Industry DGTW Return							0.109***	0.043*
							(0.032)	(0.025)
Observations	746		746		746		746	
Control Variables	YES		YES		YES		YES	
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	0.235		0.230		0.235		0.234	

Table A7 Institutional Investor Placebo Performance and Success Exit

This table presents the result from a placebo Performance test. We report both OLS and Probit regression results. The dependent variable is the Successful Exit Dummy. The key independent variable is Placebo Excess Return, which measures the weighted average of 24-month excess return over risk-free rate return outside the startups industry of all institution investors, and Placebo DGTW Return, which measures the weighted average of 24-month DGTW adjusted return outside the startups industry of all institution investors. 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	
	(1)	(2)	(3)	(4)
Placebo Excess Return	0.004		0.013	
	(0.004)		(0.012)	
Placebo DGTW Return		-0.000		0.001
		(0.003)		(0.011)
Observations	746	746	746	746
Control Variables	YES	YES	YES	YES
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	0.072	0.071	0.176	0.175