The impact of mispricing and asymmetric information on the price discount of private placements of common stock

Charmaine Glegg
East Carolina University

Oneil Harris*
East Carolina University

Jeff Madura
Florida Atlantic University

Thanh Ngo
University of Texas - Pan American

This version: October 11, 2011

Abstract

The price discount on privately placed stock is large and can vary substantially among firms. While earlier studies attribute price discounts on privately placed stock to illiquidity and costs of gathering information, we offer a more complete explanation. We find that firms exhibiting higher overvaluation have significantly larger price discounts in private stock sales. We also find that higher levels of asymmetric information about the issuing firm and about the stock market environment at the time of the private placement cause more pronounced discounts in the offer price. Our analysis also shows that post-issue abnormal returns following private placements are higher when discounts are less pronounced.

JEL Classification: G12, G24, G32, G34

Keywords: Private placements; Mispricing; PIPE discounts

* *Corresponding author*: *East Carolina University*, 3128 Bate Building, Greenville, NC 27858; Phone: (252) 328-6100; Fax: (252) 328-6870; E-mail: harriso@ecu.edu.

We would like to thank Bonnie Van Ness (the editor), two anonymous reviewers, and Edward Harris for valuable comments and suggestions. We are also grateful for the support of the ECU summer research stipend.

1. Introduction

The private placement market has become an important source of funding for many public firms seeking equity. Floros and Sapp (2011) and Huson, Malatesta, and Parrino (2010) document that not only is there a notable increase in Private Investments in Public Equity (PIPE) activities in recent years, the common equity raised through PIPE offerings rivaled the common equity raised through seasoned equity offerings (SEOs) in the U.S.[1] Additionally, while equity is typically issued at a discount, PIPE discounts are disproportionately larger than those of SEOs. For instance, SEOs are associated with a mean discount of about 3%; yet, the PIPE discount is about 10%, on average (Corwin, 2003; Hertzel, Lemmon, Linck, and Rees, 2002).

Earlier studies find that private placements elicit positive announcement wealth effects, but have negative aftermarket performance (Krishnamurthy, Spindt, Subramaniam, and Woidtke, 2005). The favorable announcement returns are attributed to certification (Hertzel and Smith, 1993) and monitoring effects (Wruck, 1989). Barclay, Holderness, and Sheehan (2007) associate the discount and post-offering underperformance to managerial entrenchment. However, Hertzel, Lemmon, Linck, and Rees (2002) argue that private equity issuers are overvalued at the time of the placement, and that the discounts reflect informed investors' assessments of the true value of the issuers.

Krishnamurthy, Spindt, Subramaniam, and Woidtke (2005) suggest that while the non-participating shareholders earn negative abnormal returns after private sales of equity, the participating shareholders experience normal returns. While their study is not focused on private placement discounts, their results suggest that private equity investors negotiate appropriate discounts on average to offset anticipated losses.

[1] For instance, Floros and Sapp (2011) report that in 2008, PIPEs raised about $117.15 billion compared to the $132.09 billion raised via SEOs. In addition, Huson, Malatesta, and Parrino (2010) document that the dollar volume of PIPE issues increased from less than $1 billion in 1995 to $92.0 billion in 2007.

However, Chen, Cheng, Cheng, and Chih (2010) argue that although issuers inflate their earnings prior to private placements, investors do not ask for a fair discount for buying the overpriced shares. They suggest that private equity investors are naïve about the extent to which issuers manipulate earnings. Yet, under U.S. securities law, firms can only place shares privately with qualified institutional buyers or accredited investors (Gomes and Phillips, 2005). Furthermore, because the private equity market is loaded with hedge funds and other sophisticated money managers (Brophy, Ouimet, and Sialm, 2009), private market investors are well informed.

Thus, private placement investors would avoid stock sales by overvalued issuers, unless they are adequately compensated for anticipated losses due to market correction for temporary overvaluation. As a result, private placement discounts should reflect restitution for placing overvalued shares with informed investors, as suggested by Hertzel, Lemmon, Linck, and Rees (2002).

Barring Chen, Cheng, Cheng, and Chih (2010), the relation between issuer equity mispricing and the private placement discount has been largely ignored. Hertzel and Smith (1993) attribute the discounts to the information costs borne by investors. Martos-Vila (2011) suggests that the discounts reflect compensation for the loss of liquidity resulting from resale restriction. Barclay, Holderness, and Sheehan (2007) and Wruck and Wu (2009) suggest that the discounts are related to managerial entrenchment and the private benefits of control.

Our study adds to existing research by examining the relation between private placement discounts, issuer equity overvaluation and post-offering underperformance. To the extent that private equity investors have proprietary information about the intrinsic value of issuing firms,

they will require larger discounts to offset the effects of overpricing. Thus, our hypothesis implies a positive relation between the discount and the degree of issuer misvaluation.

In addition, since private stock sales exhibit disparate characteristics, we expect offerings that are subject to a greater degree of information asymmetry to be more heavily discounted. Specifically, we hypothesize that higher levels of asymmetric information about the issuing firm and about the stock market environment at the time of the private placement cause more pronounced discounts in the offer price.

We also anticipate finding lower post-offering returns when discounts are larger because more pronounced discounts suggest higher issuer overvaluation. It also is possible that post-offering returns are conditioned on market expectation of issue type. Akhigbe, Newman, and Safieddine (2006) find more positive announcement returns for firms that issue equity privately when public issues are expected, suggesting that these deals signal undervaluation or monitoring benefits. While their study does not assess long-run returns, we apply their argument to hypothesize that the firms that issue equity privately when public issues are expected also may experience more favorable long-run returns.

Using a sample of 601 PIPE offerings of common equity, we verify a strong positive relation between the magnitude of the private placement discount and the issuer's equity misvaluation. Second, we find a positive association between the degree of asymmetric information surrounding the firm that engages in a private placement and the discount. Third, we find a positive association between the degree of uncertainty surrounding the stock market in general at the time of the offering and the discount. We perform various robustness tests, but these findings continue to hold.

We also find that abnormal long-horizon returns are lower when issue discounts are higher, which offers evidence that the underpricing of shares offered may be in anticipation of weak long-term share price performance following private placements. Finally, firms that engage in private placements in periods when public offerings are expected earn higher long-horizon abnormal returns, which supports the certification effect.

While earlier studies attribute private placement discounts to compensation for illiquidity or for information costs, we show that the discount also reflects the assessment of issuer misvaluation and the uncertainty surrounding the perceived misvaluation. Consequently, we offer a more complete explanation of how the discount can vary among firms and how it can change over time. In addition, by linking the discount and post-offering returns, we not only explain the discount, but also justify the documented underperformance following private stock sales.

2. Background on PIPE offerings

In a private placement, a public company sells unregistered securities to a selected group of private investors without general investor solicitation. Securities sold privately are typically issued under Regulation D (Reg D), which allows issuers to sell restricted securities to accredited investors, provided that issuers file a brief notice (known as Form D) and investors hold the securities for up to two years following purchase. Investors also are precluded from trading on any information acquired about the issuer during the private placement.

As part of Rule 144A, the SEC created a category of sophisticated investors in 1990, called qualified institutional buyers (QIBs), which are institutional investors with assets ranging from $10 million to $100 million. Rule 144A provides a safe harbor exemption for the resale of

restricted securities to other QIBs. As a result, private placements under Rule 144-A are more liquid than Reg D placements because QIBs are allowed to trade their unregistered securities with other QIBs while Reg D imposes resale restrictions (Gomes and Phillips, 2005). While Rule 144A transactions apply to QIBs in the United States, Regulation S (Reg S) allows issuers to sell securities to QIBs in international markets.

Private placements of equity and equity-related securities are commonly referred to as Private Investments in Public Equity (PIPE). Although we focus on common stock PIPE offerings, PIPEs can take many exotic forms. Chaplinsky and Haushalter (2010) note that PIPE offerings are not subject to the long holding period of other private placements.

3. Hypothesis development

While market participants have access to all publicly available information about a firm, they have imperfect information about the firm's future cash flow. Thus, information asymmetry between managers and the market may cause stock prices to deviate from their intrinsic values. Given asymmetric information, managers have incentives to issue overvalued equity (Myers and Majluf, 1984).[2] Private equity issuers are overvalued at the time of the placement (Hertzel, Lemmon, Linck, and Rees, 2002) because managers boost earnings by manipulating accounting accruals (Chen, Cheng, Cheng, and Chih, 2010).

However, managers are limited in their ability to sell overvalued stocks in private equity markets because of sophisticated well informed investors (Brophy, Ouimet, and Sialm, 2009; Gomes and Phillips, 2005). While the non-participating shareholders experience negative abnormal returns after private sales of equity, Krishnamurthy, Spindt, Subramaniam, and

[2] In support of this view, a number of studies show that equity issuers subsequently underperform (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995; Hertzel, Lemmon, Linck, and Rees, 2002; Krishnamurthy, Spindt, Subramaniam, and Woidtke, 2005).

Woidtke (2005) show that the participating shareholders earn normal returns on average due to price discounts. We more closely investigate whether the price discounts of private placements reflect proprietary information about the true value of issuing firms. We expect more overvalued issuers to have larger discounts than less overvalued issuers, implying a positive relation between the discount and issuer mispricing (**H1**). Conversely, if private equity investors are unable to assess the true value of issuers (Chen, Cheng, Cheng, and Chih, 2010), they may not negotiate appropriate discounts for buying the overpriced shares.

A higher level of asymmetric information surrounding a firm may encourage managers to time their equity offerings for periods when their stocks are overpriced (Myers and Majluf, 1984; Krasker, 1986). When investors assess privately placed securities, they should require higher compensation for offerings by firms that exhibit a higher degree of asymmetric information. We hypothesize that private equity offerings will have a more pronounced discount when the issuing firms exhibit a higher level of asymmetric information (**H2**).

Asymmetric information surrounding a private equity offering may not only be attributed to the issuer, but also to the stock market environment at the time of the offering. Holding firm-specific characteristics constant, an offering may be subject to more asymmetric information when stock market and economic conditions are more uncertain. Choe, Masulis, and Nanda (1993) find that public stock offerings elicit more negative price responses during weak economic conditions.

Edelen and Kadlec (2005) suggest that market conditions affect how aggressively issuers will price stock offering. Firms without investment opportunities experience weaker share price responses at the time of equity offerings (Jung, Kim, and Stulz, 1996). To the extent that a more uncertain stock market environment causes investors to more carefully scrutinize the potential

investment opportunities of the issuing firms, it may force investors to require higher compensation when purchasing privately placed stock to account for the higher degree of stock market uncertainty. Thus, we expect larger discounts when stock market conditions are more uncertain (**H3**).

In addition, we theorize that when discounts are more pronounced, the abnormal long-run returns to issuers are lower. The rational is that assessment of the future returns of issuers affects the price that private equity investors are willing to pay for shares. To the extent that investors expect unfavorable post-offering returns because of transient overpricing, they will require larger discounts. Thus, long-run returns are expected to be negatively related to the discount (**H4**).

According to Akhigbe, Newman, and Safieddine (2006) firms that issue equity privately when public issues are expected signal undervaluation or monitoring benefits, thereby generating more favorable announcement period returns. While their study does not assess long-run returns, post-offering underperformance also may be influenced by this signaling strategy. We expect more favorable long-run returns for firms relying on this strategy because they demonstrate a stronger certification effect by using the private market when it is relatively inactive (**H5**).

4. Sample selection and summary statistics

We obtain a sample of private placement of common stock transactions in U.S. markets from the Securities Data Corporation (SDC) New Issues Database. The sample covers the period 2000-2008. The initial sample consists of 4,822 transactions. The SDC Database provides information on the issue date, the amount raised, the offering technique, the offer price, the use of proceeds, the issuer placement agency, and other deal-related variables.

To eliminate potential confounding effects due to regulation, we exclude all stock issues by financial (SIC codes 6000–6999) and utility (SIC codes 4900–4999) firms. In addition, we retain only transactions flagged as Private Investments in Public Equity (PIPE) and only issues by firms domiciled in the United States. We focus only on private placements of common shares since we wish to avoid any confounding effects from transactions with preferred shares and other equity-related securities. These requirements reduce the sample to 2,487 deals.

To minimize the influence of outliers, we also exclude transactions where the gross proceed is less than $1 million. Each issuer also is required to have event period financial statements data in Compustat and stock price data in CRSP. The resulting sample consists of 661 deals. Some issuers conduct multiple offerings in the same year. Such transactions may introduce confounding effects since the financial data for the issuing firm is the same. Therefore, to be in our final sample, we only consider the first PIPE offering for each issuer in a given year. This results in a final sample of 601 private placements by 444 issuers. Chen, Cheng, Cheng, and Chih (2010) identify 288 private equity placements from 1997 to 2003, also drawn from the SDC. Hence, there has been a rapid rise in PIPE activities in recent years (Floros and Sapp, 2011).

We report sample summary statistics in Table 1. Panel A provides the distribution by year. PIPE issues peaked in 2003; the number of deals in 2003 was nearly double that in 2001 (when the U.S. economy was in a mild recession). During the period 2005-2007, the number of issues per year ranged from 70 to 83. In 2008, the frequency dropped to 56 (similar to that of 2001 and 2002), which may be attributed to the weak economy. Panel B shows the distribution by sectors. The results indicate that some 24% of PIPE issues in the sample are in the business

equipment sector, while 48% are in the healthcare, medical equipment, and drug sector. The remaining 28% of issues are scattered among the other sectors.

Panel C provides summary information about the issuing firm and the deal. The mean issue amount is $25.63 million (the median is $12.90). The net proceeds are $25.48 million, on average. The mean issuer market capitalization is $229.20 million; thus, deal proceeds represent about 11% of market capitalization. This is consistent with Barclay, Holderness, and Sheehan (2007) and others. Issuers have mean proportional ownership of about 12% by outside blockholders and about 15% by insiders. In addition, the mean total debt ratio is 0.742. The mean return on equity is –0.550 and the mean operating cash flow-to-equity ratio is –0.430, which is consistent with prior studies reporting that PIPE issuers experience poor operating performance before the issue.

Panel D provides summary information about the deal characteristics. The intended purpose for 97% of the issues is "general corporate purposes." In addition, a fixed price method is used to set the offer price in 79% of the issues. The results also show that about 90% of the sample represents plain vanilla placements, while the other 10% represents acquisition-related transactions. We find that the issuer has had more than one class of common stock in less than 5% of all the transactions. In addition, issuers use a placement agent in about half of all offerings in the sample.

About 75% of the issuers in the sample trade on NASDAQ, implying that PIPE issuers tend to be relatively small, young, technology based firms with more information asymmetries about their values. In about 13% of the deals the lead investor (who invested the greatest percentage) is a hedge fund. Floros and Sapp (2011) show that while hedge funds are still plentiful as investors, corporations have become the dominant investor type in PIPE offerings.

5. Methodology

5.1. Measuring mispricing

We consider a firm mispriced when its stock price deviates from its fundamental value. Lin, Pantzalis, and Park (2010) suggest that combining individual misvaluation measures into a mispricing index balances out the effects and shortcomings of the individual measures while aggregating their informativeness, and thereby provides a more complete picture of mispricing. Therefore, we measure mispricing by constructing a mispricing index using the Lin, Pantzalis, and Park (2010) approach. Doukas, Kim, and Pantzalis (2010) also simulates equity misvaluation using a mispricing index, which combines several different excess valuation measures.

The mispricing index is the average, scaled cross-sectional ranking of alternative proxies for misvaluation, given as:

$$MI_i = \frac{1}{N}\frac{1}{K}\sum_{k}^{K} RANK\left(EXV_{ik}\right) \quad (1)$$

where $RANK(EXV_{ik})$ is the rank function, which assigns a rank from least mispriced (rank of one) to most mispriced (rank of N). EXV_{ik} is the k^{th} measure of mispricing for the i^{th} firm in our sample, and K represents the dimensions of the mispricing measures. The number of mispricing measures available averages the ranks for each firm (i.e., by the denominator, K). As a result, the mispricing index ranges from zero to one (from least mispriced to most mispriced).

Our mispricing index differs from that of Lin, Pantzalis, and Park (2010) in two ways. First, we do not include the excess value based on the Residual Income Model (RIM) since our sample consists of relatively small firms that tend to list on NASDAQ. Less than 50% of firms in the sample have earnings data in the Institutional Brokers' Estimate System (I/B/E/S) database. In addition, Rhodes-Kropf, Robinson, and Viswanathan (2005) argue that the RIM may be biased toward large deals, and Ritter and Warr (2002) suggest that it produces biased results

when it is not adjusted for inflation.[3] Second, we do not take the absolute value of the mispricing measures, since some private placements are negotiated at a premium; only four out of five transactions are negotiated at a discount.[4]

Our mispricing index is based on four mispricing measures, while that of Lin, Pantzalis, and Park (2010) is based on five measures. We simulate misvaluation using firm-specific mispricing, excess imputed value, average monthly abnormal return, and industry adjusted market-to-book equity ratio. Following Lin, Pantzalis, and Park (2010), we use the firm-specific error component of the market-to-book ratio based on the Rhodes-Kropf, Robinson, and Viswanathan (2005) approach to simulate firm-specific mispricing. Rhodes-Kropf, Robinson, and Viswanathan (2005) break the market-to-book ratio into three factors, given as:

$$m_{it} - b_{it} = \underbrace{\underbrace{m_{it} - v(\vartheta_{it};\alpha_{jt})}_{firm-specific\ error} + \underbrace{v(\vartheta_{it};\alpha_{jt}) - v(\vartheta_{it};\alpha_{j})}_{time-series\ sector\ error}}_{total\ error} + \underbrace{v(\vartheta_{it};\alpha_{j}) - b_{it}}_{long-run\ value-to-book} \qquad (2)$$

The subscripts *j* and *t* denote industry and time, respectively. Each component varies across firms and over time, and depend on valuation multiples that vary across industries and over time. We focus on Rhodes-Kropf, Robinson, and Viswanathan (2005) third model, which includes book value, net income, and market leverage ratio in the accounting information vector, given as:

$$m_{it} = \alpha_{0jt} + \alpha_{1jt} b_{it} + \alpha_{2jt} \ln(NI)^{+}_{it} + \alpha_{3jt} I_{(<0)} \ln(NI)^{+}_{it} + \alpha_{4jt} LEV_{it} + \varepsilon_{it} \qquad (3)$$

where $(NI)^{+}$ is the absolute value of net income, $I_{(<0)}$ is an indicator variable when net income is negative, and LEV is the leverage ratio. Pursuant to Rhodes-Kropf, Robinson, and Viswanathan (2005), we group firms into the 48 Fama-French sectors and perform annual cross-sectional regressions for each sector. Prior studies use this technique to simulate equity mispricing around

[3] To produce accurate estimates, Ritter and Warr (2002) argue the RIM must use real required returns, adjust depreciation for the distorting effects of inflation, and make adjustments for leverage induced capital gains.

[4] See studies by Barclay, Holderness, and Sheehan (2007), Hertzel, Lemmon, Linck, and Rees (2002), Wruck and Wu (2009), and Floros and Sapp (2011).

acquisitions, public equity offerings, spinoffs, analyst coverage, and earnings management (Doukas, Kim, and Pantzalis, 2005; Rhodes-Kropf, Robinson, and Viswanathan, 2005; Chi and Gupta, 2009; Hertzel and Li., 2010; Harris and Madura, 2011).

Excess value is computed as the natural log of the total capital-to-imputed value ratio at the end of the fiscal year prior to the placement. As in Lin, Pantzalis, and Park (2010), we define total capital as the market value of equity plus book value of debt. Imputed value is given as the product of the market value of equity and the median capital-to-size ratio in the firm's industry. To identify appropriate industry peers, industry classifications are based on the 48 Fama-French sectors.

Pursuant to Lin, Pantzalis, and Park (2010), we compute the average monthly abnormal return over the year prior to the placement based on the Fama and French (1993) three-factor model. In addition, the issuer's industry-adjusted market-to-book ratio is measured as the difference between the natural log of the issuer's market-to-book ratio at the end of the month prior to the stock offering and the market-to-book ratio of the median firm in the issuer's industry (see Lin, Pantzalis, and Park, 2010).

The leakage effect leading up to the placement is used as a complementary pricing variable that may cause a more pronounced discount, denoted *RUNUP*. Private investors may require larger discounts from issuers with higher stock price run-up because price run-ups result in more potential excess valuations. *RUNUP* is measured as the cumulative abnormal returns over the event window (-30, -1) based on the market model benchmark by the CRSP total value weighted index; the model parameters are estimated over the (-350, -31) window.

5.2. Measuring firm-specific asymmetric information

Prior studies use many proxies for the level of information asymmetry surrounding a firm's future cash flows. Krishnaswami and Subramaniam (1999) and other analyses use analyst forecast errors to replicate information asymmetry. Our sample consists of relatively small firms that receive little analyst coverage. Therefore, we identify several other firm level asymmetric information variables.

Firm size and institutional ownership can affect the level of asymmetric information of the firm (Atiase, 1985). For instance, analysts and the financial press are more likely to follow larger firms than smaller firms. Large firms also are likely to have less asymmetric information due to higher institutional ownership. Also, firms with higher institutional ownership are scrutinized more and better monitored than firms with lower institutional ownership.

Therefore, we use firm size and institutional ownership as proxies for firm-level information asymmetry. We define firm size as the natural log of total assets, and institutional ownership as the percentage of shares owned by institutional investors at the end of the quarter prior to the placement. Institutional ownership data are collected from *Share-World*, an affiliate of Thomson Financial.

In addition, Butler, Grullon, and Weston (2005) find that investors require higher returns for investing in stock offerings with less liquidity. Chaplinsky and Haushalter (2010) argue that liquidity is an important concern of PIPE investors. While our entire sample reflects private offerings, some issuers may be subject to more liquidity constraints than others. We use the average ratios of trading volume to shares outstanding over the window (-12, -1) months before the placement relative to that of all non-issuer firms in CRSP to simulate asymmetric information due to liquidity.

We also use issuer high-tech status to resemble information asymmetry. High-tech firms have high growth potential, but more asymmetric information about their value (Kohers and Kohers, 2001). Following Faccio and Masulis (2005), high-tech firms are defined as having primary SIC codes of 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3674 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 4899 (communication services), and 7370 to 7375 and 7379 (software). The source of the SIC codes is SDC Platinum.

5.3. Measuring stock market uncertainty

We measure uncertainty surrounding stock market conditions using market-wide volatility. Data on the NASDAQ Volatility Index (VXN) and the S&P 500 Volatility Index (VIX) are collected from the Chicago Board of Options Exchange, which reports the VXN and VIX on a daily basis. Higher levels of both the VXN and VIX represent more uncertainty about stock market valuations.

Pursuant to Lowry, Officer, and Schwert (2010), we use the ratio of the VXN to the VIX to simulate market-wide uncertainty since about 75% of the firms in our sample trade on NASDAQ (see Table 1). To the extent that the volatility of the NASDAQ index reflects uncertainty about the value of growth options, this ratio mimics the uncertainty in pricing around equity offerings (Lowry, Officer, and Schwert, 2010). Thus, we expect a more pronounced discount when this ratio is higher.

Table 2 Panel A discloses summary information for the misvaluation and asymmetric information measures. The mispricing index, denoted *MISPRICEINDEX*, has a mean and median value of 0.14. The test statistic indicates that the mean mispricing measure is significant at the

1% level. This finding implies that PIPE issuers are overvalued at the time of the placement, which is consistent with the long-term underperformance documented in the research. There also are significant leakage effects. The mean issuer price run-up is about 7% (*t*-statistic = 5.10).

Regarding information asymmetry, the mean firm size is 2.00; the median is 1.99. The percentage of shares owned by institutional investors is 25.97%, on average. This is not surprising since investment restrictions may prohibit institutional investors from holding smaller firms in their portfolios (Brown and Brooke, 1993).

The mean level of liquidity is 0.98, but the median is 0.59, which implies that PIPE issuers tend to be less liquid than the average firm in CRSP. Additionally, 146 firms (or 24.29% of the sample) are in high-tech industries. The market uncertainty variable has a mean of 1.46 (median is 1.41), which indicates that market uncertainty about the performance of NASDAQ stocks is higher than for the stocks in the S&P 500 Index.

To ascertain if private equity issuers are indeed overvalued at the time of the offering, we identify two control groups. First, we compare PIPE issuers to other non-issuing firms matched by market capitalization and industry. We use non-issuing firms in the same market capitalization decile and Fama-French 48 sectors as the private equity firm. Only 428 sample firms have appropriate matching firms. On average, we find about 30 peers per PIPE issuers.

We also compare private equity issuers to public equity issuers (SEO firms). Public market issuing firms are matched by issue year, deal value, and industry. We use SEO firms with the closest deal value in the same issue year and same Fama-French 48 sectors as the PIPE firms. We find comparable SEOs for only 333 PIPEs, and we identify roughly three SEOs for each PIPE. Univariate tests on misvaluation are reported in Table 2 Panel B.

As expected, PIPE issuers tend to be more overvalued at offering than non-issuing firms. The mean difference in *MISPRICEINDEX* is statistically significant at the 1% level (*t*-statistic = 6.07). Relative to SEO firms, PIPE firms also are more overvalued at offering. The mean difference is significant at the 1% level (*t*-statistic = 7.88). We attribute this result to more information asymmetry and access to public equity market because the results also show that SEO firms are significantly larger than PIPE firms after controlling for issue size, industry and issue year (*t*-statistic = 5.78). In addition, while PIPE issuers have significantly higher price *RUNUP* than their non-issuing counterparts, their stock *RUNUP* is the same as SEO issuers.

5.4. Measuring the private placement discount

PIPE discounts are calculated as the percentage difference between the offer price and the issuer's closing stock price on the placement date. When the offer price is lower than the market price, the difference is negative; we define this as a discount. Thus, price discounts are defined as negative price premiums. Table 3 provides summary information about the discounts.

The mean discount for the PIPEs in our sample is about 9%. The discounts in price at the time of issuance from their prevailing market value were relatively small in 2002 when U.S. economic conditions were weak. The discount was about 7%. However, in 2003 when economic conditions were stronger and when the frequency of PIPEs increased, discounts increased sharply to about 12%. Hence, the discounts appear to be more pronounced when stocks are more highly valued; that is, in periods when stocks are more likely to be overpriced.

Discounts declined slightly over the 2004-2006 period. The mean discount declined to its lowest level in 2008, when it fell sharply to 2.77%. These results are consistent with Huson, Malatesta, and Parrino (2010), who argue the discount has decreased over time due to changes in

the characteristics of the firms that are accessing the PIPE markets and changes in the pricing of issue characteristics.

Table 3 Panel B provides a comparison of the discount across quintiles of the mispricing and the asymmetric information variables. The issue price exhibits the smallest mean discount in the lowest quintile of the *MISPRICEINDEX* measurement. In contrast, the highest quintile of the *MISPRICEINDEX* is associated with the largest mean discount. The difference in the discounts between the lowest and highest quintiles is significant at the 1% level (*t*-statistic = 2.33). This result supports our hypothesis that more overvalued issuers have larger discounts.

As expected, smaller firms are associated with significantly more pronounced discounts than larger firms. Likewise, issuing firms with lower institutional ownership exhibit significantly larger discounts than issuing firms with higher institutional ownership. Hence, issuers with more information asymmetry about their valuations, as measured by firm size and institutional ownership, tend to exhibit a larger discount.

The results also support our view that discounts are more pronounced when stock market uncertainty is higher. The issue price exhibits a lower mean discount in the lowest quintile compared to the highest quintile of *MKTVOL*, implying that the discount is lower when there is relatively less uncertainty about the stock market. The difference in the mean discount between the lowest and highest quintiles is significant at the 1% level.[5]

5.5. Measuring post-offering long-run abnormal returns

We measure abnormal long-run returns after the private placement using the buy-and-hold method. Lyon, Barber, and Tsai (1999) show that benchmarking buy-and-hold abnormal

[5] Similar results are obtained for alternative measures of the discount. For brevity, we do not report these results.

returns (BHAR) with either a control firm or a matched portfolio yields well-specified test statistics. They recommend bootstrapped skewness-adjusted *t*-statistics. BHAR are defined as:

$$BHAR_{it} = \prod_{t=0}^{T}[(1+R_{it})-1] - \prod_{t=0}^{T}[(1+R_{pt})-1] \qquad \textbf{(4)}$$

where R_{it} is the monthly return on the PIPE firm at time *t* and R_{pt} denotes the monthly return on the matched portfolio. The first benchmark portfolio used includes all non-issuing firms in the same size-decile and Fama-French 48 sectors as the PIPE firm. The second benchmark portfolio includes public issuing firms matched by issue year, deal value, and industry. We use public issues with the closest deal value for issuers in the same Fama-French 48 sectors.

Fama (1998) argues against the buy-and-hold method because of errors arising from skewness, imperfect benchmarks, and cross-sectional dependence. For robustness, the Ibbotson's (1975) returns across time and securities (RATS) method combined with the Fama and French (1993) three-factor model augmented by the momentum factor (Carhart, 1997), is used to compute long-term performance. The model is given as:

$$\left(R_{it} - R_{ft}\right) = \alpha_t + \beta_t\left(R_{mt} - R_{ft}\right) + \delta_t SMB_t + \gamma_t HML_t + \phi_t UMD_t + \varepsilon_{it} \qquad \textbf{(5)}$$

where R_{it} denotes the monthly return on firm *i* in month *t*. The risk free rate in month *t* is given as R_{ft}. R_{mt} represents the month *t* return on the value-weighted CRSP index. SMB_t, HML_t and UMD_t are the size book-to-market, and momentum factors, respectively. The RATS *t*-statistic is used to determine the significance of the mean long-run abnormal return. The Fama-French-Momentum (FFM) four-factor model also is estimated with the calendar-time portfolio approach (Fama, 1998); we report the compounded long-run abnormal returns and its *t*-statistic.

Table 4 reports the abnormal 12-month return following the placement.[6] Panel A shows that the mean BHAR is -11.62%, when benchmarked against non-issuing firms. The skewness adjusted *t*-statistic suggest that this BHAR is significant at the 1% level (*t*-statistic = -3.21). However, we find no evidence that private equity issuers underperform public equity issuers. When the FFM four-factor model is combined with the RATS method, the mean long-term abnormal returns is -10.05% (*t*-statistic = 2.96). Yet, the underperformance is slightly more pronounced when the long-run abnormal returns from the FFM four-factor model are compounded (the mean is 17.26%). Overall, these results are consistent with studies showing that PIPE firms tend to underperform following stock issues (Krishnamurthy, Spindt, Subramaniam, and Woidtke, 2005).

The table also documents the effects of price discount and premiums on post-offering underperformance. We find more favorable long-run performance for issuers that receive premiums from investors, than for issuers that give discounts to investors. Post-offering underperformance is about 3% worse for issuers that are associated with discounts, regardless of the method used, and the difference is highly significant. In fact, the results show that private equity issuers that receive premiums do not underperform after the offering except for when the long-run abnormal returns from the FFM four-factor model are compounded. Thus, post-offering underperformance appears to be concentrated among issuers that give price discount. This finding supports the overvaluation hypothesis since underpriced firm should experience normal returns.

[6] To confounding effects from other post-offering events, we measure abnormal long-run returns up to one year after the private placement over the 12-month event window [+1 to +12].

5.6. Regression analyses

5.6.1. Cross-sectional discount regression

We test our hypotheses of the discount using a regression of the general form:

$$\begin{aligned} PREMIUM = {} & \alpha + \beta_1 MISPRICEINDEX_i + \beta_2 RUNUP_i + \beta_3 LIQUIDITY_i + \beta_4 FIRMSIZE_i + \beta_5 INSTOWN_i + \beta_6 TECH_i \\ & + \beta_7 MKTVOL_i + \beta_8 RELSIZE_i + \beta_9 MSECPREM_i + \beta_{10} FIXEDPRICE_i + \beta_{11} PLAIN_i + \beta_{12} REG\_S_i \\ & + \beta_{13} AGENT_i + \beta_{14} HEDGEFUND_i + \beta_{15} DUALSTOCK_i + \beta_{16} INOWN + \beta_{17} OBLOCKOWN_i \\ & + \beta_{18} LEVERAGE_i + \beta_{19} CFEQUITY_i + \beta_{20} DISTRESS_i \end{aligned} \quad \textbf{(6)}$$

The variables of interest are equity misvaluation (*MISPRICEINDEX*), price run-up (*RUNUP*), firm size (*FIRMSIZE*), institutional ownership (*INSTOWN*), liquidity (*LIQUIDITY*), high tech status (*TECH*), and market volatility (*MKTVOL*). These variables already are defined.

The model includes several control variables, which are introduced here. We divide the controls into two groups – one set for various deal characteristics and the other set for issuer specific controls. We control for the following: the net proceeds relative to market capitalization (*RELSIZE*); the mean private placement discount in the issuer's industry in the year prior to the deal (*MSECPREM*); whether a fixed price is used to determine the offer price (*FIXEDPRICE*); whether the transaction is a plain vanilla issue (*PLAIN*); whether the placement is a Regulation S issue (*REG_S*); and for whether the issuer used a placement agent (*AGENT*). Brophy, Ouimet, and Sialm (2009) suggest that hedge funds extract greater discounts from PIPE issuers than other investors. Thus, we also control for whether the lead investor (who invested the greatest percentage) is a hedge fund (*HEDGEFUND*).

Barclay, Holderness, and Sheehan (2007) suggest that private placements are related to entrenchment, so we control for whether the issuer has had more than one class of common stock outstanding prior to the offering (*DUALSTOCK*). We control for the percentage of shares owned by managers and directors (*INOWN*), and for the ownership representing 5% or more by outside blockholders (*OBLOCKOWN*).

Additionally, we control for the issuer's debt ratio (*LEVERAGE*), since more levered issuers may have more pronounced discounts. Issuers faced with cash flow constraints may have more pronounced discounts, so we include cash flow-to-equity (*CFEQUITY*).The Altman *z*-score is used as a distress indicator variable (*DISTRESS*), since investors may require higher discounts for privately placed shares by more distressed firms (Hertzel and Smith, 1993).

5.6.2. Cross-sectional long-run regression

To examine post-offering underperformance, we estimate the following model:

$$BHAR = \alpha + \beta_1 PREMIUM_i + \beta_2 EXPECT_i + \beta_3 DISTRESS_i + \beta_4 HEDGEFUND_i + \beta_5 RELSIZE_i + \beta_6 DUALSTOCK_i + \beta_7 INSTOWN_i + \beta_8 INOWN + \beta_9 OBLOCKOWN_i + \beta_{10} CFEQUITY_i + \beta_{11} LEVERAGE_i \quad \textbf{(7)}$$

where *PREMIUM* is the issue discount (recall that discounts are defined as negative premiums). Following the method of Akhigbe, Newman, and Safieddine (2006), *EXPECT* equals 1 if a private equity offering's predicted probability is greater than the mean prediction; zero otherwise. We estimate the likelihood of a private equity offering versus a public equity offering based on the model suggested by Akhigbe, Newman, and Safieddine (2006). From the logit analysis, we obtain the predicted probability of each firm.

The controls include offering-related variables and post-offering issuer characteristics. We control for whether the PIPE firm is distress (*DISTRESS*), for whether the lead investor is a hedge fund (*HEDGEFUND*), for the net proceeds relative to market capitalization (*RELSIZE*), and for whether the issuer has dual class shares (*DUALSTOCK*). In addition, we control for institutional ownership (*INSTOWN),* for inside ownership (*INOWN*) and for outside block ownership (*OBLOCKOWN*) at the end of the first fiscal year following the placement. We control for the issuer's debt ratio (*LEVERAGE*) and cash flow-to-equity ratio (*CFEQUITY*) at the end of the fiscal year after the placement.

6. Cross-sectional regression results

6.1. PIPE discount

Table 5 provides regression results for Equation 6. We use year fixed effects to control for the observed decline in the issue discount over time (in Panel A). To the extent that there are also sector effects, we jointly control for year fixed effects and sector fixed effects in Panel B. In addition, since the firm-level asymmetric information variables may be correlated, to avoid multicollinearity we estimate different model specifications. The test statistics are based on heteroskedasticity-consistent robust standard errors.

The variable *MISPRICEINDEX* is consistently negative and significant, which suggest that the discount is larger when firms are more overvalued. This finding supports hypothesis 1 and confirms the univariate results. The marginal effect of *MISPRICEINDEX* on the price premium is approximately –0.3. In economic terms, it appears that private equity investors receive an average dollar discount of about $69 million, after controlling for the effects of uncertainties and other factors.[7] This is economically significant. Consequently, we interpret this finding to mean that PIPE discounts reflect restitution for placing overvalued shares with private investors.

RUNUP is negative and highly significant. Thus, when issuers experience a larger run-up immediately before the issue, private equity investors require a larger discount. This may be because these investors suspect managers are attempting to time the offering for periods when their stock price is higher, and is consistent with the literature on market timing.[8]

As expected, *FIRMSIZE* and *INSTOW* are highly significant and negatively related to the discount. Thus, smaller firms and firms with lower institutional ownership exhibit more

[7] The $69 million was estimated as the product of the coefficient and the mean market capitalization.
[8] See Graham and Harvey (2001), Busaba, Benveniste, and Guo (2001), Chan, Ikenberry, and Lee (2007), and Harris and Madura (2011).

pronounced discounts. These results support our hypothesis that discounts should be more pronounced when the issuing firm is subject to higher degrees of asymmetric information. However, the *LIQUIDITY* and *TECH* variables are insignificant, implying that relative liquidity and issuer high-tech status do not affect the discount.

The variable *MKTVOL* is negative and significant at the 5% level or better. Hence, when there is more uncertainty surrounding the stock market, investors require a larger price discount in private stock sales. This finding supports our hypothesis of a more pronounced discount for PIPEs that occur when stock market conditions are more uncertain.

Several of our control variables also are significant. There is evidence that a fixed price approach and a plain vanilla private placement also affect the discount. There also is marginal evidence that the discount is positively correlated to outside block ownership. To the extent that outside blockholders do not want to immediately dilute ownership levels via SEOs, they may be inclined to give larger discounts to private investors so as to retain monitoring influence over managerial decisions or to extract private benefits. The variable *CFEQUITY* is positive and significant, implying that investors extract larger discounts from issuers faced with more severe cash flow constraints.

Overall, the results in Table 5 indicate that investors who buy shares in private stock sales require more compensation (larger discounts) to offset the more pronounced overpricing. This implication may explain why these issues sell at a discount and why discounts vary among issues. Thus, while earlier studies attribute the discounts to payment for illiquidity or information costs, we show that the discount also reflects investors' assessment of stock price misvaluation and the uncertainty surrounding the perceived misvaluation.

So far, we have established a significant relationship between the discount and issuer mispricing. We now address the question of how responsive the discount is to the degree of misvaluation. To investigate whether there is heterogeneity in the sensitivity of the discount to mispricing, we use quantile regression analysis (Hallock, Madalozzo, and Reck, 2010). As shown in Table 6, evaluating different points on the conditional distribution of price premium provide a clearer picture of the relation between the discount and issuer misvaluation.

First, the impact of equity mispricing on the discount is only significant at the 30th percentile or higher. Equity mispricing is not only significant at above the 30th percentile, but the sensitivity of the discount to mispricing also abruptly increases as we move from the 40th up to the 90th percentile. This is indicated by the magnitude of the $\hat{\beta}_{\tau}$'*s* for the *MISPRICEINDEX* variable. All the estimated coefficients for the *MISPRICEINDEX* variable are significant at the 5% level or better at or above the 40% percentile.

Second, from the 40% percentile to the 70% percentile of the price premium distribution, mispricing, issuer liquidity and market volatility are all important determinants of the PIPE discount. However, below the 40% percentile, issuer liquidity and market volatility significantly explains the discount, but not mispricing. Thus, investors in the 30th percentile of the price premium distribution (recall that discounts are defined as negative premiums) are more concerned about trading volume and market uncertainty than they are about issuer mispricing.

Interestingly, the *RUNUP* variable only exhibits significance at the 60th percentile or higher. Note that mispricing always is significant above the 30% percentile. Together, these results suggest that investors at the 60th through 90th percentile of the premium distribution are more concerned about mispricing than they are about trading volume and market uncertainty.

The significance of the *RUNUP* variable suggests that investors require larger discounts to offset overpricing because they suspect that managers are attempting to time the offering.

To address potential selection bias, we employ the Heckman (1976) two-step self-selectivity approach. In the first stage, we estimate the likelihood of a PIPE versus a SEO, based on the model suggested by Akhigbe, Newman, and Safieddine (2006). We report the logit regression results in Panel A of Table 7. In the second stage, we compute the inverse Mills ratio (*INVMILLS*) and include it as an explanatory variable in the premium regression. The Heckman correction regression results are reported in Panel B. The inclusion of the inverse Mills ratio does not change the relationship between the discount and mispricing, nor the implication and significance of the firm-level asymmetric information variables and the market volatility variable. Moreover, *INVMILLS* is insignificant. These results indicate that our findings are not biased by the self-selection problem.

Since our analysis may be sensitive to how the discount is measured, we consider three alternative measures. We also compute the discount as the percentage difference between the placement offer price and the issuer's closing stock price: (1) ten days before the placement date, (2) one day before the placement date, and (3) one day after the placement date. Very similar results to those reported to this point are obtained for these alternative measures. For brevity, we do not report the results for alternative discount measures in a table.

Yet, despite the evidence, we acknowledge that our findings of misvaluation for PIPE issuers could partially represent asymmetric information. In this case, the results would only strengthen our existing results and conclusions regarding how PIPE issuers with higher degrees of asymmetric information exhibit more pronounced price discounts.

6.2. Abnormal long-run returns

Cross-sectional regression results on the post-offering underperformance are reported in Table 8. In panel A, we investigate the association between long run abnormal returns and the price discount. We find a positive and significant relation between the variable *PREMIUM* and *BHAR*, suggesting that when the price discount is lower, the aftermarket performance is more favorable. This supports hypothesis 4 and complements our earlier results on the discount and misvaluation. That is, when private equity investors expect unfavorable post-offering returns because of transient overpricing, they will require larger discounts. The results also show that the *EXPECT* variable is negative and highly significant. This supports our hypothesis that firms that issue equity privately when public issues are expected generate more favorable long-run returns.

A number of the control variables also are significant. *HEDGEFUND* is positive and significant at the 1% level, thus issuers perform better after private equity offerings where the lead investor is a hedge fund. *RELSIZE* is negative and significant, implying that relatively larger private offerings have more adverse effects of post-offering performance. *DUALSTOCK* also is negative and significant, which suggests that dual-class share structures lead to more pronounced post-offering underperformance. This is consistent with the view that dual-class shares cause agency problems (Bebchuk, Kraakman, and Triantis, 2000).

There also is some evidence that institutional ownership boosts the aftermarket performance of private equity offerings. *INSTOWN* is positive and significant. Firms with higher institutional ownership are better monitored than firms with lower institutional ownership (Atiase, 1985). In addition, *CFEQUITY* is positive and highly significant, implying that post-offering underperformance is worse for issuers faced with more severe cash flow constraints.

We also find that *INOWN* is negative and significant and that *OBLOCKOWN* is insignificant. Barclay, Holderness, and Sheehan (2007) argue that managers often place large blocks of stock with passive investors to help enhance their control of the firm. This may increase agency problems following PIPEs and lower performance. Thus, our results also support the view that some PIPEs are motivated by certification and monitoring, while others are motivated by entrenchment.

In Panel B, we test whether an unexpected discount (*UNEXPREMIUM*) reflects information about post-offering underperformance. Since private placements are motivated by different considerations (Barclay, Holderness, and Sheehan, 2007), some issuers may offer discounts that are not in line with those offered by other issuers. We measure the unexpected discount as the actual discount minus the predicted discount. The predicted discount is estimated using our regression results that control for issuer and deal-specific features, as well as year-fixed effects (to account for the decline in the observed discount over time) and sector fixed effects.[9]

There is a positive association between abnormal long-run returns and *UNEXPREMIUM*, implying that a higher than expected price discount elicits more pronounced post-offering underperformance. Hence, private equity sales characterized by a disproportionate discount may be motivated by entrenchment or other private benefits of control (Barclay, Holderness, and Sheehan, 2007; Wruck and Wu, 2009). The use of the *UNEXPREMIUM* variable does not change the significance or implications of the other variables in the model.

[9] These results were disclosed earlier in Table 5.

7. Conclusion

Earlier studies attribute the private placement discounts to compensation for illiquidity due to resale restrictions and the costs of gathering information. However, using a sample of 601 PIPE offerings of common equity, we offer a more complete explanation of the price discount at the time of offering. Overall, our findings not only explain variation in the price discount among firms, but also justify why the price discount changes over time.

We show a strong positive relation between the magnitude of the private placement discount and the issuer's equity misvaluation, after controlling for the effects of uncertainties and other factors. On average, the total dollar discount is worth about $69 million. Therefore, the fraction of the private placement discount that is related to issuer misvaluation is economically significant.

We also find a positive association between the degree of asymmetric information surrounding the private placement and the discount. We detect two sources of asymmetric information: the firm issuing the securities, and the investor perception of the stock market, in general, at the time of the offering. While firm-specific asymmetric information may be cross-sectionally correlated with mispricing, its effects on price discounts are evident even after accounting for the level of mispricing. Stock market uncertainty at the time of the private placement also has a distinct effect on the price discount.

We also apply quintile regression analysis and find that the sensitivity of the discount to mispricing is more pronounced at higher percentiles of the discount distribution increase. Overall, quintile regression analysis indicates that investors tie the discount more closely with overvaluation when the issuer's stock price is more inflated.

We provide further support for the overvaluation hypothesis by examining the relation between the discounts and post-offering underperformance. Our analysis shows that abnormal long-horizon returns are lower when issue discounts are higher. We also find that a larger than expected discount elicits more pronounced underperformance. In addition, firms that engage in private placements in periods when public offerings are expected earn higher long-horizon abnormal returns, which supports the certification effect. By relating the discount to post-offering returns, we not only explain the discount, but also help to explain the documented underperformance following private stock sales.

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Table 1

Frequency distribution by year and deal characteristics

This table provides frequency distributions and descriptive statistics for the sample of 601 PIPE offerings completed between 2000 and 2008. Deal-related data are taken from SDC platinum and accounting data are taken from Compustat. The accounting data all are measured at the end of the fiscal year prior to the place date. Outside block ownership is the percentage of shares owned by 5% or more outside blockholders and Inside ownership is the percentage of shares owned by managers and directors (data are collected from proxy statements).

Panel A – Observations by sample year

	N	*Percent*
2000	17	2.83%
2001	59	9.82%
2002	55	9.15%
2003	101	16.81%
2004	88	14.64%
2005	70	11.65%
2006	72	11.98%
2007	83	13.81%
2008	56	9.32%
Total	601	100%

Panel B – Observations by sector

	N	*Percent*
Consumer Non-Durables	7	1.16%
Consumer Durables	8	1.33%
Manufacturing	22	3.66%
Energy Oil, Gas, and Coal Extraction and Products	40	6.66%
Chemicals and Allied Products	4	0.67%
Business Equipment	143	23.79%
Telephone and Television Transmission	10	1.66%
Shops Wholesale, Retail, and Some Services	19	3.16%
Healthcare, Medical Equipment, and Drugs	286	47.59%
Other	62	10.32%
	601	100%

Panel C – Descriptive statistics for various firm and deal characteristics

	N	*Mean*	*Median*
Issue amount (in millions)	601	$25.63	$12.90
Net proceed (in millions)	597	$25.48	$12.70
Market capitalization (in millions)	585	$229.20	$98.86
Issue amount / Market capitalization	585	11.12%	11.78%
Issuer mean sector premium before the deal	592	-21.06%	-23.42%
Issuer outside block ownership	552	12.37%	7.96%
Issuer inside ownership	564	14.65%	12.74%
Issuer total debt ratio	600	0.472	0.380
Issuer net income to total equity ratio	600	-0.550	-0.479
Issuer operating cash flow-to-equity ratio	600	-0.430	-0.392
Issuer market-to-book ratio	572	7.49	3.71

Panel D – Observations for deal characteristics

	N	*Percent*
Proceeds used for general corporate purposes	575	97.29%
Offer price based on a fixed price method	474	78.87%
Plain vanilla private placement	540	89.85%
Private placement was issued under rule 144A	0	0%
Regulation S applies to the private placement	117	19.47%
Issuer has had more than one class of common stock	29	4.83%
Issuer used a placement agent	302	50.25%
Issuer primary stock exchange is NASDAQ	453	75.37%
Lead investor is a hedge fund	76	12.65%

Table 2

Descriptive statistics for the mispricing and asymmetric information measures

Panel A provides mispricing and asymmetric information summary statistics for the 601 PIPE offerings over the period 2000–2008. *MISPRICEINDEX* is a mispricing index constructed using the Lin et al. (2010) approach. The mispricing index is the average, scaled cross-sectional ranking of the following issuer misvaluation proxies: its average monthly abnormal return, its excess imputed value, its excess value based on Rhodes-Kropf et al. (2005) approach, and its industry adjusted market-to-book ratio. *RUNUP* is the issuer's price run-up over the 30-trading-day period before the placement date. *FIRMSIZE* is the natural log of the issuer's total assets (in millions). *INSTOWN* is the percentage of shares owned by institutional investors at the end of the quarter prior to the placement date. *LIQUIDITY* is the average ratios of trading volume to number of shares outstanding over the window (-12,-1) months before the placement relative to the average ratios of trading volume to number of shares outstanding in the same windows of all stocks in CRSP. *TECH* equals 1 if the issuer is in a high-tech industry, as defined by Faccio and Masulis (2005). *MKTVOL* is the ratio of the CBOE NASDAQ Volatility Index (VXN) to the CBOE S&P 500 Volatility Index (VIX), which mimic market-wide uncertainty (see Lowry et al., 2010). The symbol *** indicates significance at the 1% level. Panel B reports univariate results from comparing PIPE firms to two alternative control groups. First, we compare our private issuing firms to other non-issuing firms matched by capitalization decile and industry. We use non-issuing firms in the same market capitalization decile and Fama-French 48 sectors as the PIPE firm. In addition, we compare private issuing firms to other public issuing firms (SEO firms). Public issuing firms are matched by issue year, deal value, and industry. We use public issues with the closest deal value in the issue year for issuers in the same Fama-French 48 sectors.

Panel A – mispricing and asymmetric information measures for PIPE issuers

	N	***Mean***	***Median***	***t-statistic***
MISPRICEINDEX	464	0.14	0.14	74.93***
RUNUP	601	7.29%	-0.28%	5.10***
FIRMSIZE	601	2.00	1.99	94.08***
INSTOWN	552	25.97%	21.22%	28.43***
LIQUIDITY	601	0.980	0.591	42.55***
TECH	146	-	-	-
MKTVOL	585	1.46	1.41	35.68***

Panel B – Comparison of the mean misvaluation of PIPE firms to two alternative control groups

	Panel A – non-issuing firm control group			*Panel B – Public issuing firm control group*		
	Sample Firms	*Matching Firms*	*Difference t-statistic*	*Sample Firms*	*Matching Firms*	*Difference t-statistic*
MISPRICEINDEX	0.140	0.128	6.07***	0.196	0.171	7.88***
RUNUP	6.59%	1.79%	2.86***	6.09%	5.57%	0.25
Market capitalization	206.53	202.69	0.14	220.69	289.43	-1.76*
FIRMSIZE	4.69	4.67	1.31	4.68	5.14	5.78***
Number of sample firm	428			333		
Number of matching firms per sample firm		29.92			2.65	

***, **, and * indicate statistically significance at the 0.01, 0.05, and 0.1 level, respectively.

Table 3

Descriptive statistics for the PIPE premium

This table reports summary statistics on the PIPE premium. Discounts are defined as negative price premiums. The premium is calculated as the percentage difference between the private placement offer price and the issuer's closing stock price on the placement date. Panel A reports statistics for the full sample, while PANEL B – reports the mean premiums by year. Panel C reports univariate results on the PIPE premium. *MISPRICEINDEX* is a mispricing index, which is the mispricing index is the average, scaled cross-sectional ranking of four issuer misvaluation proxies. *RUNUP* is issuer's price run-up as measured over the 30-trading-day period before the placement date. *FIRMSIZE* is the natural logarithm of the issuer's total assets. *INSTOWN* is institutional ownership at the end of the quarter prior to the placement date. *LIQUIDITY* is the issuer's average trading volume to shares outstanding over the year prior relative to the non-issuing firms in CRSP. *MKTVOL* is the ratio of the VXN to the VIX. The sample contains 601 PIPE offerings in the U.S. over the period 2000–2008.

PANEL A – Full sample

Mean premium	-8.74%
Median premium	-8.42%
Number of Obs.	601

PANEL B – Average PIPE premiums by year

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mean	-15.91%	-9.51%	-7.05%	-12.16%	-9.22%	-9.40%	-8.76%	-6.63%	-2.77%
N	17	59	55	101	88	70	72	83	56

PANEL C – Comparison of average PIPE premium by mispricing and asymmetric information quintiles

	Quintiles					*Difference*		
	Low-Q1	*Q2*	*Q3*	*Q4*	*High-Q5*	*Q5 - Q1*	*t-statistic*	*Wilcoxon z-statistic*
MISPRICEINDEX	-6.91%	-6.73%	-6.74%	-9.41%	-9.63%	-2.71%	-2.33**	2.61**
RUNUP	-7.53%	-6.56%	-8.37%	-10.91%	-10.33%	-2.80%	-1.47	1.35
FIRMSIZE	-11.17%	-8.46%	-9.08%	-7.83%	-6.88%	4.29%	-2.33**	2.69***
INSTOWN	-11.01%	-8.57%	-10.30%	-7.59%	-6.04%	4.97%	2.74***	2.84***
LIQUIDITY	-7.23%	-9.03%	-8.91%	-10.07%	-9.14%	-1.90%	-1.18	1.24
MKTVOL	-4.15%	-10.08%	-7.72%	-11.25%	-9.59%	-5.40%	3.00***	3.78***

***, **, and * indicate statistically significance at the 0.01, 0.05, and 0.1 level, respectively.

Table 4

Abnormal long run returns of private equity issuers

Abnormal long-run returns are estimated using the buy-and-hold method based on the matched portfolio approach (Lyon et al., 1999). In a functional form, buy-and-hold abnormal return (BHAR) is defined as: $BHAR_{it} = \prod_{t=0}^{T}[(1+R_{it})-1] - \prod_{t=0}^{T}[(1+R_{pt})-1]$, where R_{it} is the monthly return on the PIPE firm at time t and R_{pt} denotes the monthly return on the matched portfolio. We use two alternative matched portfolios. The first benchmark portfolio includes all non-issuing firms in the same size-decile and Fama-French 48 sectors as the PIPE firm. The second benchmark portfolio includes public issuing firms matched by issue year, deal value, and Fama-French 48 sectors. For robustness, the Ibbotson's (1975) returns across time and securities (RATS) method combined with the Fama and French (1993) three-factor model augmented by the momentum factor (Carhart, 1997), is used to compute long-term performance. The model is given as: $(R_{it} - R_{ft}) = \alpha_t + \beta_t(R_{mt} - R_{ft}) + \delta_t SMB_t + \gamma_t HML_t + \phi_t UMD_t + \varepsilon_{it}$, where R_{it} denotes the monthly return on firm i in month t. The risk-free rate in month t is given as R_{ft}. R_{mt} represents the month t return on the value-weighted CRSP index. SMB_t, HML_t and UMD_t are the size book-to-market, and momentum factors, respectively. The RATS t-statistic is used to determine the significance of the mean long-run abnormal return. The Fama-French-Momentum four-factor model also is estimated with the calendar-time portfolio approach (Fama, 1998); we report the compounded long-run abnormal returns and its t-statistic.

Panel A. Abnormal long horizon returns based on Buy-and-hold method

	Benchmarked against non-issuing firms			*Benchmarked against public equity issuers*		
	N	*Mean*	*Skew. Adj. t-stat*	*N*	*Mean*	*Skew. Adj. t-stat.*
Full Sample	428	-11.62%	-3.205***	333	-2.82%	-0.857
Discount transactions	334	-12.23%	-3.034***	263	-3.21%	-0.882
Premium transactions	93	-9.15%	-1.062	70	-1.28%	-0.163

Panel B. Abnormal long horizon returns based on Fama-French-Momentum (FFM) factors

	FFM Factors with Ibbotson RATS Method			*FFM Factors adjusted compounded abnormal returns*		
	N	*Mean*	*Skew. Adj. t-stat*	*N*	*Mean*	*Skew. Adj. t-stat.*
Full Sample	601	-10.05%	-2.956***	591	-17.26%	-4.968***
Discount transactions	483	-11.43%	-3.143***	475	-16.43%	-4.104***
Premium transactions	118	-6.48%	-0.719	116	-13.85%	-2.093**

***, **, and * indicate statistically significance at the 0.01, 0.05, and 0.1 level, respectively.

Table 5

Cross-sectional regression results on the PIPE premium

This table presents regression results on the PIPE discount; discounts are defined as negative price premiums. The dependent variable is the price premium calculated as the percent difference between the offer price and the market price on the issue day. *MISPRICEINDEX* is the mispricing index based on the Lins et al. (2010) approach. *RUNUP* is the price run-up over 30-trading-day period before the issue. *LIQUIDITY* is the average ratios of trading volume to shares outstanding over the window (-12,-1) months before the placement relative to the average ratios for all stocks in CRSP. *FIRMSIZE* is the natural log of total assets. *INSTOWN* is institutional ownership at the end of the quarter prior to the PIPE. *TECH* = 1 when the issuer is in a high-tech industry; zero, otherwise. *MKTVOL* is the ratio of the VXN to the VIX. *RELSIZE* is the net proceed to market capitalization ratio. *MSECPREM* is the mean private placement premium in the issuer's industry in the year prior to the deal. *FIXEDPRCING* = 1 if a fixed price approach is used to determine the offer price; zero, otherwise. *PLAIN* = 1 if the deal is a plain vanilla private placement; zero otherwise. *REG_*S = 1 when the placement is a Regulation S issue; zero otherwise. *AGENT* = 1 when the issuer used a placement agent; zero, otherwise. *HEDGEFUND* = 1 when the investor is a hedge fund; zero otherwise. *DUALSTOCK* = 1 when the issuer has dual class shares; zero, otherwise. *INOWN* and *OBLOCKOWN* are the percentage of inside and block ownership, respectively. *LEVERAGE* and *CFEQUITY* are the total debt ratio and the operating cash to total equity at the end of the fiscal year prior to the placement. *DISTRESS* is the issuer's Altman *z*-score at the end of the fiscal year prior to the placement date.

	Panel A:Year Fixed Effects				*Panel B:Year and Sector Fixed Effects*			
	Coef.	*t-stat*	*Coef.*	*t-stat*	*Coef.*	*t-stat*	*Coef.*	*t-stat*
INTERCEPT	0.11*	(2.07)	-0.05	(-0.61)	0.11	(1.58)	-0.05	(-0.60)
MISPRICEINDEX	-0.30**	(-2.67)	-0.26*	(-1.88)	-0.30***	(-3.46)	-0.26***	(-3.26)
RUNUP	-	-	-0.04**	(-3.14)	-	-	-0.04***	(-11.97)
LIQUIDITY	0.30	(0.09)	0.25	(0.08)	0.30	(0.10)	0.25	(0.10)
FIRMSIZE	-	-	0.08***	(4.33)	-	-	0.08***	(4.95)
INSTOW	0.17**	(2.78)	0.02	(0.32)	0.17**	(2.51)	0.02	(0.27)
TECH	-0.02	(-0.97)	-0.01	(-0.60)	-0.02	(-0.96)	-0.01	(-0.64)
MKTVOL	-0.12***	(-3.68)	-0.12***	(-3.73)	-0.12**	(-2.23)	-0.12**	(-2.42)
RELSIZE	0.02	(0.30)	0.08	(1.57)	0.02	(0.29)	0.08	(1.58)
MSECPREM	0.00	(0.82)	0.00	(0.70)	0.00	(0.31)	0.00	(-0.04)
FIXEDPRCING	-0.05*	(-2.22)	-0.04**	(-2.43)	-0.05*	(-2.17)	-0.04**	(-2.47)
PLAIN	0.03*	(2.14)	0.03*	(2.06)	0.03**	(2.79)	0.03**	(2.75)
REG_S	0.01	(0.66)	0.02	(1.23)	0.01	(0.67)	0.02	(1.16)
AGENT	-0.01	(-0.54)	-0.01	(-0.78)	-0.01	(-0.83)	-0.01	(-1.20)
HEDGEFUND	0.00	(-0.17)	0.00	(-0.32)	0.00	(-0.17)	0.00	(-0.44)
DUALSTOCK	0.00	(0.00)	-0.02	(-0.91)	0.00	(-0.01)	-0.02	(-0.65)
INOWN	0.03	(0.41)	0.02	(0.26)	0.03	(0.52)	0.02	(0.31)
OBLOCKOWN	-0.17**	(-2.85)	-0.05	(-0.87)	-0.17**	(-2.86)	-0.05	(-0.70)
LEVERAGE	0.02	(0.72)	0.02	(0.74)	0.02	(1.03)	0.02	(1.05)
CFEQUITY	-0.01***	(-6.31)	-0.01***	(-5.88)	-0.01**	(-3.04)	-0.01**	(-3.18)
DISTRESS	0.00	(-0.67)	0.00	(-1.41)	0.00	(-0.68)	0.00	(-1.10)
F-statistic	5.59***		9.88***		4.11****		4.16***	
Adjusted R^2	0.12		0.16		0.13		0.16	
Number of Obs.	355		355		355		355	

Year Fixed Effects	YES	YES	YES	YES
Sector Fixed Effects			YES	YES

***, **, and * indicate statistically significance at the 0.01, 0.05, and 0.1 level, respectively.

Table 6

Quantile regression estimates on the PIPE premium

The dependent variable the discount measured relative to the issuer's closing price on the issue date. Discounts are defined as negative price premiums. *MISPRICEINDEX* is the mispricing index based on the Lins et al. (2010) approach. *RUNUP* is the price run-up over the 30-trading-day period before the issue. *LIQUIDITY* is the average ratios of trading volume to shares outstanding over the window (-12,-1) months before the placement relative to the average ratios for all stocks in CRSP. *FIRMSIZE* is the natural log of total assets. *INSTOWN* is institutional ownership at the end of the quarter prior to the PIPE. *TECH* = 1 when the issuer is in a high-tech industry; zero, otherwise. *MKTVOL* is the ratio of the VXN to the VIX. *RELSIZE* is the net proceed to market capitalization ratio. *MSECPREM* is the mean private placement premium in the issuer's industry in the year prior to the deal. *FIXEDPRCING* = 1 if a fixed price approach is used to determine the offer price; zero, otherwise. *PLAIN* = 1 if the deal is a plain vanilla private placement; zero, otherwise. *REG_*S = 1 when the placement is a Regulation S issue; zero, otherwise. *AGENT* = 1 when the issuer used a placement agent; zero, otherwise. *HEDGEFUND* = 1 when the investor is a hedge fund; zero, otherwise. *DUALSTOCK* = 1 when the issuer has dual class shares; zero, otherwise. *INOWN* and *OBLOCKOWN* are the percent of inside and block ownership, respectively. *LEVERAGE* and *CFEQUITY* are the total debt ratio and the operating cash to total equity at the end of the fiscal year prior to the placement. *DISTRESS is* the issuer's Altman *z*-score at the end of the fiscal year prior to the placement date.

	Percentiles								
	$\tau = 0.10$	$\tau = 0.20$	$\tau = 0.30$	$\tau = 0.40$	$\tau = 0.50$	$\tau = 0.06$	$\tau = 0.70$	$\tau = 0.80$	$\tau = 0.90$
INTERCEPT	-0.05	0.06	0.03	0.01	0.12*	0.16***	0.18***	0.18***	0.12
	(-0.44)	(0.62)	(0.43)	(0.17)	(1.70)	(2.52)	(2.54)	(2.51)	(1.18)
MISPRICEINDEX	-0.56	-0.37	-0.52*	-0.53**	-0.68***	-0.77***	-0.99***	-1.23***	-1.51***
	(-1.13)	(-0.82)	(-1.82)	(-2.13)	(-2.63)	(-2.75)	(-3.64)	(-3.67)	(-3.20)
RUNUP	-0.02	-0.01	-0.02	-0.02	-0.02	-0.03*	-0.04**	-0.05***	-0.07***
	(-0.48)	(-0.55)	(-0.93)	(-0.85)	(-0.88)	(-1.67)	(-2.25)	(-3.43)	(-3.15)
LIQUIDITY	0.01	0.02**	0.01***	0.01***	0.01**	0.01**	0.01*	0.00	0.01
	(1.22)	(2.17)	(2.48)	(2.53)	(2.25)	(2.42)	(1.65)	(0.68)	(1.51)
FIRMSIZE	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01
	(0.89)	(1.09)	(1.12)	(0.89)	(0.48)	(1.21)	(0.62)	(-0.05)	(0.26)
INSTOW	0.11	0.09	0.13**	0.12**	0.09	0.04	0.06	0.10	0.00
	(1.43)	(1.29)	(2.23)	(2.26)	(1.50)	(0.62)	(0.90)	(1.38)	(-0.04)
TECH	0.01	-0.01	-0.02*	-0.02	-0.02	-0.01	-0.02	-0.03*	-0.03
	(0.50)	(-0.84)	(-1.64)	(-1.52)	(-1.41)	(-0.90)	(-1.48)	(-1.77)	(-1.22)
MKTVOL	-0.15***	-0.17**	-0.12***	-0.09***	-0.08**	-0.09***	-0.08**	-0.06*	0.00
	(-2.52)	(-3.18)	(-3.29)	(-3.21)	(-2.33)	(-3.01)	(-2.26)	(-1.84)	(0.09)
RELSIZE	0.01	-0.04	-0.05	-0.04	-0.02	-0.02	-0.02	0.01	0.03
	(0.17)	(-1.25)	(-1.38)	(-0.95)	(-0.50)	(-0.55)	(-0.53)	(0.17)	(0.54)
MSECPREM	0.00	0.00	0.00**	0.00**	0.00	0.00	0.00	0.00	0.00
	(0.25)	(1.07)	(2.30)	(2.18)	(0.72)	(1.31)	(1.00)	(0.53)	(0.36)
FIXEDPRCING	-0.04	-0.06*	-0.04*	-0.03	-0.02	-0.02	-0.02	0.00	0.02
	(-0.81)	(-1.74)	(-1.66)	(-1.37)	(-0.99)	(-1.14)	(-0.80)	(-0.07)	(0.66)
PLAIN	0.04	0.03	0.04*	0.03	-0.02	-0.02	-0.01	0.01	0.02

	(1.18)	(1.54)	(1.89)	(1.41)	(-0.76)	(-0.96)	(-0.54)	(0.74)	(0.69)
REG_S	0.02	0.01	0.01	0.01	0.01	0.00	-0.01	-0.02	-0.03
	(0.81)	(0.74)	(0.82)	(0.97)	(0.32)	(-0.24)	(-0.51)	(-0.99)	(-1.19)
AGENT	0.03*	0.02	0.02	0.01	-0.02	-0.01	-0.02	-0.01	-0.02
	(1.85)	(1.46)	(1.34)	(1.12)	(-1.31)	(-1.10)	(-1.34)	(-0.98)	(-0.99)
HEDGEFUND	0.00	-0.02	-0.02	-0.03*	-0.04**	-0.04***	-0.04**	-0.02	-0.06**
	(0.15)	(-1.10)	(-1.36)	(-1.89)	(-2.33)	(-2.65)	(-1.98)	(-0.78)	(-2.01)
DUALSTOCK	-0.08	-0.09*	-0.08*	-0.07	-0.01	-0.03	-0.02	-0.01	0.02
	(-1.04)	(-1.78)	(-1.90)	(-1.60)	(-0.31)	(-0.74)	(-0.52)	(-0.13)	(0.11)
INOWN	0.06	0.03	-0.01	0.05	0.00	-0.03	-0.05	-0.06	-0.21**
	(0.70)	(0.42)	(-0.10)	(0.88)	(-0.08)	(-0.61)	(-0.83)	(-1.04)	(-2.39)
OBLOCKOWN	-0.03	-0.07	-0.15**	-0.18***	-0.16**	-0.12	-0.15*	-0.22**	-0.07
	(-0.24)	(-0.91)	(-2.27)	(-2.60)	(-2.10)	(-1.54)	(-1.66)	(-2.29)	(-0.65)
LEVERAGE	-0.02	-0.01	-0.01	0.00	-0.01	-0.01	0.00	0.01	0.06
	(-0.56)	(-0.38)	(-0.29)	(0.00)	(-0.64)	(-0.47)	(0.10)	(0.17)	(1.34)
CFEQUITY	0.00	0.00	0.00	0.00	0.00	0.00*	0.00	0.00	0.00
	(0.15)	(-0.49)	(-1.12)	(-1.37)	(-1.33)	(-1.69)	(-1.09)	(0.09)	(-0.21)
DISTRESS	0.00	0.00	0.00*	0.00**	0.00	0.00	0.00	0.00*	0.00
	(-0.04)	(-0.80)	(-1.81)	(-1.94)	(-1.53)	(-1.49)	(-1.27)	(-1.69)	(-1.05)

***, **, and * indicate statistically significance at the 0.01, 0.05, and 0.1 level, respectively.

Table 7

Heckman 2-step regression for selection bias

This table presents regression results for the Heckman (1976) two-step self-selectivity approach. In the first stage, we estimate the likelihood of a PIPE versus a SEO, based on the model suggested by Akhigbe et al. (2006). The logit regression results are reported in Panel A. The dependent variable = 1 if a private equity offering and zero if a public equity offering. *LNBVTA* is the natural log of total assets. *CASH* is cash and marketable securities relative to total assets. *ASIGMA* is the leverage-adjusted standard deviation of the daily stock price return for days (−220, −20) relative to the issue date. *GPROD* is the compound growth rate of the monthly industrial production index for the year before the issue. *IDIS* = 1 if the issuing firm's *CFBV* < 0 and *SALEG* < median *SALEG* value, where *CFBV* is the operating cash flow to total assets and *SALEG* is the sales growth. *LEVERAGE* is long-term debt divided by long-term debt plus market value of equity. *MVBV* is the market-to-book ratio. *PSHARES* is the issue proceeds relative to the equity market value. In the second stage, we compute the inverse Mills ratio (*INVMILLS*) and include it as an explanatory variable in the premium regression; the Heckman correction regression results are reported in Panel B. *MISPRICEINDEX* is the mispricing index. *RUNUP* is the price run-up. *LIQUIDITY* is the average ratios of trading volume to shares outstanding over the window (-12,-1) months before the placement relative to the average ratios for all stocks in CRSP. *FIRMSIZE* is the natural log of total assets. *INSTOWN* is institutional ownership at the end of the quarter prior to the PIPE. *TECH* = 1 when the issuer is in a high-tech industry; zero, otherwise. *MKTVOL* is the ratio of the VXN to the VIX. *RELSIZE* is the net proceed to market capitalization ratio. *MSECPREM* is the mean private placement premium in the issuer's industry in the year prior to the deal. *FIXEDPRCING* = 1 if a fixed price approach is used to determine the offer price; zero, otherwise. *PLAIN* = 1 if the deal is a plain vanilla private placement; zero, otherwise. *REG_*S = 1 when the placement is a Regulation S issue; zero, otherwise. *AGENT* = 1 when the issuer used a placement agent; zero, otherwise. *HEDGEFUND* = 1 when the investor is a hedge fund; zero, otherwise. *DUALSTOCK* = 1 when the issuer has dual class shares; zero, otherwise. *INOWN* and *OBLOCKOWN* are the percentage of inside and block ownership, respectively. *LEVERAGE* and *CFEQUITY* are the total debt ratio and the operating cash to total equity at the end of the fiscal year prior to the placement. *DISTRESS is* the issuer's Altman *z*-score at the end of the fiscal year prior to the placement date.

Panel A: Logistic Regression - PIPE vs SEO			*Panel B: Heckman correction*		
	Coef.	*Wald X^2 - stat*		*Coef.*	*t-stat*
INTERCEPT	1.64***	(9.84)	*INTERCEPT*	0.03	(0.53)
LNBVTA	-0.48***	(30.65)	*MISPRICEINDEX*	-0.27*	(-1.83)
CASH	0.53*	(2.68)	*RUNUP*	-0.06*	(-2.19)
ASIGMA	13.97**	(5.61)	*LIQUIDITY*	-0.75	(-0.21)
GPROD	-0.24***	(14.22)	*FIRMSIZE*	0.07**	(2.74)
IDIS	-0.24	(1.46)	*INSTOW*	0.10	(1.64)
LEVERAGE	1.59**	(5.13)	*TECH*	-0.03**	(-2.43)
MVBV	-0.01**	(4.93)	*MKTVOL*	-0.09*	(-1.85)
PSHARES	-1.38***	(10.58)	*RELSIZE*	0.14	(1.58)
			MSECPREM	0.00	(-0.41)
			FIXEDPRCING	-0.03	(-1.04)
			PLAIN	0.02	(1.50)
			REG_S	0.02	(0.83)
			AGENT	-0.01	(-1.01)
			HEDGEFUND	-0.02	(-1.23)
			DUALSTOCK	-0.01	(-0.13)
			INOWN	-0.02	(-0.43)
			OBLOCKOWN	-0.12	(-1.56)
			LEVERAGE	0.01	(0.63)
			CFEQUITY	-0.01***	(-3.96)
			DISTRESS	-0.01***	(-6.02)
			INVMILLS	-0.20	(-1.33)
Pseudo R^2	0.11		*F-statistic*	10.86***	
Likelihood Ratio X^2	87.99***		*Adjusted R^2*	0.19	

% correctly	69%	*Number of Obs.*	278
Number of Obs.	773	*Year Clusters*	YES
		Sector Clusters	YES

***, **, and * indicate statistically significance at the 0.01, 0.05, and 0.1 level, respectively.

Table 8

Cross-sectional regression results on post-offering underperformance

This table reports regression results on the abnormal long-run returns. The dependent variable is the 12 months BHAR after the PIPE benchmarked against non-issuing firms. *PREMIUM* is the issue discount; discounts are negative price premiums computed as the percentage difference between the offer price and the issuer's closing stock price on the day of the issue. *UNEXPREMIUM* is the actual discount minus the predicted discount. We predict the discount using regression results that control for issuer- and deal-specific features, as well as year-fixed effects (to account for the decline in the observed discount over time) and sector fixed effects. *EXPECT* = 1 if the PIPE issue's predicted probability is greater than the mean prediction; zero, otherwise. *DISTRESS is* the issuer's Altman z-score at the end of the fiscal year prior to the placement date. *HEDGEFUND* = 1 when the investor is a hedge fund; zero, otherwise. *RELSIZE* is the net proceed to market capitalization ratio. *DUALSTOCK* = 1 when the issuer has dual class shares. *INSTOWN* is institutional ownership end of the fiscal year following the PIPE. *INOWN* is the percentage of shares owned by managers and directors and *OBLOCKOWN* is the percentage of shares owned by 5% or more outside blockholders at the end of the fiscal year after the PIPE. *CFEQUITY* and *LEVERAGE* are the operating cash flow to total equity ratio and the total debt ratio at the end of the fiscal year following the PIPE, respectively. *INVMILLS* is the inverse Mills ratio to account for the Heckman selectivity bias.

	Panel A: Actual premium				*Panel B: Unpredicted premium*					
	Model 1		*Model 2*		*Model 3*		*Model 4*		*Model 5*	
INTERCEPT	0.33***	(4.00)	0.38***	(7.13)	0.31**	(2.93)	0.33***	(5.77)	-0.09	(-0.63)
PREMIUM	0.63***	(4.58)	0.63*	(2.27)						
UNEXPREMIUM					0.57***	(9.63)	0.59**	(3.43)	0.55**	(3.10)
EXPECT	-0.18***	(-11.52)	-0.12**	(-3.68)	-0.22***	(-25.46)	-0.17***	(-10.07)		
DISTRESS	0.00	(0.66)	0.00	(0.60)	0.00	(-0.64)	0.00	(-0.13)	0.00	(-0.37)
HEDGEFUND	0.38***	(4.26)	0.33***	(4.83)	0.42***	(5.06)	0.43***	(13.28)	0.42***	(12.34)
RELSIZE	-0.28**	(-3.06)	-0.30*	(-2.47)	-0.34*	(-2.31)	-0.39*	(-2.35)	-0.37**	(-2.44)
DUALSTOCK	-0.34**	(-2.88)	-0.47**	(-3.04)	-0.30*	(-1.94)	-0.46*	(-2.33)	-0.36*	(-2.13)
INSTOWN	0.22	(1.49)	0.34**	(3.52)	0.25	(1.81)	0.42***	(4.22)	0.42***	(4.36)
INOWN	-0.98***	(-5.60)	-1.10***	(-4.80)	-0.90***	(-5.21)	-0.96***	(-3.72)	-0.90***	(-3.63)
OBLOCKOWN	0.04	(0.33)	0.10	(0.52)	-0.14	(-1.10)	-0.22	(-1.26)	-0.27	(-1.66)
CFEQUITY			0.04***	(15.07)			0.06***	(3.70)	0.05***	(3.44)
LEVERAGE			0.07	(0.37)			0.19	(0.79)	0.18	(0.79)
INVMILLS									0.54	(1.47)
F-statistic	15.07***		12.32***		13.65***		16.64***		13.25***	
Adjusted R^2	0.06		0.07		0.07		0.1		0.10	
Number of Obs.	303		217		285		203		203	
Sector Fixed Effects	YES		YES		YES		YES		YES	

***, **, and * indicate statistically significance at the 0.01, 0.05, and 0.1 level, respectively.