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Monitoring via staging: Evidence from Private investments in public equity

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ABSTRACT

I study the causes and consequences of staging in the setting of private investments in public equities (PIPEs). I find that, in PIPE investments, as in venture capital staging, the staging strategy is used by investors as a monitoring mechanism to mitigate information asymmetry and agency problems. Moreover, strategic investors and investors investing alone are more likely to utilize staging. I show also that staging reduces the cost of financing and has positive implications for PIPE issuers' long-run stock performance.

1. Introduction

The market for private investment in public equity (the PIPE market) has been developing rapidly since 1995, having grown from $1.4 billion in 1995 to $124 billion in 2008 before shrinking somewhat in 2009–2010 due to the broad market crash and the ensuing recession.[1] Over this 16-year period (1995–2010), more than 17,000 PIPE transactions occurred, raising approximately $460 billion.[2] The same period also featured rapid growth in private equity funds and hedge funds—the most influential players in the PIPE market—as their impact on the overall economy increased accordingly. A long-debated issue in the literature on private placements since Wruck (1989) is whether and how private placement investors monitor managers. Given dramatic changes in the landscape of the private placement market since 1995, this paper aims to shed new light on this issue using a sample of US PIPE transactions that occurred from 1996 to 2007.

Most PIPE issuers are small, young, and risky public companies (see Dai, 2007; Brophy et al., 2009; Chaplinsky and Haushalter, 2010; Chen et al., 2010b; Dai et al., 2010). PIPE investors therefore need to understand how to mitigate the agency and information problems that typically accompany such investments. Extant studies show that investors request higher discounts and/or aggressively negotiate for investor-friendly contracts when facing substantial agency costs (Chaplinsky and Haushalter, 2010; Anderson and Dai, 2010; Bengtsson and Dai, 2010). In addition, a few studies document the practice on the part of some private placement investors of requesting board seats so that they can directly monitor managerial activity (e.g., Wruck, 1989; Dai, 2007; Anderson and Dai, 2010). On the other hand, Hertzel and Smith (1993) do not find a monitoring effect after controlling for information cost. Wu (2004) and Barclay et al. (2007) argue further that most private placement investors are passive investors even though they sometimes hold large stakes in issuers. In this paper, I examine whether private placement investors monitor via staging, the sequential disbursement of capital from an investor or a group of investors to a company, based on whether the company meets certain performance hurdles. Furthermore, I examine the following two questions: First, what are the determinants of staging in PIPE investments? Second, what are the implications of staging for the cost of financing and the long-run performance of PIPE issuers? While staging in venture capital investments is widely studied, this is, as far as I know, the first paper to examine the utilization of staging as a monitoring tool in public equity investment, in particular private placements by public companies.

The PIPE market offers several advantages as a setting in which to investigate the causes and consequences of staging and their relation to theory. First, the literature on staging is limited to

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[1] PIPE statistics given are reported by Sagient Research (www.sagientresearch.com/pt).

[2] Ibid.

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private equity investments. The lack of access to financial data on private firms often serves as a basis for criticism of these empirical studies. In this paper, I explore the role of staging in public equity investments, which arguably allows for greater precision when measuring agency costs and performance. Second, the PIPE market exhibits substantial heterogeneity across both issuers and investors. This feature allows me to further examine whether the utilization of staging and its effect conditional on investor characteristics.

As modeled in much theoretical work (see e.g., Sahlman, 1988, 1990; Hellman, 1994; Neher, 1999; Cornelli and Yosha, 2003; Wang and Zhou, 2004; Yerramilli, 2008), staging helps address agency problems associated with information asymmetry, moral hazard, and potential hold-up and helps address the problem of inefficient continuation (Admati and Pfleiderer, 1994). Based on this line of reasoning, I conjecture that the utilization of staging in PIPE investments is positively correlated with PIPE issuers' agency costs. To empirically test this hypothesis, following the literature on venture capital staging (see e.g., Gompers, 1995; Hege et al., 2003; Krohmer et al., 2009; Tian, 2011), I examine whether PIPE issuers receive multiple rounds from the same lead investors, the length of time that passes between rounds (an inverse proxy for monitoring intensity that I henceforth call 'duration'), the amount of total financing, and offer size per round. In contrast to venture capital investments, PIPE investors show greater heterogeneity in terms of investment objectives and horizons, as discussed in Dai (2007) and Anderson and Dai (2010). I expect that the utilization of staging in PIPEs is conditional on these investor characteristics. Presumably, investors with larger ownership stakes, strategic investors, and those investing alone have a more compelling need to monitor managers and thus are more likely to utilize staging. Third, if staging effectively reduces agency cost and moral hazard and prevents inefficient continuation, as the theories propose, I anticipate finding that staging reduces financing costs and predicts better long-run performance on the part of PIPE issuers. I estimate PIPE discounts as a proxy for financing cost. To measure long-run performance, I examine both stock performance and operating performance up to 2 years subsequent to a PIPE offering.

Using a sample of 3135 US PIPE transactions between 1996 and 2007 with available data, I show that agency costs of issuing firms are important determinants of staging in PIPE investments. I find, for instance, that analyst coverage significantly reduces the probability of staging and the total number of rounds while issuer bid-ask spread and financial leverage significantly increase the probability of staging and the total number of rounds. Furthermore, duration is positively correlated with analyst coverage but negatively associated with the bid-ask spread and financial leverage. Analyzing the total amount of financing and investment size per offering, I find that firms with staged financing receive about $3 million more in financing than firms that receive a single round do. The round size of staged financing, on the other hand, is significantly smaller on average than is the average single round sample. Moreover, both the total amount of financing and round size decrease with agency cost. More specifically, these figures increase with analyst coverage but decrease with the ratio of enterprise value to assets. These findings suggest that, as is the case with staging in private equity investment, staging is used by investors to mitigate agency problems in PIPE investments.

I find that, in addition to the agency cost of PIPE issuers, some investor characteristics also condition the utilization of staging in PIPE investments. In particular, I show that strategic investors (including corporations, VCs, and PEs) are more likely to utilize staging than other investors are. Moreover, investors are more likely to stage their investments when they are investing alone. These findings support the notion that staging is used as a monitoring tool to alleviate information asymmetry and investment uncertainty.

In the second set of analyses, I examine the effect of staging on the cost of financing measured by PIPE discounts and on long-run firm performance. I show that, on average, firms offer lower discounts to investors in staged financing, indicating that staging helps mitigate the agency and information problems, resulting in lower financing costs. As far as I know, this study provides, for the first time, direct empirical evidence of the effect of staging on the cost of financing to firms issuing PIPES. In addition, I find that staging is significantly and positively related to the long-run stock performance of PIPE firms. In particular, PIPE issuers with staged financing outperform their peers with single-round financing by 6%, 10%, and 9%, respectively, at 100 days, 250 days, and 500 days subsequent to PIPE offerings. This evidence extends the findings reported in Gompers (1995), Krohmer et al. (2009) and Tian (2011) that examine staging in venture capital investments.

This paper contributes to the literature on staging and PIPEs along several dimensions. First, the paper extends existing empirical work on staging in venture capital investments by providing new evidence pertaining to the determinants and consequences of staging in public equity offerings. The findings are, in general, consistent with predictions in theoretical work that staging is used as a monitoring tool in the face of severe agency and information asymmetry problems and that it benefits issuers in the sense that it helps reduce financing costs and improves long-run performance.

Furthermore, this paper provides new evidence that, in addition to direct control (voting rights and board seats) and contractual protections (see e.g., Dai, 2007; Chaplinsky and Haushalter, 2010; Anderson and Dai, 2010; Bengtsson and Dai, 2010), PIPE investors also utilize staging to monitor managerial actions and interim firm performance. This finding reflects the diversity of mechanisms that private placement investors utilize to monitor managers. Yet this approach is neglected in the literature that examines whether investors monitor managers in private placements, which potentially leads to an underestimation of the monitoring effect provided by private placement investors.

As PIPE financing grows increasingly popular, especially among small and risky firms, concerns have been raised that the structure of these offerings allows sophisticated investors to take advantage of companies with a desperate need for funds.[3] The evidence provided in this paper that staging helps to reduce issuers' financing costs and improves long-run stock performance runs counter to such an argument. More importantly, our findings suggest that heterogeneity in the design of PIPE transactions needs to be taken into account when deciding whether and to what extent PIPE issuers (as well as investors) benefit from this increasingly important financing tool.

The remainder of the paper is organized as follows. Section 2 summarizes the relevant literature on staging and PIPEs and develops testable hypotheses. Section 3 describes the data and the sample. Section 4 presents empirical analysis of the determinants of staging in PIPE investments. Section 5 examines the effects of staging on the cost of financing and on long-run firm performance. In Section 6, I summarize the primary findings of the paper and discuss their implications.

2. Literature review and hypotheses development

2.1. Literature related to PIPEs

A private placement is a sale of unregistered securities by a public company to a selective group of individuals or institutions. PIPE securities are issued pursuant to Section 4(2) of the Securities

[3] See, for example, "A Troubling Finance Tool for Companies in Trouble", *The New York Times* (March 15th, 2006).

Act or Regulation D under the Securities Act, the SEC Rule that allows public companies to issue stocks privately to a group of accredited investors without the need for public registration prior to the transaction.[4] Sagient Research categorizes PIPEs into traditional and structured categories based on whether or not investors are price protected. Securities issued within the traditional class are typically common stocks or convertibles with a fixed conversion price. Conversion prices with structured PIPEs can be adjusted downward if there is an adverse change in either market conditions or the fundamentals of the issuing firm. The PIPE offerings considered in this paper are traditional PIPEs, including plain-vanilla common stock issuances and convertibles with fixed pricing.

PIPE offerings are similar to traditional private placements in many respects. The primary difference between common stock PIPEs and traditional private placements is the duration of resale restrictions on participating investors. For traditional private placements, such a restriction period could remain effective up to 2 years following purchase. In contrast, PIPEs do not impose such lengthy no-trading intervals, but do require the issuer to register the shares received by participating investors, usually within 30 days after a deal closes. Once the registration statement becomes effective, the new shares can be publicly traded—typically within 90 days. Thus, in comparison with traditional private placements, PIPEs offer enhanced liquidity to participating investors. Due to this advantage associated with PIPEs, the volume of traditional private placements has declined significantly in recent years.[5]

As noted above, most PIPE issuers are small, young, and risky (see Dai, 2007; Brophy et al., 2009; Chaplinsky and Haushalter, 2010; Chen et al., 2010b; Dai et al., 2010). Many of PIPE issuers have met with difficulty when attempting to obtain capital through more traditional means of financing, such as Seasoned Equity Offerings (SEOs). Chen et al. (2010b) examine how firms choose between traditional SEOs and PIPEs. They find that PIPE firms possess high levels of information asymmetry and poor operating performance. More than 50% of PIPE issuers are not covered by any financial analyst, the stock bid-ask spread for such PIPE issuers is much greater than it is for SEO issuers, and the majority of PIPE firms are not profitable at the time of PIPE issuance. Thus, information asymmetry and agency cost are serious concerns to PIPE investors.

Several studies (e.g., Wruck, 1989; Hertzel and Smith, 1993; Wu, 2004; Barclay et al., 2007; Dai, 2007; Chaplinsky and Haushalter, 2010; Anderson and Dai, 2010; Bengtsson and Dai, 2010) examine the means and approaches that investors utilize to mitigate information asymmetry and agency problems as well as the effectiveness of such means and approaches in both traditional private placements and PIPEs. The major findings can be summarized into three categories. First, almost all studies show that investors request steeper discounts when issuers are associated with higher information asymmetry and agency cost. Second, a few studies (see e.g., Chaplinsky and Haushalter, 2010; Anderson and Dai, 2010; Bengtsson and Dai, 2010) indicate that investors request comparatively investor-friendly contracts (i.e., harsher to issuers) when facing higher information and agency costs. Third, investors directly monitor issuing firm management and intervene regarding a range of management issues afterwards. There is, however, considerable disagreement regarding this monitoring role of investors. For instance, Wruck (1989) finds that ownership concentration increases after private placements (as a proxy for monitoring), which purportedly explains the positive short-run market reaction to private placement announcements. Dai (2007) finds that venture capitalists are more likely to acquire block stakes, request board seats, and keep stakes acquired from PIPEs longer than hedge funds are. She further shows that PIPEs associated with VCs outperform in the long-run stock returns. On the other hand, Hertzel and Smith (1993) do not find such a monitoring effect. Wu (2004) and Barclay et al. (2007) argue that entrenched managers offer greater discounts to private placement investors to avoid monitoring and the majority of private placement investors are passive investors even when they hold block stakes.

In this paper, I consider another monitoring mechanism, staging, which is largely neglected in the abovementioned studies when examining whether private placement investors monitor managers. I focus my analysis on under what circumstances a PIPE is staged and the impact of such staging on issuers' capital cost and post-issuance stock performance.

2.2. Hypothesis development

Several theoretical models explore why staging is utilized in the setting of venture capital investments. The predominant argument is that staging is a monitoring mechanism that helps address agency problems associated with information asymmetry, moral hazard, and potential hold-up. For instance, Sahlman (1990) notes that staged capital infusions provide the most potent control mechanism a venture capitalist can employ. The role of staged capital infusion is analogous to that of debt in highly leveraged transactions, keeping the owner/manager on a "tight leash" and reducing potential losses from bad decisions. Neher (1999) argues that entrepreneurs can hold up venture capitalists after they have made investments. Staged financing helps mitigate this commitment problem. Wang and Zhou (2004) confirms that, when used in conjunction with a sharing contract, staged financing acts as an effective complementary mechanism alongside contracting to control agency problems. Second, staging could be designed to address the problem of inefficient continuation. For instance, Admati and Pfleiderer (1994) argue that entrepreneurs have an incentive to continue projects even when it is optimal to abandon them. This occurs because an entrepreneur is not putting up the money for the continuation but nevertheless stands to gain if the options to continue pay off. Venture capitalists undertake staged financing to avoid inefficient decisions pertaining to the continuation of financing projects with poor prospects.

The extant empirical research on venture capital staging generally finds that investor utilization of staging is related to agency problems associated with investee companies. Gompers (1995) shows, for instance, that the duration of funding and hence the intensity of monitoring is negatively related to expected agency costs. Tian (2011) uses geographic distance of an entrepreneurial firm from a venture capital fund as a proxy for agency cost and finds supporting evidence for the view that staging is a monitoring mechanism that is used when agency cost is high.

Following previous studies on staging (see e.g., Gompers, 1995; Hege et al., 2003; Krohmer et al., 2009; Tian, 2011), I define staging as a process in which firms receive funding sequentially from the same investor or a group of investors. For instance, during our sample period, Evolve Software conducted two PIPEs on September 21, 2001 and August 20, 2002, through which the company raised $15 million and $7.5 million, respectively. A group of nine investors participated in the first offering and a group of three investors

[4] Regulation D Rule (501) defines investors from the following categories as accredited investors: banks, brokers or dealers, insurance companies, registered investment companies or business development companies, small business investment companies, pension funds, directors, executive officers, or general partners of the issuer, corporations, limited liability companies, trusts or partnerships with total assets in excess of $5 million not formed for the specific purpose of acquiring the securities offered, any natural person whose individual net worth, or joint net worth with that person's spouse, at the time of the purchase exceeds $1 million, or income or joint income exceeds $200,000 or $300,000, respectively, in each of the two most recent years, and any entity in which all equity owners are accredited investors.

[5] See Chen et al. (2010b).

participated in the second one. Warburg Pincus Private Equity was the lead investor in both offerings, in which it invested $10 million (67%) and $5 million (75%), respectively. I regard these two PIPEs as an example of staged financing.

As discussed earlier, information asymmetry and agency cost are serious concerns for PIPE investors. I expect that PIPE issuers with higher agency costs are more likely to find their funding staged. Furthermore, agency cost is expected to be positively associated with monitoring intensity; therefore, firms with higher agency costs would have shorter duration between rounds and smaller investment size per round. These predictions are summarized as follows.

H1. Firms with greater agency costs are more likely to be subject to staged financing, with shorter financing duration and smaller investment size per round.

One difference between PIPE investments and venture capital investments is that there is much greater heterogeneity across PIPE investors, among which are hedge funds, private equity funds, venture capital funds, banks, dealers/brokers, mutual funds, insurance companies, sovereign funds, pension funds, and so on. As discussed in Dai (2007) and Anderson and Dai (2010), PIPE investors exhibit a range of investment objectives and act rather hetereogeneously in contracting and post-PIPE activities. In general, they show that private equity funds, venture capital funds, and corporations are often strategic investors who acquire large stakes and have greater incentives to monitor the management. I therefore anticipate that these investors would be more likely to utilize staging.

Syndication is a specialized financing structure. The decision to syndicate implies a preference for financing with a group as opposed to as a single investor. The literature on syndicates in venture capital investments (see Lerner, 1995, among many others) show that syndicates help with information gathering, risk sharing, and monitoring. In PIPE investments, while the majority of all deals involve multiple investors, it is not uncommon for some investors to prefer investing alone. When investors invest alone, staging, as a complimentary control mechanism, would seem to be of greater importance to them as there is no foreseeable assistance from peer investors for information collection, due diligence, or monitoring. Therefore, I anticipate that investors would be more likely to utilize staging while investing alone. These predictions are summarized as follows.

H2. Strategic investors and investors with high ownership stakes are more likely to utilize staging and stage more frequently.

H3. Investors are more likely to utilize staging and stage more frequently when they are investing alone.

Theoretical studies that examine staging (e.g., Sahlman, 1990; Admati and Pfleiderer, 1994; Wang and Zhou, 2004) predict a positive effect of staging on performance. However, the empirical findings based on venture capital investments are mixed in this regard. For instance, Gompers (1995) and Tian (2011) provide evidence of the positive effects of staging, suggesting that companies that receive staged financing are more likely to successfully exit (IPOs or M&As). In contrast, however, Hege et al. (2003) find that a larger total number of financing rounds is negatively associated with returns to investors, an estimation based on reported round valuations. Krohmer et al. (2009) believe these opposing views can be reconciled by studying when staging is used. In particular, they find that staging has a positive effect on investment returns towards the beginning of the investment relationship, while it appears to be negatively associated with returns when used prior to the exit decision.

Regarding the consequences of staging in PIPE investments, I consider two proxies, the cost of financing measured by PIPE discounts and issuers' long-run performance following PIPE transactions. PIPE issuers often offer investors steep discounts to offset high levels of information asymmetry and high agency costs that are typically associated with such arrangements (Dai, 2007; Brophy et al., 2009; Chaplinsky and Haushalter, 2010; Chen et al., 2010b; Dai et al., 2010). If staging effectively reduces agency costs, I would expect a lower discount to be offered when staging is utilized. As staging gives investors the option of abandoning bad investments, firms that receive multiple financing rounds should be meeting investor expectations, which implies in turn that they are exhibiting better performance over the long run. Furthermore, if investors' monitoring effectively keeps an owner/manager on a "tight leash" and reduces potential losses from poor management decisions, this "value-added" result will be reflected in better long-run performance on the part of firms with staged financing. These predictions are summarized as follows.

H4. Firms offer lower discounts to investors when staging is utilized.

H5. Firms with staged financing achieve better long-run performance.

3. Data and summary statistics

To establish a sample from which to pull study data, I started with 5415 traditional PIPE transactions (common stocks and fixed-price convertibles) that were completed from 1996 through 2007. The PIPE sample is obtained from Sagient Research. I also request that issuers be included in Compustat and CRSP so that necessary financial data would be available. These restrictions resulted in a final sample of 3135 PIPE transactions. Among the 3135 PIPE transactions, 2148 are common stock PIPEs and the remaining 987 are PIPEs with fixed-price convertibles. Table 1 shows the distribution and values of the PIPES over the sample period.

As mentioned in Section 2, following exiting studies on venture capital staging (Gompers, 1995), I define staging as a process through which firms receive funding sequentially from the same lead investor where the lead investor invests the largest amount of capital in the first round. The key interest of my analysis is in studying the role of firm–investor relationships established through staging. Based on this definition, as shown in Panel A of Table 2, I find a total of 535 staged PIPE transactions involving 225 unique firm–investor relationships. The average number of rounds for the staged sample is 2.3, with a median of 2 rounds. The average duration between rounds is about 10.9 months with a median of 7.5 months. The interval between early rounds is significantly longer than intervals separating later rounds. The mean and median duration between the first round and the second round are 11.2 months and 7.7 months, respectively. In contrast, the duration between later rounds is 8.5 months on average, with the median at 4.6 months. The average round size of staged PIPEs is $14.4 million with the median at $6.0 million.[6] The average discount applied to staged financing is 8.9% with the median at 5.0%. I find no significant difference between first-round discounts and sequential-round discounts.

In Panel B of Table 2, I compare the characteristics of firms that receive staged financing with those of firms that receive a single

[6] Both the mean and median offer sizes of staged PIPEs appear smaller than do those of traditional private placements. For instance, Chen et al. (2010a) document an average offer size of traditional private placements from 1997 to 2003 of $19.81 million, with a median of $8 million.

Table 1
PIPE Transactions from 1996 through 2007.

Year	Common stock PIPEs		Convertibles with fixed-price PIPEs	
	N	Total proceeds ($M)	*N*	Total proceeds ($M)
1996	44	305	24	844
1997	55	688	36	746
1998	75	772	25	334
1999	153	2312	77	3292
2000	246	8602	100	4427
2001	244	4683	135	4248
2002	179	2872	107	4942
2003	271	4013	130	3367
2004	254	4243	120	2526
2005	201	5043	86	3370
2006	197	7132	67	1822
2007	229	20,301	80	7301
1996–2007	2148	60,966	987	37,219

This table summarizes the number and total proceeds of common stock PIPEs and fixed-price convertible PIPEs by year from 1996 to 2007. Total proceeds are in millions of dollars.

Table 2
Summary Statistics.

	Full sample	First round	Sequential rounds	*p*-value
Panel A: Characteristics of staged financing in PIPEs				
Number of rounds	2.3			
	(2.0)			
Duration between rounds (months)	10.9	11.2	8.5	0.000***
	(7.5)	(7.7)	(4.6)	0.000***
Round size ($M)	14.4	15.3	13.9	0.531
	(6.0)	(6.5)	(5.7)	0.062*
Discounts	8.9%	9.8%	8.2%	0.523
	(5.0%)	(5.0%)	(5.0%)	0.823
N	535	225	310	
	Staged financing		Single round	*p*-value
Panel B: Firm characteristics before the first round				
Market capitalization	162		322	0.095*
	(72.2)		(88.9)	0.009***
Intangible/Assets	12.3%		11.6%	0.562
	(1.5%)		(1.0%)	0.380
EV/Assets	4.5		4.6	0.909
	(2.0)		(1.9)	0.510
RD/Assets	26.5%		24.3%	0.501
	(14.6%)		(9.2%)	0.026**
EBITDA/Assets	−45.2%		−35.6%	0.047**
	(−29.7%)		(−18.6%)	0.001***
Debt/Assets	18.9%		14.8%	0.026**
	(4.9%)		(3.6%)	0.535
Analyst coverage	1.3		1.8	0.005***
	(1.0)		(1.0)	0.003***
Bid-ask spread	7.5		7.0	0.013***
	(7.2)		(6.7)	0.031**
Volatility	6.2%		5.9%	0.159
	(5.7%)		(5.4%)	0.040**
CAR (−6, −1)	2.6%		12.5%	0.108
	(−0.9%)		(4.2%)	0.087*
Gross proceeds	15.3		34.9	0.068*
	(6.5)		(10.4)	0.000***
Fraction placed	22.1%		28.2%	0.099*
	(13.7%)		(15.8%)	0.039**
Discounts	9.8%		17.4%	0.264
	(5.0%)		(9.7%)	0.021**
Use of proceeds: R&D	17.8%		16.6%	0.648
Lead investor ownership	9.4%		9.2%	0.931
	(5.1%)		(4.2%)	0.001***
Percentage with strategic investors	28.9%		23.6%	0.073**
Percentage with single investors	39.1%		28.8%	0.001***
N	225		2561	

Panel A summarizes the number of rounds, between-round duration (months), round size in millions of dollars, and discounts of the sample of staged financing. I further compare and contrast the aforementioned measures in the subsample of the first rounds with those in the subsample of the sequential rounds. Panel B compares and contrasts various firm characteristics in the single-round sample with those in the sample with staged financing. Medians are reported in parentheses below the means. *P*-values for the differences across sub-samples are reported in the last column.

*** Denote statistical significance at the 1% confidence levels, respectively.

** Denote statistical significance at the 5% confidence levels, respectively.

* Denote statistical significance at the 10% confidence levels, respectively.

round from a specific investor. The accounting data are based on the fiscal year before the very first round of financing. I show that firms that receive staged financing are significantly smaller than those with single-round financing are. For instance, the mean and median market capitalization before a first PIPE transaction in the staged sample are $162 million and $72 million, respectively, while those from the single-round sample have a mean market capitalization of $322 million and a median at $89 million.

Following Gompers (1995), I estimate the following ratios as proxies for agency costs: intangible assets to total assets, firm enterprise value to the book value of assets, and R&D expenses to total assets. Agency costs increase as the tangibility of assets declines, the share in growth options in firm value rises, and asset specificity grows. Instead of using an industry average, I estimate these measures using each PIPE issuer's own financial data, which presumably captures firm-specific agency costs more accurately. I show that firms with staged financing exhibit significantly higher (median) ratios of R&D to total assets, but the two groups do not differ significantly in asset tangibility or growth potential. In particular, the median RD/Assets ratios are 14.6% for the staged group and 9.2% for the single round group, respectively. Furthermore, I compare profitability and financial leverage in the staged sample and those in the single-round sample. I show that firms receiving staged financing exhibit significantly more negative EBITDA/Assets and relatively higher financial leverage. For instance, for the staged group, the median EBITDA/Assets ratio is −29.7%; in contrast, this ratio is −18.6% for the single-round group. The difference in leverage is significant only at the means. The average Debt/Assets ratio is 18.9% for the staged group, in comparison with 14.8% for the single-round group.

In addition to the aforementioned accounting measures of agency costs, I further examine analyst coverage and the bid-ask spread to gauge information and agency costs associated with PIPE issuers. Following Wu (2004) and Chen et al. (2010b), analyst coverage is measured as the average number of analysts following a firm 12 months prior to a PIPE offering and the bid-ask spread is calculated as the average daily spread, measured as 100 (1-bid/ask) in the last 12 months. I show that firms with staged financing exhibit significantly less analyst coverage and higher bid-ask spreads before the first PIPE transaction. This finding indicates that firms with staged financing exhibit higher agency costs due to the lack of outside monitoring. Furthermore, the staged sample exhibits relatively poor stock performance 6 months before a PIPE offering. For instance, the mean CAR (−6, −1) of a PIPE offering (cumulative abnormal returns adjusted by equal-weighted market returns) is 2.6% with a median of −0.9%, while the single-round group has a mean CAR (−6, −1) of 12.5% and a median of 4.2%.

Staged PIPEs also exhibit some deal characteristics that distinguish them from their single-round counterparts. For instance, first-round investments in the staged sample are, on average, $15.3 million (median: $6.5 million). This figure is significantly smaller than the offer size of the single-round group, which has a mean of $34.9 million and a median of $10.4 million. The average dilution effect is 28.2% for the single-round sample, with a median of 15.8%. In contrast, the average dilution is 22.1% for the staged-financing sample, with a median of 13.7%. These differences in means and medians are statistically significant. Furthermore, the discounts offered under staged financing appear much smaller than those offered with single-round financing are. In particular, the mean and median discounts of the former are 9.8% and 5.0%, respectively, while they are 17.4% and 9.7% for the single-round sample.

Moreover, the investor profile of the staged-financing group is very different from that of the single-round group. First, the lead

Table 3
Correlation matrix of key explanatory variables.

	Intangible assets	EV/ Assets	RD/ Assets	EBITDA/ Assets	Debt/ Assets	MV	Analyst	Spread	BHAR (−6, −1)	Proceeds: R&D	Strategic investor	Single investor
EV/Assets	0.023											
	(0.204)											
RD/Assets	−0.163***	−0.026										
	(0.000)	(0.152)										
EBITDA /Assets	0.170***	0.069***	−0.794**									
	(0.000)	(0.000)	(0.000)									
Debt /Assets	0.007	0.002	−0.053***	−0.025								
	(0.713)	(0.927)	(0.003)	(0.170)								
MV	−0.047***	0.005	−0.109***	0.189***	0.142***							
	(0.009)	(0.780)	(0.000)	(0.000)	(0.000)							
Analyst	−0.060***	0.004	−0.067***	0.171***	0.018	0.543***						
	(0.001)	(0.824)	(0.000)	(0.000)	(0.323)	(0.000)						
Spread	0.027	0.009	0.241***	−0.324***	−0.135***	−0.378**	−0.281***					
	(0.140)	(0.623)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
BHAR(−6, −1)	−0.039**	0.030	0.057***	−0.042**	−0.012	0.079***	0.019	0.130***				
	(0.038)	(0.105)	(0.002)	(0.026)	(0.524)	(0.000)	(0.304)	(0.000)				
Use of proceeds: R&D	−0.114***	−0.019	0.190***	−0.130***	−0.063***	0.021	0.042**	0.069***	0.031			
	(0.000)	(0.281)	(0.000)	(0.000)	(0.001)	(0.244)	(0.019)	(0.000)	(0.100)			
Strategic investor	−0.016	−0.001	0.019	−0.031*	0.114***	0.093***	0.123***	0.041**	−0.068***	−0.075***		
	(0.362)	(0.957)	(0.292)	(0.092)	(0.000)	(0.000)	(0.000)	(0.022)	(0.000)	(0.000)		
Single investor	0.026	−0.025	−0.064***	0.022	0.139***	0.036**	−0.025	−0.027	−0.054***	−0.130***	0.345***	
	(0.150)	(0.171)	(0.000)	(0.234)	(0.000)	(0.045)	(0.167)	(0.134)	(0.004)	(0.000)	(0.000)	
Ownership	0.026	0.000	−0.019	0.002	0.030*	−0.217***	−0.056***	0.063***	−0.101***	−0.040**	0.201***	0.113***
	(0.151)	(0.993)	(0.292)	(0.928)	(0.098)	(0.000)	(0.002)	(0.000)	(0.000)	(0.027)	(0.000)	(0.000)

This table presents the correlation matrix of the key explanatory variables.
*** Denote statistical significance at the 1% confidence levels, respectively.
** Denote statistical significance at the 5% confidence levels, respectively.
* Denote statistical significance at the 10% confidence levels, respectively.

investor in staged financing acquires a significantly larger stake than does a lead investor in the single-round group. In particular, staged-financing lead investors obtained 5.1% of the issuing firms at the median while those in the single-round group obtained 4.2%. Second, for the staged-financing sub-sample, a significantly larger proportion (28.9%) of the lead investors are venture capital funds, private equity funds, or corporations when compared with the single-round group (23.6%). Third, lead investors in the staged-financing group are more likely to invest alone. In particular, 39.1% of them invest alone while only 28.8% of single-round investors invest alone. In summary, lead investors in staged financing are often strategic investors obtaining large stakes in issuing firms, and they invest alone more often.

The correlation matrix for the abovementioned variables are presented in Table 3. Ownership, strategic investor, and single investor are significantly and positively correlated. In particular, the correlation coefficient between strategic investor and single investor is 0.345. It is not surprising to see the positive correlations among these three variables as, for instance, single investors are likely to obtain greater ownership shares by keeping the offer size constant, while investors with greater ownership stakes in general are more likely to be strategic investors. However, these three variables also capture other dimensions of investor characteristics. For instance, many PIPE investors are passive investors even though they hold block stakes. Both strategic investors and non-strategic investors can invest alone. Therefore, in the analyses that follow, I report findings from specifications that include each of the three variables individually as well as that include all three.

The above univariate analysis shows that issuers of staged PIPEs are systematically different from those who raise only one round. In general, the former group exhibits higher agency cost and information asymmetry. Furthermore, the investor clientele and the structure and pricing of staged PIPEs differ substantially from those of single-round PIPEs. In the following sections, we relate the choice of staged PIPE financing to agency cost of issuers and investor characteristics in a multivariate setting.

4. Determinants of staging, duration, total financing, and size per round

4.1. Determinants of staging

Several theoretical models (Sahlman, 1990; Neher, 1999; Wang and Zhou, 2004) predict that staging is a monitoring mechanism that helps address agency problems associated with information asymmetry, moral hazard, and potential hold-up. Empirical work on venture capital investments (e.g., Gompers, 1995; Tian, 2011)

Table 4
Determinants of Staging.

	1	2	3	4	5
Panel A: Probit regressions on the choice of staging					
Intercept	−1.674**	−1.591**	−1.495*	−1.710**	−1.363*
	(0.034)	(0.043)	(0.064)	(0.029)	(0.092)
Agency cost					
Intangible/Assets	−0.049	−0.048	−0.048	−0.057	−0.054
	(0.813)	(0.817)	(0.817)	(0.784)	(0.796)
EV/Assets	0.001	0.001	0.001	0.001	0.001
	(0.911)	(0.854)	(0.959)	(0.855)	(0.886)
R&D/Assets	−0.060	−0.064	−0.062	−0.050	−0.059
	(0.639)	(0.619)	(0.630)	(0.693)	(0.646)
Ln(Analyst)	−0.131*	−0.147**	−0.125*	−0.129*	−0.133*
	(0.052)	(0.031)	(0.066)	(0.057)	(0.053)
Ln(Spread)	0.270**	0.247**	0.274**	0.272**	0.259**
	(0.025)	(0.041)	(0.023)	(0.023)	(0.033)
EBITDA/Assets	−0.109	−0.103	−0.108	−0.103	−0.098
	(0.249)	(0.273)	(0.255)	(0.274)	(0.299)
Debt/Assets	0.237*	0.221*	0.249*	0.209	0.218*
	(0.063)	(0.085)	(0.051)	(0.102)	(0.092)
Investor characteristics					
Strategic investor		0.167*			0.144
		(0.055)			(0.125)
Ownership			−0.245		−0.374
			(0.281)		(0.055)
Single investor				0.191**	0.163*
				(0.017)	(0.055)
Other control variables					
Ln(MV)	−0.015	−0.019	−0.024	−0.017	−0.034
	(0.701)	(0.633)	(0.546)	(0.665)	(0.403)
Use of proceeds: R&D	0.460	0.066	0.043	0.072	0.082
	(0.654)	(0.517)	(0.672)	(0.486)	(0.426)
CAR (−6, −1)	−0.088*	−0.081*	−0.093**	−0.085*	−0.086*
	(0.058)	(0.082)	(0.047)	(0.068)	(0.067)
N	2726	2726	2726	2726	2726
Pseudo *R*-square (%)	2.18	2.44	2.28	2.59	2.91
Panel B: OLS regressions on the number of rounds raised from the same lead investor					
Intercept	0.681***	0.693***	0.693***	0.681***	0.712***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Agency cost					
Intangible/Assets	−0.010	−0.010	−0.010	−0.010	−0.010

(*continued on next page*)

Table 4 (*continued*)

	1	2	3	4	5
	(0.516)	(0.535)	(0.513)	(0.509)	(0.522)
EV/Assets	0.001	0.001	0.001	0.001	0.001
	(0.337)	(0.265)	(0.361)	(0.306)	(0.283)
R&D/Assets	−0.012	−0.012	−0.012	−0.011	−0.011
	(0.241)	(0.239)	(0.238)	(0.289)	(0.268)
Ln(Analyst)	−0.010**	−0.012**	−0.010**	−0.010**	−0.011**
	(0.036)	(0.017)	(0.045)	(0.043)	(0.031)
Ln (Spread)	0.021**	0.018**	0.021**	0.021**	0.019**
	(0.018)	(0.041)	(0.016)	(0.018)	(0.034)
EBITDA/Assets	−0.015*	−0.014*	−0.015*	−0.014*	−0.013*
	(0.052)	(0.068)	(0.053)	(0.067)	(0.083)
Debt/Assets	0.059***	0.057***	0.060***	0.057***	0.058***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Investor characteristics					
Strategic investor		0.019***			0.018**
		(0.005)			(0.016)
Ownership			−0.016		−0.025*
			(0.244)		(0.063)
Single investor				0.015**	0.011*
				(0.015)	(0.093)
Other control variable					
Ln(MV)	0.001	−0.001	−0.001	−0.001	−0.001
	(0.928)	(0.925)	(0.906)	(0.988)	(0.631)
Use of proceeds: R&D	0.001	0.002	−0.001	0.002	0.003
	(0.982)	(0.772)	(0.997)	(0.787)	(0.684)
CAR (−6, −1)	−0.089**	−0.008**	−0.009***	−0.008**	−0.008**
	(0.010)	(0.020)	(0.008)	(0.014)	(0.017)
N	2726	2726	2726	2726	2726
Pseudo *R*-square (%)	1.95	2.22	1.97	2.15	2.38

Panel A presents the probit regressions on the determinants of staging, where the dependent variable is equal to 1 if the issuer receives more than one round from the same lead investor and 0 otherwise. In Panel B, I run OLS regressions where the dependent variable is the natural logarithm of the number of total rounds from the same lead investor plus 1 as a robustness check. Measures of agency cost include *Intangible/Assets, EV/Assets, R&D/Assets, Ln(Analyst), Ln (Spread), EBITDA/Assets,* and *Debt/Assets.* Measures of investor characteristics include a *Strategic Investor* dummy that is equal to 1 if the lead investor is a VC/PE fund or a corporation and 0 otherwise, *ownership*, and a *Single investor* dummy that is equal to 1 if the lead investor invests alone and 0 otherwise. In addition, I also control for *Ln(MV),* a dummy variable indicating whether the proceeds are used for R&D, and stock performance before a PIPE (*CAR (−6, −1)),* which is measured as cumulative abnormal returns 6 months prior to the transaction adjusted by the equal-weighted market index. *P*-values are shown in parentheses.

*** Denote statistical significance at the 1% confidence levels, respectively.

** Denote statistical significance at the 5% confidence levels, respectively.

* Denote statistical significance at the 10% confidence levels, respectively.

generally supports this notion. In this section, I examine the determinants of staging in PIPE investments by considering the following two groups of factors.

First, to gauge agency costs of PIPE issuers, on the right-hand side of the regressions I control for the following ratios for each firm: intangible/Assets, enterprise value/Assets, and R&D/Assets. As mentioned earlier, information asymmetry and thus agency costs increase as these ratios increase. Furthermore, I include Ln(Analyst), which is the natural logarithm of the average analyst coverage before PIPE financing plus 1, and Ln(Spread), which is the natural logarithm of the arithmetic daily average of 100(1-bid/ask) in the 12 months prior to the offering plus 1, as additional measures of information asymmetry. Moreover, other than agency costs due to information asymmetry and moral hazard, the potential agency problem between new equity investors and existing debt holders becomes more of a concern if a firm suffers from a high probability of distress. I use the profitability (EBITDA/Assets) and financial leverage (Long term debt/Assets) of issuing firms to represent agency costs in this regard.

Second, because staging is a monitoring tool utilized by investors to mitigate information and agency problems, I anticipate that investor interest in monitoring management would also to be relevant to the staging choice. I design three measures to capture the desire for oversight on the part of PIPE investors. The first measure is a dummy variable that is equal to 1 if the lead investor is a venture capital fund or a private equity fund or a corporation—often regarded as strategic investors in practice—and 0 otherwise. The second measure is the size of the ownership stake acquired by the lead investor in the first round. The third measure is a dummy variable that is equal to 1 if there is only one investor and 0 otherwise. The venture capital syndicate literature suggests that syndicate members help with information collection and risk sharing. Therefore, I expect that investors will sense a greater need to stage when investing alone.

In all these specifications I also control for market capitalization of PIPE issuers and the stock performance of issuers 6 months prior to PIPE transactions. Furthermore, I control for whether PIPE proceeds are used for R&D expenses.

Panel A of Table 4 presents the probit regressions on the determinants of staging, where the dependent variable is set to 1 if the issuer receives more than one round from the same lead investor and 0 otherwise. In Panel B of Table 4, as a robustness check, I run OLS regressions where the dependent variable is the natural logarithm of the number of total rounds from the same lead investor plus 1.

The following findings emerge from both Panels. First, agency costs of issuing firms are important determinants of staging. Specifically, analyst coverage significantly reduces the probability of staging and the total number of rounds. The probability of staging and the total number of rounds increase when the Ln(Spread) increases. The effects are also economically significant. In particular, a one-standard-deviation increase in Ln(Analyst) leads to an approximately 2.0% reduction in the probability of staging. On the other hand, a one-standard-deviation increase in Ln(Spread)

results in an increase of 3.0–4.0% in the probability of staging. I also find that Debt/Assets is significantly and positively correlated with both the probability of staging and the total number of rounds from the same investor. A one-standard-deviation increase in Debt/Assets leads to about a 3.0% increase in the probability of staging. This finding suggests that investors are more likely to utilize staging when the risk of distress increases. These findings provide supporting evidence for Hypothesis 1.

Second, I show that strategic investors and single investors are more likely to utilize staging, supporting Hypotheses 2 and 3. In particular, strategic investors (VC/PE funds and corporations) are 2.5% more likely than other investors are to enforce staging. Furthermore, investors are 2.8% more likely to use staging when they invest alone. Strategic investors and single investors are also positively associated with the total number of rounds. I do not find that investors with greater ownership stakes are more likely to use staging to monitor issuers, which is consistent with the notion that some institutional investors with large stakes could be passive investors (Barclay et al., 2007).

4.2. Duration, round size, and total financing

Firms that are subject to greater agency costs should be monitored more often, and thus funding durations should be shorter. Using duration between rounds as an inverse proxy for monitoring intensity, in this section I examine the relationship between agency costs and monitoring intensity. The duration data is right-censored, that is, we observe only the duration of financing when a subsequent financing occurs. To address this problem, following Gompers (1995), I estimate a parametric hazard model for duration analysis assuming that the hazard rate follows the Weibull distribution. The instantaneous probability of receiving financing is called the hazard rate, $\mathbf{h}(\mathbf{t})$. Here $\mathbf{h}(\mathbf{t})$ is defined as:

$$\mathbf{h}(\mathbf{t}) = \frac{\mathbf{f}(\mathbf{t})}{\mathbf{S}(\mathbf{t})},$$

where $\mathbf{f}(\mathbf{t})$ represents the probability of receiving funding between $\mathbf{t}$ and $\mathbf{t} + \Delta\mathbf{t}$; $\mathbf{S}(\mathbf{t})$ represents the probability of receiving funding after $\mathbf{t}$. The model estimated in Table 5 is:

$$\mathbf{h}(\mathbf{t}) = \mathbf{h}_0(\mathbf{t})\mathbf{e}^{\beta_0+\beta_1\mathbf{X}_1+\cdots+\beta_K\mathbf{X}_K},$$

Table 5
Regressions on the Duration between Rounds.

	1	2	3	4	5
Intercept	3.916***	3.765***	3.785***	3.973***	3.569***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Agency cost					
Intangible/Assets	−0.130	−0.147	−0.130	−0.097	−0.116
	(0.607)	(0.560)	(0.606)	(0.703)	(0.647)
EV/Assets	−0.001	0.145	−0.001	−0.002	−0.003
	(0.868)	(0.356)	(0.907)	(0.774)	(0.758)
R&D/Assets	0.139	0.145	0.139	0.126	0.136
	(0.375)	(0.356)	(0.377)	(0.415)	(0.383)
Ln(Analyst)	0.253***	0.276***	0.247***	0.247***	0.251***
	(0.005)	(0.002)	(0.006)	(0.007)	(0.006)
Ln(Spread)	−0.323**	−0.281*	−0.330**	−0.327**	−0.308*
	(0.042)	(0.076)	(0.039)	(0.039)	(0.054)
Debt/Assets	−0.642***	−0.597***	−0.644***	−0.596***	−0.572***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EBITDA/Assets	0.151	0.142	0.150	0.142	0.134
	(0.177)	(0.201)	(0.183)	(0.199)	(0.227)
Investor characteristics					
Strategic investor		−0.270**			−0.219*
		(0.012)			(0.057)
Ownership			0.186		0.377
			(0.483)		(0.211)
Single investor				−0.304***	−0.254**
				(0.003)	(0.017)
Other control variables					
Ln(MV)	−0.005	0.002	0.002	−0.001	0.018
	(0.917)	(0.972)	(0.966)	(0.975)	(0.711)
Use of proceeds: R&D	−0.001	−0.026	0.001	−0.035	−0.048
	(0.998)	(0.852)	(0.993)	(0.800)	(0.729)
CAR (−6, −1)	0.130***	0.117**	0.134**	0.121**	0.119**
	(0.000)	(0.039)	(0.020)	(0.033)	(0.037)
N	3026	3026	3026	3026	3026
Log likelihood	−1080.24	−1077.13	−1079.96	−1075.72	−1073.40
LR chi2	79.93	86.16	80.49	88.97	93.62
Prob > chi2	0.000	0.000	0.000	0.000	0.000

I estimate a parametric hazard model for duration analysis assuming that the hazard rate follows the Weibull distribution using the maximum likelihood method. The dependent variable is the natural logarithm of the duration (in months) between a particular PIPE financing and the next one. The negative coefficients from the hazard model imply shorter durations, and positive coefficients imply longer durations. Measures of agency cost include *Intangible/Assets, EV/Assets, R&D/Assets, Ln(Analyst), Ln(Spread), EBITDA/Assets,* and *Debt/Assets.* Measures of investor characteristics include a *Strategic Investor* dummy that is equal to 1 if the lead investor is a VC/PE fund or a corporation and 0 otherwise, *ownership*, and a *Single investor* dummy that is equal to 1 if the lead investor invests alone and 0 otherwise. In addition, I also control for *Ln(MV),* a dummy variable indicating whether the proceeds are used for R&D, and stock performance before a PIPE (*CAR (−6, −1)),* which is measured as cumulative abnormal returns 6 months prior to a transaction adjusted by the equal-weighted market index. *P*-values are shown in parentheses.

*** Denote statistical significance at the 1% confidence levels, respectively.

** Denote statistical significance at the 5% confidence levels, respectively.

* Denote statistical significance at the 10% confidence levels, respectively.

where $\mathbf{h}_0(\mathbf{t})$ is the baseline hazard function, $\mathbf{X}_i$ are the covariates, and $\boldsymbol{\beta}_i$ are estimated via maximum likelihood estimators.

The dependent variable in Table 5 is the natural logarithm of the duration (in months) between a particular PIPE offering and the next one. The negative coefficients from the hazard model imply shorter durations, while the positive coefficients imply longer durations. The independent variables are similar to those used in Table 4.

As shown in Table 5, I find that financing duration increases with analyst coverage but decreases with bid-ask spread and Debt/Assets. These coefficients are significant at the 1–5% confidence levels. These findings suggest that higher agency costs lead to tighter monitoring, supporting Hypothesis 1. Furthermore, I show that strategic investors and investors investing alone are significantly associated with shorter financing duration (at the 1% confidence level), suggesting more intensive monitoring. The coefficient on investor ownership, again, is not significant. Among the control variables, I find that pre-PIPE stock performance is significantly and positively associated with duration, and thus is inversely related to the intensity of monitoring.

In Table 6, I further examine factors affecting the size of total financing and funding amounts per offering. The dependent variable of the first specification is the natural logarithm of the total amount of funding that a firm received from the same lead investor

Table 6
Regressions on the total financing and funding amount per round.

	Log (total financing)	Ln (proceeds per round)			
		Staged and single		Staged	
		First round only	All rounds	First round vs. follow-up round	
	1	2	3	4	5
Intercept	−0.364	3.212***	3.372***	4.563***	4.845***
	(0.631)	(0.000)	(0.000)	(0.000)	(0.000)
Staging	*1.134***	*−0.112***	*−0.245***		
	(0.000)	*(0.031)*	*(0.000)*		
Sequential round				*−0.198***	
				(0.001)	
Ln(Round number)					*−0.474***
					(0.000)
Agency cost					
Intangible/Assets	0.038	−0.037	−0.031	0.032	0.052
	(0.845)	(0.631)	(0.674)	(0.850)	(0.759)
EV/Assets	−0.016**	−0.017***	−0.019***	−0.025***	−0.025***
	(0.011)	(0.000)	(0.000)	(0.001)	(0.000)
R&D/Assets	0.178	0.114**	0.119**	0.067	0.080
	(0.166)	(0.023)	(0.015)	(0.595)	(0.520)
Ln(Analyst)	0.219***	0.140***	0.127***	0.025	0.019
	(0.000)	(0.000)	(0.000)	(0.663)	(0.718)
Ln(Spread)	0.258**	−0.217***	−0.213***	−0.349***	−0.334***
	(0.021)	(0.000)	(0.000)	(0.001)	(0.001)
Debt/Assets	0.064	0.109**	−0.113***	−0.289***	−0.234***
	(0.649)	(0.049)	(0.007)	(0.000)	(0.000)
EBITDA/Assets	0.125	0.001	0.005	−0.061	−0.051
	(0.194)	(0.996)	(0.889)	(0.524)	(0.585)
Investor characteristics					
Strategic investor	0.428***	0.154***	0.121***	0.013	0.017
	(0.000)	(0.000)	(0.001)	(0.867)	(0.824)
Ownership	2.931***	2.051***	2.169***	4.373***	4.380***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Single investor	0.189**	−0.637***	−0.649***	−0.620***	−0.619***
	(0.024)	(0.000)	(0.000)	(0.000)	(0.000)
Other control variables					
Ln(MV)	0.784***	0.725***	0.719***	0.658***	0.660***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Use of proceeds: R&D	0.199**	0.052	0.062	0.124	0.116
	(0.045)	(0.182)	(0.102)	(0.163)	(0.186)
CAR (−6, −1)	−0.033	−0.016	−0.019	−0.039	−0.050
	(0.450)	(0.366)	(0.246)	(0.328)	(0.203)
N	2726	2726	3022	520	520
Adjusted *R*-square (%)	32.57	70.41	68.51	63.98	65.00

In this table, I examine factors affecting the size of the total financing and funding amounts per round. The dependent variable of the first specification is the natural logarithm of the total amount of funding that a firm received from the same lead investor during our sample period. The dependent variables in models 2–5 are the natural logarithms of gross proceeds per round measured in millions of dollars. Model 2 considers the size of the first rounds. Model 3 includes both the first rounds and sequential rounds. Models 4 and 5 compare the sizes of early rounds with those of later rounds within the staged-financing sample. *Staging* is a dummy variable equal to 1 if the firm received more than one round from the same lead investor and 0 otherwise. *Sequential Round* is a dummy variable equal to 1 if it is not the first round from the lead investor and 0 otherwise. *Ln(Round number)* is the natural logarithm of a round number from the same lead investor. Measures of agency cost include *Intangible/Assets, EV/Assets, R&D/Assets, Ln(Analyst), Ln(Spread), EBITDA/Assets,* and *Debt/Assets*. Measures of investor characteristics include a *Strategic Investor* dummy that is equal to 1 if the lead investor is a VC/PE fund or a corporation and 0 otherwise, *ownership*, and a *Single investor* dummy that is equal to 1 if the lead investor invests alone and 0 otherwise. In addition, I also control for *Ln(MV)*, a dummy variable indicating whether the proceeds are used for R&D, and stock performance before a PIPE (*CAR (−6, −1)*), which is measured as cumulative abnormal returns 6 months prior to a transaction adjusted by the equal-weighted market index. *P*-values are shown in parentheses.

* Denote statistical significance at the 10% confidence levels, respectively.

*** Denote statistical significance at the 1% confidence levels, respectively.

** Denote statistical significance at the 5% confidence levels, respectively.

during our sample period. Included in the right-hand side of the regression are a dummy variable, *Staging*, which is equal to 1 if the firm received more than one round from the same lead investor and 0 otherwise, and variables representing agency costs and investor profiles, as discussed in earlier sections. The results show that firms with staged financing receive significantly greater total financing than firms that only receive a single round do. Put in terms of economic significance, firms are able to raise about $3 million more in financing through staging than are those that receive only a single financing round. Moreover, firms with greater analyst coverage and lower EV/Assets ratios receive more financing, indicating that total financing decreases with agency cost. Strategic investors on average invest more than financial investors do. Single investors, surprisingly, also invest greater amounts. Larger firms receive more total financing. When the use of proceeds is R&D related, there is significantly greater total financing.

The dependent variables in models 2–5 in Table 6 are the natural logarithms of gross proceeds per round measured in millions of dollars. Specification 2 considers the size of the first round. Specification 3 includes both first rounds and sequential rounds. Specifications 4 and 5 compare the sizes of early rounds with those of later rounds within the sample of staged financing. I find that the round size of the staged sample, no matter whether it is the first round or a sequential round, is significantly smaller than that of the single-round group. Within the sample of staged financing, the size of the later rounds is significantly smaller than are those of earlier rounds. In fact, round size decreases with round number. Furthermore, I find that round size is positively correlated with analyst coverage but negatively correlated with the bid-ask spread and the ratio of EV/Assets, suggesting that agency cost decreases investment size per round. While single investors on average invest more in total, they invest less per round.

Overall, the above findings suggest that PIPE investors, particularly strategic investors and those who invest alone, use staging to control agency costs that are associated with information asymmetry and moral hazard. Furthermore, monitoring intensity increases with firms' agency cost, while total financing and investment amount per round decreases with agency cost. These findings support Hypotheses 1, 2, and 3 and are consistent with the theoretical predictions and empirical findings regarding the role of staging in the setting of private equity investments.

5. The consequences of staging

In contrast to general agreement regarding the causes of staging that we find in the relevant literature (see e.g., Gompers, 1995; Hege et al., 2003; Krohmer et al., 2009; Tian, 2011), such studies exhibit mixed findings regarding the effect of staging on firm performance and investor returns. Moreover, there is a lack of documentation of the effect of staging on the cost of financing. In this section, I examine the effect of staging on the cost of financing and post-financing firm performance following PIPE investments.

5.1. Staging and the cost of financing

If staging helps to mitigate information asymmetry between investors and issuers, I would expect to see a negative association between staging and the cost of financing. In addition, staging gives investors the option of abandoning an investment if a firm turns out to be a "lemon," suggesting that there is a lower downside risk for investors; this indicates lower financing costs. I measure the cost of financing in PIPEs in terms of the discounts issuers offered to investors. Following the extant literature, such a discount is calculated as the percentage difference between the closing price and the offer price.

Various studies have established that PIPE discounts are positively associated with the level of information asymmetry and agency costs of issuing firms (see e.g., Dai, 2007; Chaplinsky and Haushalter, 2010; Dai et al., 2010). Thus, in regressions on discounts, I control for information asymmetry and risk to issuing firms by including the following 'usual suspects': the natural logarithm of market capitalization before a PIPE, the ratio of intangible assets to total assets, the ratio of enterprise value to total assets, the ratio of R&D expenses to total assets, the natural logarithm of analysts, the natural logarithm of volatility (which is measured as the standard deviation of daily returns over the past 12 months), the ratio of debt to total assets, the ratio of EBITDA to total assets, and a dummy variable indicating whether the use of proceeds is related to R&D. In addition, I also control for investor characteristics, including a strategic investor dummy, ownership, and a single investor dummy. To control for the potential scale effect, I further include the natural logarithm of gross proceeds as a proxy for offer size. Moreover, I include industry dummies and year dummies in all specifications, because Huson et al. (2010) show that PIPE (common stocks) discounts have changed over time.

As presented in Table 7, discounts associated with staged financing are significantly lower than are those for the single-round sample. In particular, other things remaining equal, staging reduces discounts by 11.0%. As shown in Table 2, the average discount associated with the single-round sample is 17.4%. Thus, the impact of staging on the cost of financing is also economically significant. In the second specification, I show further that the natural logarithm of round number is significantly and negatively associated with PIPE discounts, confirming the finding from the first model. These findings are consistent with the prediction expressed by Hypothesis 4. They are unlikely to be explained by the endogeneity of staging, because I show that firms with higher agency costs are more likely to be staged, which indicates steeper rather than lower discounts. Thus, if I were to control for the endogeniety of staging, the empirical findings would be reinforced. In the third specification, I further examine whether sequential rounds exhibit lower discounts than first rounds do and whether round duration influences discounts. While the coefficient of the *Sequential Round* dummy is negative and that of *Ln(Duration)* is positive, neither is statistically significant.

For other variables, the findings are generally consistent with those of existing studies on PIPEs. For instance, discounts are positively associated with the *Intangible/Assets* and *R&D/Assets* ratios, suggesting that investors require steeper discounts when facing higher levels of information asymmetry and higher agency costs. Similar to Dai, Jo, and Schatzberg (2010), I show that *Ln(Analyst)* significantly decreases discounts, while *Ln(Volatility)* significantly increases discounts. Furthermore, single investors charge significantly lower discounts, which is consistent with Hertzel and Smith (1993).

5.2. Stock performance and operating performance

In this section, I examine the performance implications of staging in the PIPE market by comparing stock performance and operating performance following the first round in the staged sample and the single-round sample. Panel A of Table 8 summarizes the raw returns and market-adjusted abnormal returns using both value-weighted (VW CAR) and equal-weighted (EW CAR) market indices around the announcement and up to 500 days following the issuance.[7] For the staged sample, I report stock performance for all rounds, the first round, and follow-up rounds, respectively.

[7] I use the same time intervals for stock performance as in Brophy et al. (2009) and Chen et al. (2010b) for comparison purposes.

Table 7
Does Staging Reduce the Cost of Financing?

	1 Full sample	2 Full sample	3 Staged financing
Intercept	−0.479	−0.344	−0.710**
	(0.261)	(0.426)	(0.027)
Staging	*−0.110***		
	(0.027)		
Ln(Round number)		*−0.209***	
		(0.045)	
Sequential round			*−0.019*
			(0.689)
Ln(Duration)			*0.018*
			(0.353)
Agency cost			
Intangible/Assets	0.197*	0.197*	0.025
	(0.053)	(0.053)	(0.731)
EV/Assets	0.002	0.002	−0.001
	(0.513)	(0.510)	(0.855)
R&D/Assets	0.252***	0.253***	−0.068
	(0.000)	(0.000)	(0.197)
Debt/Assets	0.006	0.015	−0.052*
	(0.921)	(0.791)	(0.060)
EBITDA/Assets	0.064	0.066	−0.091**
	(0.200)	(0.188)	(0.022)
Ln(Analyst)	−0.056*	−0.055*	−0.007
	(0.090)	(0.096)	(0.772)
Ln(Spread)	−0.053	−0.055	0.042
	(0.646)	(0.636)	(0.629)
Ln(Volatility)	0.329***	0.335***	0.097
	(0.000)	(0.002)	(0.226)
Investor characteristics			
Strategic investor	0.056	0.057	0.038
	(0.242)	(0.231)	(0.237)
Ownership	0.081	0.085	−0.385***
	(0.446)	(0.424)	(0.008)
Single investor	−0.177***	−0.179***	−0.092***
	(0.000)	(0.000)	(0.003)
Other control variables			
Ln(MV)	0.104***	0.105***	0.032
	(0.000)	(0.000)	(0.126)
Use of proceeds: R&D	−0.010	−0.011	0.009
	(0.844)	(0.830)	(0.805)
CAR (−6, −1)	−0.036	−0.036	0.001
	(0.118)	(0.118)	(0.995)
Convertible	0.002	−0.001	−0.095***
	(0.962)	(0.985)	(0.001)
Ln(Proceeds)	−0.095***	−0.096***	0.002
	(0.000)	(0.000)	(0.924)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
N	2811	2811	479
Pseudo *R*-square (%)	3.14	3.11	20.38

This table examines whether staging influences the cost of financing measured by PIPE discounts, which is the percentage difference between the closing price 1 day prior to the closing and the offer price. *Staging* is a dummy variable that is equal to 1 if multiple rounds are raised from the same lead investor and 0 otherwise. *Ln(Round number)* is the natural logarithm of round number plus 1. *Sequential Round* is a dummy variable that is equal to 1 if it is not the first round from the same investor and 0 otherwise. Ln(Duration) is the natural logarithm of duration from the previous round in months. Measures of agency cost include *Intangible/Assets, EV/Assets, R&D/Assets, Ln(Analyst), Ln(Spread), EBITDA/Assets,* and *Debt/Assets.* Measures of investor characteristics include a *Strategic Investor* dummy that is equal to 1 if the lead investor is a VC/PE fund or a corporation and 0 otherwise, *ownership*, and a *Single investor* dummy that is equal to 1 if the lead investor invests alone and 0 otherwise. In addition, I also control for *Ln(MV),* a dummy variable indicating whether the proceeds are used for R&D, the stock performance before the PIPE (*CAR (−6, −1)),* which is measured as cumulative abnormal returns 6 months prior to a transaction adjusted by the equal-weighted market index, PIPE type (common stock or convertible), and offer size measured as the natural logarithm of gross proceeds. Year dummies and industry dummies are included in all specifications. *P*-values are shown in parentheses.

*** Denote statistical significance at the 1% confidence levels, respectively.
** Denote statistical significance at the 5% confidence levels, respectively.
* Denote statistical significance at the 10% confidence levels, respectively.

The *p*-values of the differences in stock performance across groups are also reported.

As shown in Panel A of Table 8, the announcement-term market reactions to PIPE announcements, measured from day −4 to day +5 relative to the event, are significantly positive across all sub-samples, consistent with findings in the literature (see e.g. Wruck, 1989; Hertzel and Smith, 1993; Dai, 2007; Brophy et al., 2009; Chen et al., 2010b). I do not find a significant difference in announcement returns between the single-round sample and the staged sample.

Table 8 also provides three longer return intervals, from day 6 to day 100, day 250, and day 500 relative to the event. I show that the single-round sample exhibits negative market-adjusted abnormal returns in the long run, which is consistent with the findings of Hertzel et al. (2002), Brophy et al. (2009), Chen et al. (2010b), and Chaplinsky and Haushalter (2010). In contrast, the staged sample exhibits positive market-adjusted abnormal returns up to 500 days following the event. Overall, the long-run stock performance of the staged sample is significantly better than that of the single-round sample.

Panel B of Table 8 summarizes the operating performances of PIPE issuers 1 year before and up to 2 years after the first PIPE offering. Measures of operating performance include sales (measured in millions of dollars), the R&D/Assets ratio, the EBITDA/Assets ratio, and the EV/Assets ratio. The median data from each sub-sample are reported. The *p*-values of the differences in medians for each measure in each year are also provided. In the last three rows of Table 8, I calculate the cumulative changes in each measure in the offering year, 1 year, and 2 years following the PIPE, using data from 1 year before the financing as benchmark. Regarding sales, I calculate the percentage changes, or cumulative growth in sales.

In general, staged firms are smaller on the revenue scale. However, this group of firms grows faster after PIPEs than do firms in the single-round group. For instance, the median sales in year 2 following a PIPE have grown by 91.2% in comparison with 55.0% growth in median sales of the single-round group. The staged sample is more R&D intensive, both before and after PIPE issuance. Both groups have reduced their R&D/Assets ratios gradually over the years following PIPE financing. The staged sample exhibits lower profitability both before and after PIPE financing. Both groups exhibit less negative EBITDA/Assets but remain negative within 2 years following PIPE issuance. The EV/Assets ratios for both groups have declined following PIPEs. There is no significant difference in the EV/Assets ratios before PIPEs across groups. Nevertheless, we see that the staged sample exhibits higher growth options after PIPE financing. Overall, the comparison of post-PIPE operating performance reveals that firms in the staged sample exhibit higher rates of growth in sales and remain more R&D intensive while exhibiting lower profitability than firms in the single-round sample.

In Table 9, I examine the effect of staging on PIPE issuer performance in a multivariate setting. In Panel A, I examine stock performance on the part of PIPE issuers. The dependent variables include equal-weighted CARs over the windows [−4, 5], [6, 100], [6, 250], and [6, 500]. The independent variables include the *Staging* dummy, *Intangible/Assets*, *R&D/Assets*, *EV/Assets EBITDA/Assets*, *Debt/Assets*, *Ln(Analyst), Ln(Spread)*, *discounts*, *ownership*, *strategic* an *investor* dummy, a *single investor* dummy, a dummy that is equal to 1 if the use of proceeds is related to R&D (0 otherwise), and the *Convertible* dummy. All specifications include year dummies and industry dummies.

Consistently with the univariate analysis, I find that staged financing is significantly and positively associated with better long-run stock performance up to 500 days subsequent to an

Table 8
The performance implication of staging.

	Single round	Staged financing			*p*-values		
		All rounds	First round	Sequential rounds	(1) vs. (2)	(1) vs. (3)	(3) vs. (4)
	(1)	(2)	(3)	(4)			
Panel A: stock performance							
Raw return							
[−4, 5]	5.8%	4.3%	4.2%	4.3%	0.180	0.320	0.938
[6100]	1.8%	8.3%	12.0%	5.6%	0.013**	0.008***	0.175
[6250]	2.3%	15.6%	25.4%	9.1%	0.002***	0.000***	0.051*
[6500]	14.5%	31.3%	40.8%	24.6%	0.003***	0.001***	0.103
VW CAR							
[−4, 5]	5.4%	3.9%	3.6%	4.1%	0.158	0.241	0.810
[6100]	−0.2%	6.4%	9.7%	4.0%	0.007***	0.006***	0.200
[6250]	−0.9%	10.9%	19.6%	4.7%	0.004***	0.001***	0.062*
[6500]	−8.2%	22.6%	30.6%	16.9%	0.009***	0.005***	0.164
EW CAR							
[−4, 5]	4.8%	3.2%	3.0%	3.4%	0.140	0.234	0.841
[6100]	−4.5%	2.0%	4.5%	0.3%	0.006***	0.011**	0.337
[6250]	−11.5%	0.8%	8.2%	−4.4%	0.002***	0.001**	0.107
[6500]	−13.5%	2.2%	8.5%	−2.2%	0.003***	0.005***	0.265

	Sales ($M)			R&D/Assets			EBITDA			EV/Assets		
	Single round	Staged financing	*p*-value	Single round	Staged financing	*p*-value	Single round	Staged financing	*p*-value	Single round	Staged financing	*p*-value
Panel B: Annual operating performance												
T_{-1}	21.1	12.5	0.035**	9.2%	14.6%	0.026**	−18.6%	−29.7%	0.001***	1.9	2.0	0.510
T_0	25.7	17.3	0.048**	7.3%	13.5%	0.004**	−15.6%	−26.6%	0.001***	1.7	2.0	0.078*
T_1	29.3	19.6	0.070*	4.5%	10.1%	0.013*	−13.0%	−19.5%	0.008***	1.4	1.6	0.031**
T_2	32.7	23.9	0.109	0.1%	8.1%	0.000***	−9.4%	−20.1%	0.005***	1.4	1.5	0.160
T_0	$-T_{-1}$	21.8%	38.4%		−1.9%	−1.1%		3.0%	3.1%		−0.2	0.0
T_1	$-T_{-1}$	38.9%	56.8%		−4.7%	−4.5%		5.6%	10.2%		−0.5	−0.4
T_2	$-T_{-1}$	55.0%	91.2%		−9.1%	−6.5%		9.2%	9.6%		−0.5	−0.5

Panel A summarizes the raw returns and market-adjusted abnormal returns using both the value-weighted (VW CAR) and equal-weighted (EW CAR) market indices around the announcement and up to 500 days following issuance. For the staged sample, I report stock performance for all rounds, the first round, and the follow-up rounds, respectively. The *p*-values of the differences in stock performance across groups are also reported. Panel B summarizes the operating performances of PIPE issuers from 1 year before up to 2 years after the first PIPE offering. Measures of operating performance include sales (measured in millions of dollars), the ratio of R&D/Assets, the ratio of EBITDA/Assets, and the ratio of EV/Assets. The median data from each sub-sample are reported. The *p*-values of the differences in medians for each measure in each year are also provided. In the last three rows, I calculate the cumulative changes in each measure in the offering year, 1 year, and 2 years following the PIPE, using data from 1 year before the financing as benchmark. In the case of sales, I calculate the percentage changes, or cumulative growth in sales.

*** Denote statistical significance at the 1% confidence levels, respectively.

** Denote statistical significance at the 5% confidence levels, respectively.

* Denote statistical significance at the 10% confidence levels, respectively.

Table 9
Regression analysis on the relation between staging and firm performance.

	CAR (4, 5)	CAR (6, 100)	CAR (6, 250)	CAR (6, 500)
Panel A: Stock performance				
Intercept	−0.066**	−0.221***	−0.555***	−0.719***
	(0.030)	(0.001)	(0.000)	(0.000)
Staging	*−0.017*	*0.058***	*0.099***	*0.089**
	(0.123)	*(0.017)*	*(0.015)*	*(0.097)*
Intangible/Assets	−0.058**	−0.033	−0.012	0.066
	(0.011)	(0.510)	(0.887)	(0.554)
R&D/Assets	0.015	0.056*	0.124**	0.109
	(0.312)	(0.090)	(0.023)	(0.131)
EV/Assets	−0.001	−0.004***	−0.011***	−0.016***
	(0.561)	(0.000)	(0.000)	(0.000)
Debt/Assets	−0.010	0.026	0.081*	0.227***
	(0.415)	(0.353)	(0.085)	(0.000)
EBITDA/Assets	−0.010	0.027	−0.024	−0.097*
	(0.330)	(0.249)	(0.527)	(0.054)
Ln(Analyst)	0.014**	0.046***	0.097***	0.094***
	(0.033)	(0.001)	(0.000)	(0.003)
Ln(Spread)	0.049***	0.074**	0.141***	0.254***
	(0.001)	(0.021)	(0.008)	(0.000)
Strategic Investor	0.034***	−0.002	0.026	0.084*
	(0.001)	(0.925)	(0.505)	(0.099)
Ownership	0.117***	0.206***	0.265***	0.257***
	(0.000)	(0.000)	(0.000)	(0.009)

(*continued on next page*)

Table 9 (*continued*)

	CAR (4, 5)	CAR (6, 100)	CAR (6, 250)	CAR (6, 500)
Single investor	0.012	0.019	0.030	0.057
	(0.202)	(0.367)	(0.389)	(0.222)
Discounts	−0.005	−0.015	−0.017	−0.027
	(0.239)	(0.111)	(0.286)	(0.192)
Use of proceeds: R&D	−0.004	0.014	−0.027	0.008
	(0.712)	(0.595)	(0.524)	(0.892)
Convertible	−0.025***	0.009	0.022	−0.025
	(0.006)	(0.657)	(0.522)	(0.581)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
N	2917	2917	2917	2917
Adjusted *R*-square (%)	3.63	6.46	8.17	8.84
	Sales growth	Change in R&D/Assets	Change in ROA	Change in EV/Assets
Panel B: Operating performance				
Intercept	0.061	0.023	−0.905	0.387
	(0.947)	(0.919)	(0.365)	(0.786)
Staging	*0.726***	*−0.003*	*0.118*	*−0.296*
	(0.001)	*(0.961)*	*(0.631)*	*(0.568)*
Intangible/Assets	−0.043	−0.315***	0.113	−0.345
	(0.910)	(0.001)	(0.786)	(0.568)
R&D/Assets	0.348	−0.681***	2.028***	1.755***
	(0.211)	(0.000)	(0.000)	(0.000)
EV/Assets	−0.005	−0.003*	0.004	−1.001***
	(0.433)	(0.059)	(0.557)	(0.000)
Debt/Assets	−0.192	0.074	0.298	0.329
	(0.472)	(0.229)	(0.295)	(0.430)
EBITDA/Assets	−0.076	−0.123***	1.272***	−1.287***
	(0.664)	(0.004)	(0.000)	(0.000)
Ln(Analyst)	0.035	−0.028	0.033	−0.101
	(0.732)	(0.266)	(0.769)	(0.528)
Ln(Spread)	0.014	0.107*	0.020	0.266
	(0.950)	(0.087)	(0.935)	(0.450)
Strategic investor	0.365**	−0.023	0.045	−0.474*
	(0.034)	(0.572)	(0.809)	(0.078)
Ownership	−0.062	−0.128	0.202	−0.867
	(0.866)	(0.149)	(0.215)	(0.134)
Single investor	−0.016	−0.032	0.169	0.340
	(0.317)	(0.408)	(0.323)	(0.165)
Use of proceeds: R&D	0.034*	0.087**	−0.026	0.262
	(0.078)	(0.038)	(0.898)	(0.371)
Convertible	−0.079	−0.020	0.138	0.199
	(0.603)	(0.598)	(0.406)	(0.406)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
N	1825	1410	1895	1862
Adjusted *R*-square (%)	0.04	14.24	2.00	88.14

In Panel A, I examine whether staging influences PIPE issuers' stock performance. The dependent variables include the equal-weighted CARs over the windows [−4, 5], [6, 100], [6, 250], and [6, 500]. In Panel B, I analyze whether staging affects firms' operating performance, proxied for by growth in sales, changes in R&D/Assets, changes in ROA, and changes in EV/Assets, by comparing these ratios from 2 years following a PIPE offering to the year prior to the offering. The key independent variable of interest is the Staging dummy. I further control for agency costs and PIPE investor characteristics. Measures of agency costs include *Intangible/Assets, EV/Assets, R&D/Assets, Ln(Analyst), Ln(Spread), EBITDA/Assets,* and *Debt/Assets.* Measures of investor characteristics include a *Strategic Investor* dummy that is equal to 1 if the lead investor is a VC/PE fund or a corporation and 0 otherwise, *ownership*, and a *Single investor* dummy that is equal to 1 if the lead investor invests alone and 0 otherwise. In addition, I also control for PIPE type (common stock or convertible), the use of PIPE proceeds (a dummy variable indicating whether the proceeds are used for R&D), and discounts issuers offered to investors. All specifications include year dummies and industry dummies. *P*-values are shown in parentheses.

*** Denote statistical significance at the 1% confidence levels, respectively.

** Denote statistical significance at the 5% confidence levels, respectively.

* Denote statistical significance at the 10% confidence levels, respectively.

offering after controlling for issuer characteristics and various features of a PIPE offering. Put in terms of economic significance, the staged group outperforms the single-round group by 6%, 10%, and 9%, respectively, 100 days, 250 days, and 500 days following PIPE offerings. These findings provide supporting evidence for Hypothesis 5.

I show that, among the control variables, the EV/Assets ratio is significantly and negatively associated with the long-run stock performance of PIPE issuers. Firms with greater analyst coverage outperform those with lesser or no analyst coverage over the long run. I show also that the ownership stake claimed by PIPE investors is significantly and positively associated with PIPE issuers' long-run stock performance.

In Panel B of Table 9, using multivariate regressions, I further examine whether staging helps to improve issuers' long-run operating performance. The dependent variables are growth in sales, changes in the R&D/Assets ratio, changes in ROA, and changes in the EV/Assets ratio measured by comparing these ratios in the 2 years following a PIPE offering with those of the year prior to the offering. I show that staging and the strategic investor dummy are significantly and positively associated with sales growth. Other than that, I find no evidence that staging affects operating performance within a 2-year window following a PIPE offering.

The above analysis shows that staging helps to reduce the cost of capital. Furthermore, staging is associated with better long-run stock performance on the part of PIPE issuers. Both findings

suggest that staging is an effective monitoring mechanism in PIPE investments.

6. Conclusions

I study the causes and consequences of staging in the setting of private investments in public equities (PIPEs). The main findings of this paper are as follows.

First, agency costs of the issuing firms increase the probability of staged financing and the frequency of staging, while decreasing the total financing and investment size per round. Second, strategic investors, such as VC/PE funds and corporations, are more likely to enforce staging. Furthermore, investors are more likely to utilize staging when they are investing alone. These findings support the notion that staging is a supplemental monitoring mechanism that investors use to control agency and information problems, as predicted in several theoretical studies (Sahlman, 1990; Hellman, 1994; Neher, 1999; Cornelli and Yosha, 2003; Wang and Zhou, 2004; Yerramilli, 2008) and documented in empirical studies on venture capital staging (Gompers, 1995; Krohmer et al., 2009; Tian, 2011).

Second, I show that staging is associated with lower PIPE discounts and therefore with the cost of financing for issuing firms. Firms with greater agency costs typically are more likely to be charged steeper discounts, as shown in Dai (2007), Chaplinsky and Haushalter (2010), and Dai et al. (2010). Staging helps mitigate agency and information problems and thus reduces the cost of financing for these firms.

Third, the paper shows that firms with staged financing achieve significantly better long-run stock performance than do their single-round peers. This evidence is consistent with the findings of Gompers (1995), Krohmer et al. (2009), and Tian (2011), which examine staging in venture capital investments.

These findings have important implications regarding the role of PIPE investors and the debate about whether PIPEs represent a faulty investment tool that allows investors to expropriate value from PIPE issuers. I show that, in addition to direct control (such as voting rights and board seats) and contractual protections, PIPE investors often use staging as an additional monitoring tool to mitigate agency and information asymmetry problems, which are rather severe in PIPE investments. This aspect of investor monitoring is, nevertheless, largely neglected in the extant literature on private placements and PIPEs, which potentially leads to an underestimation of the activist role of private placement investors. Furthermore, the finding that issuers offering staged financing experience positive long-run stock performance stands in contrast to the prevailing evidence that PIPE issuers, on average, substantially underperform relative to the market. This finding points to a need to study heterogeneity in PIPE structures when judging the social welfare of the PIPE investment tool.

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