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**Working Paper**

# Hole in the Wall: Informed Short Selling ahead of Private Placements

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# Hole in the Wall: Informed Short Selling ahead of Private Placements

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# Hole in the Wall:
# Informed Short Selling ahead of Private Placements

**Henk Berkman, Michael McKenzie and Patrick Verwijmeren***

May 10, 2013

**Abstract**

Companies planning a private placement typically gauge the interest of potential buyers before the offering is publicly announced. Regulators are concerned with this practice, called wall-crossing, as it might invite insider trading, especially when the potential investors are hedge funds. We examine privately placed common stock and convertible offerings and find widespread evidence of pre-announcement short selling. We show that pre-announcement short sellers are able to predict announcement day returns. The effects are especially strong when hedge funds are involved and when the number of buyers is high.

JEL classification: G32

Keywords: Insider trading, Hedge funds, Private placements, Wall-crossing, Short-selling

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The total capital raised via private placements has grown considerably over the last twenty years as more companies choose to raise funds through means other than public offerings. For example, Chen, Dai and Schatzberg (2010) and Floros and Sapp (2012) provide evidence that the Private Investment in Public Equity (PIPE) market has surpassed the traditional SEO market in terms of both dollar volume and number of transactions.[1] Furthermore, De Jong, Dutordoir and Verwijmeren (2011) document that approximately 95 percent of convertible issues in the period 2003 – 2007 are privately placed.

When a firm is planning a private placement, it will typically gauge the interest of potential investors in a series of confidential conversations before the offering is publicly announced.[2] This practice is commonly referred to as 'wall-crossing' and regulation Fair Disclosure (Reg FD) deems the investor receiving the private information to be a 'temporary insider'. Thus, having crossed the wall, an investor is expressly prohibited under the Securities Act from trading on the private information revealed during these conversations. This legal restriction of the trading activity of wall-crossers is understandable given that the announcement of a private placement often has a material price impact.[3]

While the academic literature has yet to consider the issue of wall-crossings, it has drawn the attention of the regulatory authorities. For example, in a testimony before the U.S. Senate Banking, Housing and Urban Affairs Committee, the then chairman of the Securities and

[1] The main difference between PIPEs and traditional private placements is the duration of the resale restrictions on the participating investors. The restriction period was typically two years for traditional private placements, whereas for PIPEs the shares can typically be publicly traded within 90 days. Traditional private placements have only been issued sporadically in the 21st century (Chen, Dai, and Schatzberg, 2010).

[2] This practice is different from the typical form of book-building, which occurs after the public announcement of the intended security issue.

[3] Variation in the observed announcement effects can be large. Studies examining the announcement effects of private placements include Wruck (1989), Hertzel and Smith (1993) and Hertzel, Lemmon, Linck and Rees (2002), who observe positive average announcement effects. De Jong, Dutordoir and Verwijmeren (2011) and Duca, Dutordoir, Veld and Verwijmeren (2012) find negative average announcement effects of convertible bonds privately placed under Rule 144A.

Exchange Commission (SEC), Christopher Cox, stated that the SEC would create a new working group to enhance the efforts to combat insider trading by hedge funds, and one of the enforcement priorities was short selling based on insider information in private placements (Mahoney et al., 2008).[4] The SEC's decision to target hedge funds is understandable as hedge funds are often the subject of insider trading allegations.[5] The focus on private placements is also unsurprising given that wall-crossings create an obvious opportunity for insider trading and hedge funds are heavily involved in PIPE offerings (see Brophy, Ouimet and Sialm, 2009), and are the dominant purchasers of convertible securities that are privately placed under Rule 144A (see Brown, Grundy, Lewis and Verwijmeren, 2012).[6] In recent years, the SEC has filed complaints against a variety of hedge fund managers that were allegedly engaging in insider trading activity by short selling securities before the public announcement of a private placement. We list these complaints in Appendix A.

In this paper, we investigate the trading behavior of short sellers around PIPE and Rule 144A private placements. The focus on short sellers is guided by statements of regulatory authorities such as the SEC, which clearly highlight short selling as a potential problem in the case of private placements. Moreover, using proprietary data from Dataexplorers, we measure changes in short interest at a daily frequency and are therefore able to closely monitor the actions of these sophisticated investors, predominantly comprising hedge funds. Our sample consists of

[4] Episodes of insider trading have sparked outrage about the perceived abuse of corporate insiders' privileged positions at the expense of ordinary investors (Beny and Seyhun, 2012). The issue of insider trading is important for market regulators as it decreases the public's trust in financial markets, which could lead to reduced stock market participation (Guiso, Sapienza and Zingales, 2008). Further, insider trading may increase trading costs (Fishe and Robe, 2004) and decrease overall economic growth by raising the cost of capital for firms (Bhattacharya and Daouk, 2002).

[5] The reputation of hedge funds as potential inside traders was reinforced with the very public arrest of the Galleon Group hedge fund founder, Raj Rajaratnam, in 2009. He has since been sentenced to 11 years in prison and fined over $150 million. Empirical evidence of insider trading by hedge funds in the syndicated loan market and around mergers and acquisitions may be found in Massoud, Nandy, Saunders and Song (2011) and Dai, Massoud, Nandy and Saunders (2011), respectively.

[6] Rule 144A offerings are only issued to Qualified Institutional Buyers, which are typically large institutional buyers with more than $100 million of investable assets.

private placements of common stock and convertible securities between January 2007 and August 2011, which is the period for which we have daily data from Dataexplorers.

Our results may be summarized as follows. First, we document significant pre-announcement increases in average short interest, which is evidence of information leakage. Second, we find that abnormal pre-announcement increases in short interest are negatively related to the stock price reaction to the public announcement of the private placement. This result suggests that the information received during the wall-crossing procedure is material, and that some privately-informed investors take speculative positions prior to the announcement in order to profit from this information. Third, we find that short selling before the announcement is more pronounced when there are more buyers involved in the private placement. As the number of buyers is likely to correlate closely with the number of investors who have crossed the wall, we interpret this result as supporting our hypothesis that the existence of more potential traders with private information increases the probability of informed trading in the pre-announcement period. Finally, using information on hedge fund involvement in privately-placed security offerings, we find that the observed patterns are non-existent when hedge funds are not involved and strongest when hedge funds are heavily involved.

This study contributes to the broader insider trading literature. Prior studies have examined situations in which private information has leaked through "Chinese walls" designed to separate, for example, commercial and investment banking within the same bank. Ivashina and Sun (2011) and Massoud, Nandy, Saunders and Song (2011) find evidence of insider trading by institutions that obtain private information by lending in the syndicated loan markets; Acharya and Johnson (2007) find that informed banks exploit information in the credit default swap market; and Bodnaruk, Massa and Simonov (2009), Dai, Massoud, Nandy, and Saunders (2011),

and Beny and Seyhun (2012) find information leakage around merger and acquisition events. On the other hand, Griffin, Shu and Topaloglu (2012) do not find evidence that investment bank clients use inside information to trade around merger and earnings announcements. We contribute to this literature by providing new evidence in the context of private placements, which involves an explicit breach of trust between a firm and potential investors. Henry and Koski (2010) consider public equity offerings and find no evidence of increased pre-announcement short selling in public seasoned equity offerings. However, public seasoned equity offerings are less likely to be targeted by inside traders, due to the lower involvement of hedge funds in that market and the higher scrutiny compared to private security offerings.

Our study also contributes to the burgeoning literature on short selling. While it has been suggested that short sellers are informed traders that are particularly skillful at digesting public information (see Engelberg, Reed and Ringgenberg, 2012), we are able to focus on short sellers' use of non-public information. Our findings are consistent with studies that observe increased short selling before negative earnings surprises (e.g., Christophe, Ferri, Angel, 2004; Boehmer, Jones and Zhang, 2012) and before the appearance of negative firm-specific news in the media (Fox, Glosten and Tetlock, 2010).

Our results have clear regulatory implications and suggest that the limited resources of the regulators should be focused on examining placements with a high degree of hedge fund involvement and a large number of wall-crossers. Furthermore, our results also suggest that regulators may wish to provide more extensive and timely disclosures of short interest.[7] Apart from its impact on the perceived integrity of the stock market, disclosure of short interest would be of great interest to the parties directly involved in private placements. For example, in SEC

[7] Section 417 of the Dodd-Frank Act requires a study of "the feasibility, benefits, and costs of requiring reporting publicly, in real time short sale positions of publicly listed securities." The U.K., France and Spain have recently adopted rules requiring short sellers to disclose their positions (see Jones, Reed and Waller, 2012).

vs. Pollet, a taped conversation lodged as evidence revealed that an underwriter told Pollet that his biggest concern was investors who trade before the public announcement.[8] Finally, our results highlight an important downside of wall-crossing. This evidence is timely as U.S. President Obama recently signed into law the Jumpstart Our Business Startups (JOBS) act to encourage funding of small businesses, which promotes the use of wall-crossing by young companies.

The remainder of this paper is organized as follows. Section I describes insider trading regulation in the context of wall-crossings, while Section II develops the hypotheses. In Section III we describe our data, and in Sections IV and V we present and discuss our results. We provide additional tests in Section VI and conclude in Section VII.

## I. Wall-Crossings and Insider trading Regulation

Reg FD requires that companies must disclose material information to all investors at the same time. Exemptions to this rule do exist however, as communications without public disclosure can be made to those who owe the issuer a duty of trust or confidence, such as an attorney or an accountant. These exclusions also apply to communications made to any person for legitimate business purposes, subject to the proviso that they expressly agree to maintain the information in confidence. This class of exclusions is relevant when a firm is considering raising capital through a private placement as it allows issuers and underwriters to confidentially gauge interest in an offering prior to any public disclosure.

Generally, private placements are initially marketed on an anonymous basis by an underwriter to a limited number of institutional investors. This is sometimes called a pre-

[8] Pollet replied: "but it's illegal" and then allegedly short sold the stock before the public announcement anyway (www.sec.gov/litigation/litreleases/2007/lr19984.htm).

sounding, sounding-out or pre-marketing campaign. If an investor is interested, they sign a confidentiality agreement and are informed of the identity of the issuer and the specifics of the offering. It is at this point that the investor legally crosses the wall and becomes a temporary insider. As such, they are restricted from trading in the issuer's securities until a public announcement of the offering has been made or else face the risk of prosecution for insider trading.

In 2004, potential irregularities in wall-crossing attracted the attention of the U.S regulator. The SEC sent out requests for documents to securities brokers and other firms that sell securities to hedge funds in private transactions. The agency was concerned that these firms may have leaked news of forthcoming deals to favored clients, allowing them to profit by trading the stock ahead of the announcement (Pulliam, 2004). Subsequently, the SEC made the decision to focus on the trading activity of hedge funds and one of the enforcement priorities was short selling based on insider information in private placements (Mahoney et al., 2008).

Since 2005, the SEC has filed complaints against a variety of hedge fund managers. The SEC accused them of engaging in illegal insider trading by short selling issuer securities on the basis of material, non-public information prior to the announcement of a private offering, notwithstanding their agreement to keep information about the offering confidential and to refrain from trading prior to the public announcement. Appendix A provides a brief description of these cases, all of which relate to PIPE issues. Most of the defendants consented to final judgments, without admitting or denying the accusations, leading to civil fines and repayment of unlawful profits. The amounts can be high and exceeded U.S.$15 million in the case of SEC versus Langley Partners. In the cases where the judges did make rulings, a not guilty verdict was

returned in some cases because the judge ruled that the announcement effect of the PIPE was too small for information to be deemed "material" (see Hartlin, 2009).

The issue of insider trading by wall-crossed investors has also attracted the attention of regulators outside the United States. In the United Kingdom, the Financial Services Authority (FSA) accused a hedge fund manager of short selling after being wall-crossed in 2003, and fined him in 2006.[9] In the course of the first half of 2012, the FSA released details of five market abuse enforcement cases involving improper disclosure and insider dealing on the basis of information released during a pre-sounding exercise.[10] In France, the market regulator fined four hedge funds after an insider trading investigation into a Vivendi Universal SA securities sale in 2002. The hedge funds were accused of using information resulting from being wall-crossed and massively selling shares ahead of the official announcement of the operation (Vivendi shares fell 14 percent in the three days before the offering).[11] Japan's Financial Services Agency also started several investigations into allegations of insider trading ahead of public share offerings. For example, in the case against Whitney Japan Fund, one of Japan's highest profile hedge funds, the Japanese regulator has ordered a dozen investment banks to report on whether they had leaked inside information about planned share issues to this hedge fund in return for winning trading orders.[12]

## II. Hypothesis Development

In the spirit of Ritter (2008), who coined the term "forensic finance," we consider a large sample of private placements to empirically establish whether the problem of insider trading is

[9] See http://www.fsa.gov.uk/library/communication/pr/2006/077.shtml
[10] See the cases of Einhorn, Hannam, Kyprios, Osborne and Ten-Holter on http://www.fsa.gov.uk/pages/about/what/financial_crime/market_abuse/library/notices/index.shtml
[11] See http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aCPasXEGQ8sw&refer=germany
[12] See http://biz.thestar.com.my/news/story.asp?file=/2012/7/21/business/11704988&sec=business

limited to a few rogues, as implied by the small number of legal cases, or is more widespread. The focus of this paper is on the trading behavior of short sellers in the period before a private placement. This approach is consistent with the legal cases discussed in the previous section. Moreover, using daily changes in short interest from Dataexplorers, we have detailed insight into the actions of these sophisticated investors.

We argue that information leakage about the upcoming private placement should result in an increase in short interest prior to the announcement of a private placement. This statement assumes that at least some of those who are privy to the pre-announcement information are willing to trade on it. These short sellers might trade for speculative reasons in an attempt to exploit a negative announcement effect.[13] These short sellers might also be wall-crossed investors who decide to lock-in a profit on the securities they agreed to purchase, as the securities in a private placement are typically offered at a discount. Importantly, both speculation-induced pre-announcement short selling and hedging-induced pre-announcement short selling is considered illegal by the SEC.

*H1. Firms that privately place securities experience an increase in short interest prior to the public announcement of the offering.*

If short sellers are informed speculators, then private placements with negative announcement returns that are larger in magnitude should, on average, experience a larger increase in short interest before the announcement. On the other hand, if short sellers are uninformed or trade for the purposes of hedging, then the pre-announcement change in short

[13] Note that even though the pre-announcement information might induce some traders to assume long positions and others to assume short positions, we only observe the actions of short sellers.

interest should be unrelated to abnormal announcement returns. This leads to the second hypothesis.

*H2. The change in short interest in the pre-announcement period is negatively related to the abnormal return at the time of the public announcement of the private placement.*

The third test is designed to provide further insights into these previous results and examines whether short selling before the announcement is related to the number of buyers. Acharya and Johnson (2010) find that a larger number of financing participants increases the likelihood of observing suspicious patterns prior to bid announcements of private-equity buyouts. Based on their results, and assuming that the number of buyers (which we do observe) is positively related to the number of temporary insiders (which we do not observe), we argue that a larger number of buyers increases the probability that at least some temporary insiders will be willing to risk possible prosecution and damaging their relationship with the issuing firm or underwriter by short selling before the public announcement.

*H3. Pre-announcement short selling is more pronounced and the negative relation between changes in short interest in the pre-announcement period and announcement day returns is stronger when there are more buyers involved in the private placement.*

The final hypothesis focuses specifically on the role of hedge funds. As noted by Massoud, Nandy, Saunders and Song (2011), hedge funds are largely unregulated with respect to their long and short equity holdings in comparison with other institutional investors, and have

fewer internal information barriers (Chinese walls) between those involved in financing decisions and those involved in trading decisions. Hedge funds also have an incentive-based fee structure that makes informational advantages extremely valuable. These factors, combined with the fact that short selling is part of the day-to-day activities of hedge funds, leads us to expect that the involvement of hedge funds exacerbates the observed patterns in pre-announcement short selling and that the degree of informed short selling is a function of the number of hedge funds involved.

*H4. Pre-announcement short selling, the impact of the number of buyers, and the relation between pre-announcement changes in short interest and announcement returns are all more pronounced when the buyers are hedge funds.*

## III. Sample Selection, Data and Descriptive Statistics

### *A. Sample selection*

We obtain a sample of private placements from Securities Data Company (SDC) and Sagient's PlacementTracker.[14] We obtain all placements for the period January 2007 to August 2011, which is the period for which we have daily data on short interest from Dataexplorers. The private placements include PIPE offerings, which can be structured as common stock or convertible securities.[15] The private placements also include convertible offerings placed under

[14] These databases only partially overlap. Most notably, the Sagient database includes more PIPE issues, and is typically used in studies on PIPEs. The Sagient database also reports information on hedge fund involvement in the offerings.

[15] The PIPE issues in our sample are traditional PIPEs rather than structured PIPEs, which have virtually disappeared since 2003 because of legal issues associated with potential market manipulation. Structured PIPEs are not price protected, and conversion prices of structured PIPEs can be adjusted downward if there are for example adverse changes in market conditions (see Hillion and Vermaelen, 2004).

Rule 144A, which allows companies to sell securities without registration under the U.S. Security Act of 1933 if the securities are issued only to qualified institutional buyers (QIBs).[16]

The sample is restricted to issuers whose ordinary common shares trade on the NYSE, AMEX, and NASDAQ exchanges and have CRSP share codes 10 or 11 (i.e. we exclude REITS, Closed-End Funds, ADRs, Canadian Firms and Other Non-U.S. Incorporated Firms, Primes and Scores, and HOLDRs). IPOs, right offerings, exchangeable securities, secondary offerings by current blockholders, and shelf filings that only state the issuer "may sell shares periodically" (see Henry and Koski, 2010) are also excluded. The data are further filtered to include only stocks that have information in CRSP, Compustat and Dataexplorers at the time of the issue. It is also a requirement that, two weeks before the announcement, there is a non-zero number of shares available for lending and that the stock price is larger than one dollar.

Announcement dates are obtained from Factiva and we use the timestamp from the earliest newswire to assign an announcement date. If the announcement occurs after the close of trading, the following trading day is identified as the announcement date (day 0). When no announcement is available in Factiva or when the announcement coincides with another major announcement (like a merger agreement), that observation is deleted from the dataset. After applying all these criteria, we are left with a sample of 323 convertible bond issues and 339 common stock issues by 536 unique firms.

*B. Short interest data*

Daily short interest data are sourced from Dataexplorers, an independent data vendor whose clients include trading desks, hedge funds and industry participants. The Dataexplorers

[16] QIBs, which are typically large institutional buyers with more than $100 million of investable assets, are allowed to trade the offering among themselves.

database is accessible through Bloomberg and provides daily aggregated inventory information for over 22,000 funds who lend through over 100 wholesale stock lending market participants across 33 countries.[17] Dataexplorers provides daily security-level information on the quantity of shares available for lending (referred to as the level of beneficial ownership), which is measured as the total number of shares held by all beneficial owners[18] divided by the total number of shares outstanding. Volume information for loan transactions is also available, which provides information on the level of short interest and is measured as the total number of shares lent, divided by the number of shares outstanding. The daily average loan fee for new loans is also included, which provides information on the transactions cost to stock lenders.

There are a number of differences between publicly available short interest data from sources such as the NYSE and NASDAQ and the short interest data from Dataexplorers. Most notably, short interest in Dataexplorers is available on a daily basis, whereas short interest data from the NYSE and NASDAQ is available on a (semi-)monthly basis. Despite the obvious and unique value of the Dataexplorers data set, there are limitations. Firstly, not all custodians report to Dataexplorers. By their own estimates, the Dataexplorers database covers approximately 70 percent of trading in the stock lending market. Secondly, the Dataexplorers database captures lending for purposes other than short selling. Similarly though, the publicly available short data also do not solely reflect lending.[19] Despite these differences, Dataexplorers document that the

[17] Further details of the Dataexplorers database can be found in Saffi and Sigurdsson (2011), Berkman and McKenzie (2012) and www.dataexplorers.co.uk.

[18] Beneficial owners are the wholesale lenders of stock such as pension funds or mutual funds. Inventory and loan information is normally reported to Dataexplorers by the custodians, who are the beneficial owners' agents in the lending process.

[19] The publicly available short data capture lending for short selling as well as lending for rehypothecation (where a prime broker borrows a fund's long position to cover another fund's short position) and exclusive trading (asset managers agree to lend a portfolio exclusively to a single counterparty). While the lending captured in the Dataexplorers database is for short selling, stocks are also loaned for reasons related to dividend arbitrage (typically to extract tax benefits through deals with foreign parties) and settlement (where a fund is unable to buy or sell a stock immediately, it must borrow the security). The data also include 'pay-to-hold' transactions, whereby a

correlation between the publicly reported level of short interest in the U.S. market and the Dataexplorers data is almost 0.90. Our own validation of the database confirms this to be accurate.

Finally, note that alternative sources of daily short sales data are available, but these databases only cover small periods and, more importantly, these databases capture only sales by short sellers. For example, the Reg-SHO data and short sales data collected by the NASDAQ and NYSE only include additions to short interest, but not the reductions as brokers have to disclose whether a sell order is a short sale, but not whether a buy order is intended to cover a short.

*C. Descriptive Statistics*

Panel A of Table 1 provides descriptive statistics for our total sample of 662 private placements, and Appendix B provides the definitions of our variables. The firms in our sample on average have total assets of $8,279 million. The average issue raised $166 million in proceeds or 22 percent of the firm's pre-issue market capitalization. The Dataexplorers data show that on the announcement date, day 0, the average short interest in firms privately placing capital is 6.20 percent, with a standard deviation of 7.39 percent. The average beneficial ownership on the announcement date is 13.25 percent, with a standard deviation of 12.49 percent. Thus, these data suggest there is a wide dispersion of short interest and institutional ownership among the private placements in the sample.

For a restricted sample of 451 private placements, we have additional information on the total number of buyers and the total number of hedge funds among these buyers. This

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speculator will pay to hold borrowed stock as a form of option against the possibility of an announcement. Our discussions with industry participants suggest that pay to hold is more common in companies with limited lending availability (due to limited free floats or company size) given the likely scramble for shares if an announcement eventuates. This type of strategy became much less popular in the post-GFC era.

information is obtained from either the Sagient database, or, if missing, from the registration statements available from SEC Edgar.[20] The total number of buyers in our sample ranges from 1 to 467, with a mean of 14. Fifty-one percent of the private placements involve buyers who are hedge funds and the average number of hedge fund buyers is 7.

[ insert Table 1 here ]

Panel B of Table 1 presents a summary of the data distinguishing between Rule 144A and PIPE convertible debt issues as well as the sample of PIPE common stock issues.[21] On average, a firm privately issuing common stock tends to be smaller, has higher market-to-book ratios, higher annualized volatility, lower return on assets, lower leverage, and is less likely to pay dividends compared to firms issuing convertible debt. Both short interest and beneficial ownership are lower for firms privately placing common stock than for firms with private placements of convertibles.

Rule 144A convertible debt offerings tend to have a substantially larger level of institutional ownership (26.37 percent compared to around 10 percent for PIPE issues). They also tend to have almost twice the average level of short interest (9.17 percent compared to around 5 percent for PIPE issues) and a much lower average lending fee (100bps compared to 385bps for PIPE convertible debt and 539bps for common stock offerings).

The average number of buyers for private placements of common stock is 9, and this average is 38 for 144A convertible offerings and 14 for convertible PIPEs. Consistent with Choi,

[20] The registration statements in SEC Edgar (either S-3/A, S-3, S-3ASR, or 424B filings) contain a list of buyers in their "Selling Securityholders" section. Obtaining the identity of buyers from registration statements follows the procedure in Brown, Grundy, Lewis and Verwijmeren (2012).

[21] As noted by Chen, Dai and Schatzberg (2010), there have been few non-PIPE private placements of common stock in the 21st century.

Getmansky and Tookes (2009) and Brown, Grundy, Lewis and Verwijmeren (2012), hedge funds are frequently involved in convertible issues under Rule 144A. Hedge funds are involved in 73 percent of 144A issues and there are on average 21 hedge fund buyers, which is noticeably higher than in PIPE issues.

The last three rows of Panel B in Table 1 contain information specific to the 144A and PIPE convertible issues. The average time to maturity is longer for 144A convertibles, whereas the conversion premium and the mean delta are very similar for both types of convertibles.

*D. Announcement Day Returns*

As a first step in the analysis, we calculate the benchmark-adjusted cumulative abnormal returns on the announcement day and the following day (i.e., day 0 and day 1). For each stock, the abnormal return on day *t* is the actual return on day *t*, minus the return on the matching size and book-to-market portfolio on day *t*.[22] Table 2 presents descriptive statistics for the cumulative abnormal return for the whole sample as well as for the three different types of private placements. The mean announcement return for the entire sample is 1.06 percent (t-statistic is 2.2), and the median announcement return is -0.06 percent.

The average cumulative abnormal return equals -3.51 percent (t-statistic is -5.4) for 144A convertibles, 2.48 percent (t-statistic is 2.0) for convertible PIPE issues and 2.40 percent (t-statistic is 3.7) for common stock PIPEs. The standard deviations for these three groups are 8.08 percent, 16.10 percent, and 11.84 percent, respectively. These relatively high standard deviations highlight the diversity of market responses to private placement announcements.

[22] The benchmark return is the value-weighted return for the intersections of 5 size and 5 book-to-market portfolios from Ken French's website. The size breakpoints for year t are the NYSE market equity quintiles at the end of June of t. The book-to-market breakpoints are NYSE quintiles, where the book-to-market ratio for June of year t is the book equity for the fiscal year end in t-1 divided by the market value of equity for December of t-1.

[ insert Table 2 here ]

## IV. Patterns in Short Interest, Lendable shares and the Lending Fee

The first hypothesis relates to whether firms with private placements experience an increase in short interest prior to a public announcement of the offering. Figure 1A and Figure 1B present plots of the pattern in mean short interest over the window -50 to +40 days around the announcement for convertible bond private placements and common stock private placements, respectively. Interestingly, both plots display a strong run-up in short interest prior to the announcement. Also of interest is that the speed with which this happens markedly differs. For convertible issues, most of the increase in short interest occurs in the few days prior to the announcement of the offering. For common stock issues, however, this increase begins about a month prior to the announcement and continues until a few days before the public announcement.[23] These differences in the pattern of build-up of short positions are in line with the high involvement of convertible arbitrage hedge funds in convertible issues. Convertible arbitrage hedge funds combine their purchase of convertible bonds with short positions in the underlying stock to hedge against changes of the stock price (see for example Mitchell, Pedersen and Pulvino, 2007; Choi, Getmansky and Tookes, 2009; Brown, Grundy, Lewis and Verwijmeren, 2012), and because of their hedged positions they are able to make their investment decisions very quickly (see Dong, Dutordoir and Veld, 2013).[24]

[23] Relatively long wall-crossing periods are not uncommon for common stock PIPEs. For example, the SEC versus Gryphon Partners outlines a 2003 Celsion Corporation PIPE offering, in which the executive summary of the offering was e-mailed on May 21st, the confidentiality agreement was received on June 3rd, and the public announcement occurred on July 8th.

[24] Dong, Dutordoir and Veld (2013) interview financial managers of companies that issued convertible securities and are told that convertible arbitrage hedge funds are typically able to make their investment decisions within a

[ insert Figure 1 here ]

Following the announcement of the private placement, the level of short interest stays at an elevated level for convertible issues, which reflects the activity of convertible arbitrageurs. By way of contrast, short interest in common stock issues peaks a few days prior to the announcement and falls thereafter. This observed pattern suggests that the increase in short interest prior to the announcement is mainly the result of speculative positions taken by short sellers rather than pre-announcement (and therefore also illegal) hedging activity.[25] In case of hedging the common stock PIPE issue, short interest would remain at this elevated level for about 90 days (see footnote 1) until the investor acquired the shares from the issuer, at which time they could close their short positions and short interest would fall considerably.[26]

To provide further insights, we tabulate average abnormal short interest, lendable shares (beneficial ownership), turnover and the value weighted average lending fee over the period -20 to +10 trading days, which is the period when the largest changes are observed. To calculate the abnormal values, we first define the 'normal' value of these variables as the event-specific average over the 30-day period from day -50 to -21. Then, for each event day in the period -20 to +10, we subtract this average from the actual value. Next, we average the daily abnormal values across all observations in each group. For each group, the *t*-statistics are based on the standard deviation across these daily abnormal values.

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day. Convertible arbitrage hedge funds do not need to talk to management or form credit committees, according to one of the interviewed managers.

[25] Recall that legal hedging activity would manifest itself as a rapid increase in short positions at the time of the announcement as any trading prior to that would be deemed insider trading.

[26] The SEC requires that the closing out of post-announcement short sale transactions is done with shares acquired on the open market (referred to as the 'double print' technique). In the event that the short sale transaction is closed out using shares acquired under the PIPE (a 'wash' trade), the SEC has argued that the seller is delivering unregistered securities in violation of Section 5 of the Securities Act (for a detailed discussion see Hartlin, 2009).

The first columns of Table 3 present the results for the 323 private placements of convertible bonds. Consistent with the raw data presented in Figure 1, we observe a sharp increase in abnormal short interest in the last three days before the announcement and this increase is statistically significant. Short interest increases further after the announcement, consistent with convertible arbitrageurs increasing their short positions. The abnormal lending fee is significantly positive on several days before the announcement and on most days after the announcement. Finally, abnormal turnover is significantly positive from day -1 to day +6, while there is no readily observable pattern in the number of lendable shares close to the announcement.

[ insert Table 3 here ]

The columns on the right of Table 3 present the descriptive metrics for the 339 common stock offerings. There is a significant increase in abnormal short interest in the 20 days before the announcement for common stock offerings. Short interest peaks on day -3 at a level of 0.61 percent of shares outstanding above the normal level (the *t*-statistic is 4.1) and then decreases in the next 2 weeks to a level of 0.15 percent of shares outstanding above the normal level of short interest. There is no evidence of any abnormal patterns in beneficial ownership, whereas the lending fee and turnover are significantly elevated in the days immediately after the announcement.

## V. Announcement Returns, Number of Buyers, and Hedge Funds

### *A. Does the change in short interest predict announcement returns?*

The results in the previous section provide strong support for the first hypothesis: firms that have private placements on average experience a significant increase in short interest prior to the public announcement of the offering. This increase in short interest in the days before the private placement announcement could suggest that informed speculators are positioning themselves to benefit from expected changes in the stock price following the announcement of the offering. On the other hand, the pre-announcement short selling could be due to wall-crossed investors illegally hedging the securities they agreed to purchase before the announcement of the security, without these investors expecting any particular abnormal return on the announcement date. Our second hypothesis can provide insights into the importance of the speculation-based rationale as the hypothesis relates to whether short sellers are successful in exploiting their informational advantage about the upcoming announcement, in which case the pre-announcement change in short interest is expected to be negatively related to the announcement return. To test this hypothesis, we estimate the following regression model:[27]

$$\Delta SI(-T,-1)_i = \alpha_0 + \alpha_1 \, CAR(0,+1)_i + \alpha_2 \, CAR(-T,-1)_i + \alpha_3 \, ATurn(-T,-1)_i + \alpha_4 \, Fee(-T,-1)_i + \alpha_5 \, Rel_Proceeds_i + \varepsilon_i \quad (1)$$

where:

$\Delta SI(-T,-1)$ = the change in short interest for stock *i* over day -T to day -1 where T = 10 or 20. We present results for a 10- and a 20-day window in order to align the measurement period with the long period over which the increase in abnormal short interest is observed (see Figure 1 and Table 3);

[27] Christophe, Ferri, and Angel (2005) use a comparable model to test whether short sellers have the ability to predict abnormal returns in reaction to earnings announcements.

CAR(0,+1) = cumulative abnormal return for stock *i* over day 0 and day 1, i.e. the abnormal announcement return measured over the period from the close on day -1 to the close on day +1;

CAR(-T,-1) = cumulative abnormal return on stock *i* over the interval from day -T to day -1. This variable is included to control for the possibility that changes in the stock price affect the change of short interest in the days leading up to the announcement;

ATurn(-T,-1) = average daily abnormal turnover in stock *i* over the interval from day -T to day -1, where daily abnormal turnover is defined as the difference between actual turnover and average turnover over the period from day -50 to -21. This variable is included to account for the potential contemporaneous correlation between changes in short interest and changes in turnover;

Fee(-T,-1) = average daily lending fee in stock *i* over the interval from day -T to day -1. We expect that stocks that are more expensive to short have a smaller increase in short interest; and

Rel_Proceeds = the proceeds of the issue as a percentage of market capitalization. This variable is included as a control for the size of the issue.

For convertible issues, the estimated model is an extended version of equation (1), in which we also include a dummy variable that indicates whether the convertible issue is a Rule 144A offering ($D_{144A}$), and an interactive term that captures the cross effects between a Rule 144A offering and the announcement return ($D_{144A}$*CAR(0,+1)). In order to reduce the influence of outliers, all continuous variables are winsorized at the 1 percent and 99 percent levels. All

reported p-values for the coefficients in the panel regressions are based on standard errors that are clustered by firm and quarter.

[ insert Table 4 here ]

Panel A of Table 4 presents the results for convertible issues, where the change in short interest is measured over a 10- and 20-day window. The main coefficient of interest is $\alpha_1$ in equation (1), which measures the strength of the relation between the change in short interest in the pre-announcement period and the abnormal announcement period return, CAR(0,+1). The results show that, consistent with our hypothesis, the change in short interest in the pre-announcement period is negatively and significantly associated with the announcement period return.

Of the other variables included in the equations, we find that the abnormal turnover and fee have significant effects. Consistent with expectations, higher turnover is positively related to the change in short interest and a higher fee is associated with a smaller increase in short interest.

In Panel B of Table 4, we consider the relation between short interest and announcement returns for common stock. The results show that the change in short interest is significantly and negatively related to the announcement returns for both the 10-day and 20-day windows. Regarding the other explanatory variables, we find that larger issues have greater changes in short interest in the pre-announcement period, and there is a significant negative relation between short interest and the fee, again suggesting that stocks with higher fees experience smaller increases in short interest.

To summarize, the evidence in Table 4 provides support for the hypothesis that informed short sellers successfully change their positions in anticipation of the market reaction to the announcement of private placements of convertible bonds and common stock. We provide additional tests related to our second hypothesis in Section VI.C, where we predict announcement returns based on information available to wall-crossed investors before the announcement, including the offering discount.

*B. The number of buyers in a private placement*

For 451 of our 662 issues, we have information on the number of buyers involved in the private placement. The actual number of wall-crossed investors is likely to exceed the number of buyers as wall-crossed investors are free to decline the invitation to invest in the security offering even after they agree to be wall-crossed. However, while no information on the actual number of investors that have crossed the wall is available, it is reasonable to expect that this number would be positively correlated with the number of actual buyers.

Our third hypothesis is that pre-announcement short selling is more pronounced and the negative relation between pre-announcement short selling and announcement day returns is stronger when there are more buyers involved in the private placement. To test this hypothesis, the reduced sample is split into three groups based on the number of buyers: the first group consists of private placements with one buyer (n=150); the second group consists of private placements with 2 to 10 buyers (n=134); and the third group consists of private placements with more than 10 buyers (n=167).

Figures 2 and 3 present plots of average short interest in the period -50, +40 for these three groups. Figure 2 represents convertible private placements and Figure 3 represents

common stock private placements. It is interesting to note that the previously documented patterns of changes in short interest for both convertible bond and common stock placements are most apparent in the sample of issues that have more than 10 buyers. For convertible placements with 2 to 10 buyers the overall trend is still apparent, but some of the detail is lost and the magnitudes of change are far less than if there are more than 10 buyers. The plots for common stock placements with more than 10 buyers and 2 to 10 buyers are more similar, but again, the build-up in short positions in the pre-announcement period is more pronounced when there are more than 10 buyers.

Where there is only one buyer, the identified patterns are largely lost. Convertible issues with a single buyer exhibit no appreciable change in short interest until the time of the announcement, after which it falls by an average of around 1.5 percent. Short interest in common stock issues with a single buyer falls throughout the entire window and the magnitude of the decrease after the announcement is relatively small at about 0.4 percent. These obvious differences in the behavior of short sellers could reflect the lower probability to stay off the SEC's radar if only a small number of firms have crossed the wall. In addition, the share price reaction for the group of firms with only one buyer is relatively favorable with an average CAR(0,+1) of 4.5 percent (t-statistic is 4.1), whereas for the group of events with 2 to 10 buyers the average CAR(0,+1) is 0.01 percent (t-statistic is 0.7), and for private placements with more than 10 buyers the average CAR(0,+1) is 0.00 percent (t-statistic is 0.3).

[ insert Figures 2 and 3 here ]

To formally test whether the number of buyers affects i) the change in short interest in the pre-announcement period and ii) the relation between the change in short interest and the announcement return, we estimate the following model:[28]

$$\Delta SI(-T,-1)_i = \alpha_0 + \alpha_1 D_{B,2\text{-}10} + \alpha_2 D_{B,>10} + \alpha_3 CAR(0,+1)_i + \alpha_4 D_{B,2\text{-}10}*CAR(0,+1)_i + \alpha_5 D_{B,>10}*CAR(0,+1)_i + \alpha_6 CAR(-T,-1)_i + \alpha_7 ATurn_i(-T,-1)_i + \alpha_8 Fee(-T,-1)_i + \alpha_9 Rel_Proceeds_i + \varepsilon_i \quad (2)$$

where $D_{B,2\text{-}10}$ ($D_{B,>10}$) is a dummy variable that takes a value of one if the number of buyers in the private placement is between 2 and 10 (greater than 10) and is zero otherwise. The other variables are as previously defined and the estimation results are presented in Table 5. For both windows considered, we find that the increase in short interest in the pre-announcement period is significantly higher for private placements with more than 10 buyers compared to private placements with only one buyer (i.e., $\alpha_2$ is positive and significant at the 1 percent level for both windows). For private placements with 2 to 10 buyers, short interest also increases more than for private placements with one buyer, and this difference is significant at the 10 percent level for the 20-day window.

Moreover, for both windows, we find that the relation between the announcement return and the pre-announcement change in short interest is stronger (i.e. more negative) if there is more than one buyer. The difference in the coefficients for the cumulative abnormal announcement return is significant at the 10 percent level or better for private placements with

[28] Because we require information on the number of buyers, our sample size is smaller than in the previous section. To increase the power of our test, we combine the sample of common stock and convertible issues. We have confirmed that inclusion of a dummy variable to distinguish common stock and convertible bond placements does not change the conclusions of our analysis.

more than 10 buyers. The difference is not statistically significant for placements with 2 to 10 buyers. All other coefficients are as previously discussed.

In summary, the results of Table 5 provide support for the hypothesis that informed trading before the announcement is more prevalent if there are more buyers involved in the private placements. The results also provide support for the hypothesis that pre-announcement short selling is more informative about announcement day returns when there are many buyers involved in the private placement.

[ insert Table 5 here ]

*C. Hedge funds*

The final hypothesis concerns a formal test of the role of hedge funds. Hedge funds are thought to have greater opportunities to engage in insider trading as they are largely unregulated, have few reporting requirements, can hold both long and short equity positions, have fewer internal information barriers, such as Chinese walls, and have an incentive based fee structure that makes any informational advantage extremely valuable. Within private placements, Dai (2007) shows that hedge funds differ from other investors by keeping their stakes for shorter periods of time and by being less likely to obtain board seats.

To test the impact of hedge fund involvement in private placements, we modify equation (2) to include both the number of hedge funds and the number of non-hedge funds. Panel A of Table 6 presents the estimation results. In line with our expectations, we find that a higher number of involved hedge funds is positively related to the increase in pre-announcement short interest. Moreover, the involvement of hedge funds increases the negative relation between

changes in pre-announcement short interest and the abnormal return in reaction to the announcement. Both these effects are statistically significant at the 5 percent level, irrespective of the window that we use. In addition, we do not find significant effects of the number of non-hedge funds, which again suggests that the profitable pre-announcement changes in short interest are explained by hedge funds.

To provide an alternative test of the impact of hedge funds, in Panel B of Table 6 we consider a sample of private placements in which hedge funds have no involvement (135 observations), and in Panel C we consider a sample of private placements in which hedge funds are the sole participants (94 observations). To examine the effects of the overall number of buyers for these relatively small sample sizes, we include a dummy variable ($D_{B,>1}$) that takes a value of one if the number of buyers in the private placement is greater than one and is zero otherwise.

It can be seen that the sample with no hedge fund involvement (Panel B) suffers from a general lack of significance of the estimated parameters. On the other hand, for the 94 private placements in which hedge funds are the sole buyers (Panel C), we find evidence of a larger increase in short interest in the pre-announcement period if there is more than 1 hedge fund buyer. For issues solely purchased by hedge funds, the coefficient estimate for the interactive term is consistently negative across both reported results and statistically significant at the 5 percent level, again indicating that the relation between short selling and announcement returns is more negative when more than one hedge fund buyer is involved in the private placement.

To summarize, we find that when no hedge funds are involved as buyers in private placements, there is no evidence of a relation between pre-announcement short selling and announcement period returns. Similarly, when there is only one hedge fund buyer, the predictive

ability of pre-announcement changes in short interest is lost. When there are a number of hedge funds involved, however, the change in short interest in advance of private placement announcements is informative.

[ insert Table 6 here ]

## VI. Additional Tests

In this section, we first examine whether inclusion of variables that proxy for information asymmetry and the probability of a private placement impact our results. Next, we discuss the results of a simulation analysis that shows that the relation between the change in short interest and the subsequent return is exceptionally strong for the event that we study compared to non-events. We then explain the pre-announcement change in short interest using only information that is available to wall-crossed investors before the announcement of the private placement, instead of using actual announcement returns. Finally, we discuss the results of some additional extensions to our base models. In all these additional tests we consistently find that our results are robust.

### *A. Information asymmetry and the probability of a private placement*

Companies with high information asymmetry tend to place more securities with hedge funds (see for example Brophy, Ouimet and Sialm, 2009). As a result, our findings on the impact of hedge funds could be due to spurious correlation where information asymmetry is the factor driving changes in pre-announcement short selling. To control for this possibility, we include the Durnev, Morck, Yeung and Zarowin (2003) *psi* variable as a proxy for the level of information

asymmetry. This variable *psi* measures the firm-specific return variability in a given year relative to the total return variability. The underlying intuition is that firms with a higher level of firm-specific variation in stock returns have more informative stock prices and therefore have a lower level of information asymmetry.[29]

Our second additional control variable represents the probability of a private placement based on publicly observable firm characteristics. Inclusion of this variable could be important if the probability of a private placement affects the change in short interest in the pre-announcement period, for example because firms with a high probability of a private placement have a higher level of short interest at the start of the pre-announcement event window. To obtain this variable, we download the full sample of firms from Compustat for the period 2006 – 2010. We estimate a logit regression model in which the dependent variable equals one if the firm privately places an equity or convertible issue in the subsequent year, and zero otherwise.[30] The explanatory variables included in the regression equation are based on Chen, Dai and Schatzberg (2010) and Ellis and Twite (2013), and all firm characteristics are measured at the fiscal year-end. Firms are only included if all the required data in Compustat, CRSP, and IBES are available. Appendix C presents the estimation results for this model. Consistent with earlier studies, we find that companies that privately place securities are relatively small, volatile and have low profitability. These firms also tend to have low turnover and relatively high leverage and capital expenditure. In calculating probabilities of a private issue for a particular firm in a particular year, we use the estimated coefficients in Appendix C, including industry and year

[29] This variable is also used in, for example, Dittmar and Thakor (2007). The firm-specific stock return variation is obtained from the regression: Firm return(t) = $\beta_0 + \beta_1$ market return(t) + $\beta_2$ industry return(t) + $\varepsilon$, which is estimated for each firm, using monthly returns measured over the year prior to the security offering. *Psi* is the variance of $\varepsilon$ scaled by the total variance of the dependent variable. A high estimate of *psi* indicates low information asymmetry.

[30] That is, the dependent variable is collected for the period 2007 – 2011.

dummies. We calculate the estimated probability of a private issue for each of the observations in our sample and include this estimated probability as an additional control variable in our regression models.

Because the possibility of information leakage might be related to the size of the firm, we also include the natural logarithm of market capitalization, measured at day -20. In addition, to control for potential differences in normal trading volumes and the costs of trading, we include normal turnover and the percentage bid-ask spread as our fourth and fifth additional control variable. Normal turnover is calculated as the issuer's average turnover over days [-50, -21] and the percentage bid-ask spread is measured at the start of the window over which the change in short interest is measured (i.e. at day -10 or -20). We are able to obtain these additional variables for 602 of our observations.

Panels A and B of Table 7 show a re-estimated equation (1) with the additional control variables. Our measures of information asymmetry, firm size and turnover are never significantly related to the change in short interest. Hence, it is unlikely that differences in information asymmetry are able to explain the results in Table 4. For convertible issues (Panel A), we find that the change in short interest is positively related to the probability of a private placement and negatively related to the bid-ask spread, whereas we do not find these relations for common stock issues (Panel B). Most importantly, in both panels we find that including the additional control variables does not change our conclusions with regard to the ability of short sellers to successfully anticipate abnormal announcement returns.

In Panel C of Table 7 we present the results on the impact of hedge fund involvement when we include additional control variables. In line with our earlier results, we find that a higher number of hedge fund investors in the placement is positively related to the increase in

pre-announcement short interest and that the involvement of hedge funds increases the negative relation between changes in pre-announcement short interest and the abnormal return in reaction to the announcement.[31]

[ insert Table 7 here ]

*B. Simulation analysis*

A possible concern with our analysis regarding equation (1) is that the estimates for the relation between the pre-announcement change in short interest and the announcement return might reflect the typical relation between the change in short interest over a 10-day or 20-day window and the subsequent 2-day abnormal return, rather than being specific to the announcement of private placements. To provide evidence on this issue, we estimate equation (1) for 100 pseudo-events which are centered on a new event day 0. For each observation, new event day 0 is equal to actual event day 0 plus T trading days. For this analysis, we let T start at a value of -110, increase in steps of 2, and end at a value of +110. We exclude all T's in the interval -10 to +10.

For each of the pseudo-events, we estimate equation (1) and collect the t-statistic for the $\alpha_1$ coefficient. This gives an empirical distribution of 100 t-statistics. For our sample of private placements of common stock, the t-statistic for the true event day 0 is between the first and second percentile of the empirical distribution for the 10-day window, and smaller than the first percentile for the 20-day window. For the sample of convertibles, the t-statistic of $\alpha_1$ for the true event day 0 is between the first and second percentile of the empirical distribution for the 10-day

[31] When we re-estimate our other models, we again find that the inclusion of the additional variables does not materially change our conclusions.

window, and between the fourth and fifth percentile for the 20-day window. These results show that the strong relation between the pre-announcement change in short interest and the announcement return reported in Table 4 is exceptional and is unlikely to be the result of a typical relation between the change in short interest and subsequent abnormal returns.

*C. Offering discount and predicted announcement return*

Throughout the paper we have used actual announcement returns as a proxy for wall-crossers' expectations of announcement returns. Instead of actual announcement returns, this section uses information on the offering discount to explain the pre-announcement change in short interest. Note that information on the offering discount is available to wall-crossed investors before the announcement of the private placement. In addition to the offering discount, we use a predicted announcement return, which again is only based on information available to wall-crossed investors before the announcement. If short sellers are speculating on negative announcement effects, then we expect to observe a larger increase in pre-announcement short interest in case of a larger offering discount and in case of a more negative predicted price change on announcement.

We are able to obtain the offering discount for 301 common stock PIPEs with data from Sagient. The offering discount is calculated as the percentage difference between the stock price on day -1 and the price per share offered to the security buyers. For example, a value of -0.1 indicates that the offering price is 10 percent below the pre-announcement stock price. The average offering discount in our sample is -4.45 percent, with a standard deviation of 18.59 percent.

Our second measure of the expected announcement return is the predicted announcement return based only on variables that are observable to wall-crossed investors before the announcement. The explanatory variables included in the regression equation to obtain the predicted announcement return are based on Dai (2007), Brophy, Ouimet and Sialm (2009), and Floros and Sapp (2012). Firms are only included if all the required data in Compustat, CRSP, and Sagient are available. Appendix D presents the estimation results for this model. Consistent with earlier studies, we find that announcement returns are significantly higher for larger issues, and for issues that have a smaller discount (i.e. a less negative discount). Announcement returns are significantly lower for larger firms and for issues that have more hedge fund participation. In calculating the predicted announcement return, we use the estimated coefficients in Appendix D. The average predicted announcement return based on the model in Appendix D is 1.8 percent, with a standard deviation of 4.8 percent. The correlation between the actual announcement return and the predicted announcement return is 0.46 (significant at the 0.1 percent level). The correlation between the actual announcement return and the offering discount is 0.33 (significant at the 0.1 percent level).

Table 8 shows the relation between these two measures of expected announcement returns and the pre-announcement change in short interest. In line with our expectations, both the offering discount and the predicted announcement return are negatively related to the change in pre-announcement short interest. The relation between the change in short interest and the predicted announcement return is the strongest, with statistical significance at the 1 percent level for both event windows.[32]

[32] We further examine whether our results related to hypothesis 3 and 4 are robust to the inclusion of the offering discount. We find that both the positive relation between the number of buyers and changes in pre-announcement short selling (Table 5) and the relation between the number of hedge funds and pre-announcement short selling (Panel A of Table 6) are robust to including the offering discount to the corresponding regression specifications.

[ insert Table 8 here ]

*D. Alternative measures, windows and samples*

For our first set of robustness tests, we: i) estimate all models without winsorizing; ii) estimate all models after transforming the independent variables into decile ranks, scaled to range from −0.5 to 0.5; iii) examine the impact of removing the 15 security issues that occur during or within 20 days after the 2008 short sale ban; and iv) examine the impact of choosing particular event windows by re-examining our results when abnormal announcement returns are measured on day 0, and when abnormal announcement returns are measured over a 5-day window, starting on day 0. We find that our results are robust in all of these instances.[33]

In a second set of additional tests, we add a dummy variable (DUM) and an interaction variable (CAR(0,+1) * DUM) to our models. In a first additional test, we examine whether our results are specific to sub-periods in our sample. In this test, the dummy variable assumes a value of 1 if the private placement takes place in 2007 or 2008, and zero otherwise. In a second additional test, the dummy variable assumes a value of 1 if the private placement was preceded by another private placement for the same stock in the period going back to 2000, which represents the start of the Sagient database, and zero otherwise. This dummy variable controls for an effect of repetitive issuers, which Floros and Sapp (2012) have found to be important in explaining announcement returns. In a final additional test, we control for events where short selling might have been relatively difficult because the stock was 'on special'. In this test, the dummy variable assumes a value of 1 if the lending fee in the 10-day period before the

[33] All the unreported results in the paper are available upon request.

announcement was larger than 250 basis points, and zero otherwise. Again, our results affirm the robustness of the main conclusions, as the estimation results are qualitatively similar to those detailed in the main body of the paper.

## VII. Conclusion

This paper examines privately placed common stock and convertible offerings in the U.S. markets in the period 2007 – 2011. Using proprietary short interest data, we document significant increases in short interest in the pre-announcement period and show that pre-announcement short sellers are able to predict announcement day returns. We find that pre-announcement short selling is particularly informative when the number of buyers is high and when there is a high degree of hedge fund participation.

Our results reinforce the concerns expressed by regulators around the world that wall-crossing – the practice where companies that are planning a private placement gauge the interest of potential buyers before the offering is publicly announced – might result in insider trading. Our results indicate that the limited resources of regulators should be directed towards examining those placements with a high degree of hedge fund involvement and a large number of wall-crossed investors.

Our findings are also relevant to the issues of hedge fund regulation and disclosure of short positions. Both these issues came to the fore with the implementation of the Dodd-Frank Act, which was aimed at closing regulatory gaps and ending the speculative trading practices that contributed to the 2008 financial market crisis. The Dodd-Frank Act mandates hedge fund advisers to increase record keeping and disclosure, and also called for studies of costs and benefits of reporting, in real time, short sale positions. Our results suggest that more extensive

and timely disclosures of short interest is of great interest to the parties involved in private placements and would help market participants in reporting suspicious short selling activity to enforcement authorities.

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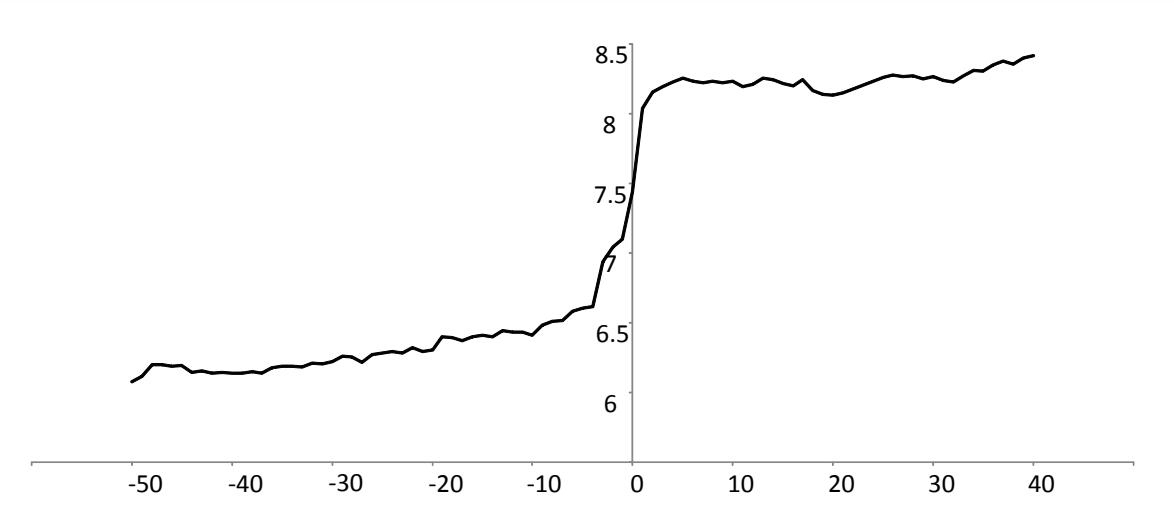
**Figure 1**

**Changes in Short Interest Around the Announcement of a Private Placement**

This figure plots the pattern in mean short interest (as a percentage of shares outstanding) over the window -50 to +40 days around the announcements of convertible bond private placements (Panel A) and common stock private placements (Panel B).

## Panel A – Convertible Bond Issues




## Panel B – Common Stock Issues

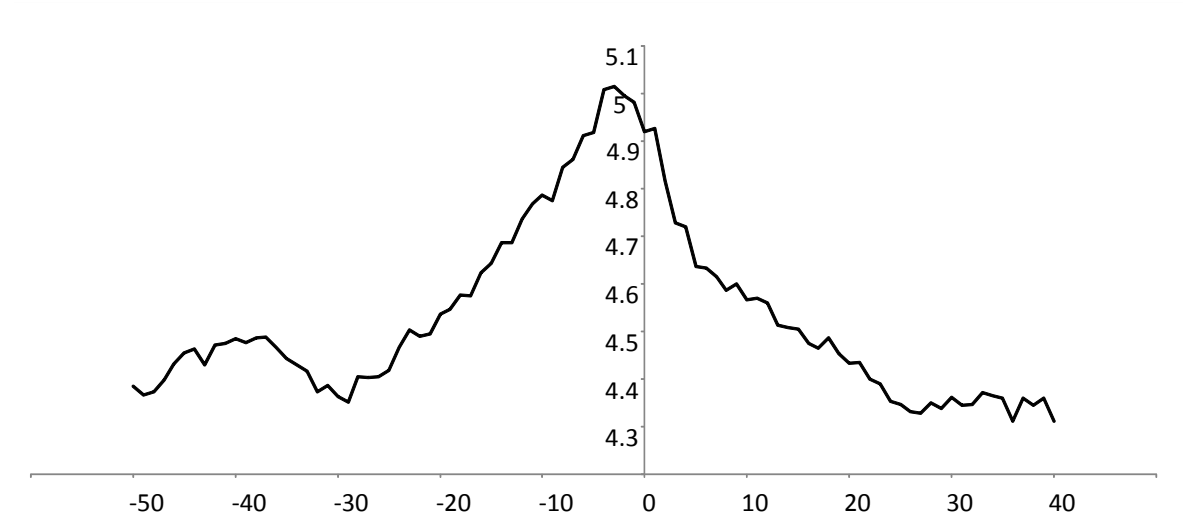


**Figure 2**

**Changes in Short Interest Around the Announcement of a Private Placement of Convertible Bonds Distinguishing Between the Number of Buyers**

This figure presents a plot of the average short interest (as a percentage of shares outstanding) in the period of -50 to +40 days around the announcement of a private placement of convertible bonds, where the sample is split into three groups based on the number of buyers: the first group consists of private placements with one buyer; the second group consists of private placements with 2 to 10 buyers; and the third group consists of private placements with more than 10 buyers.

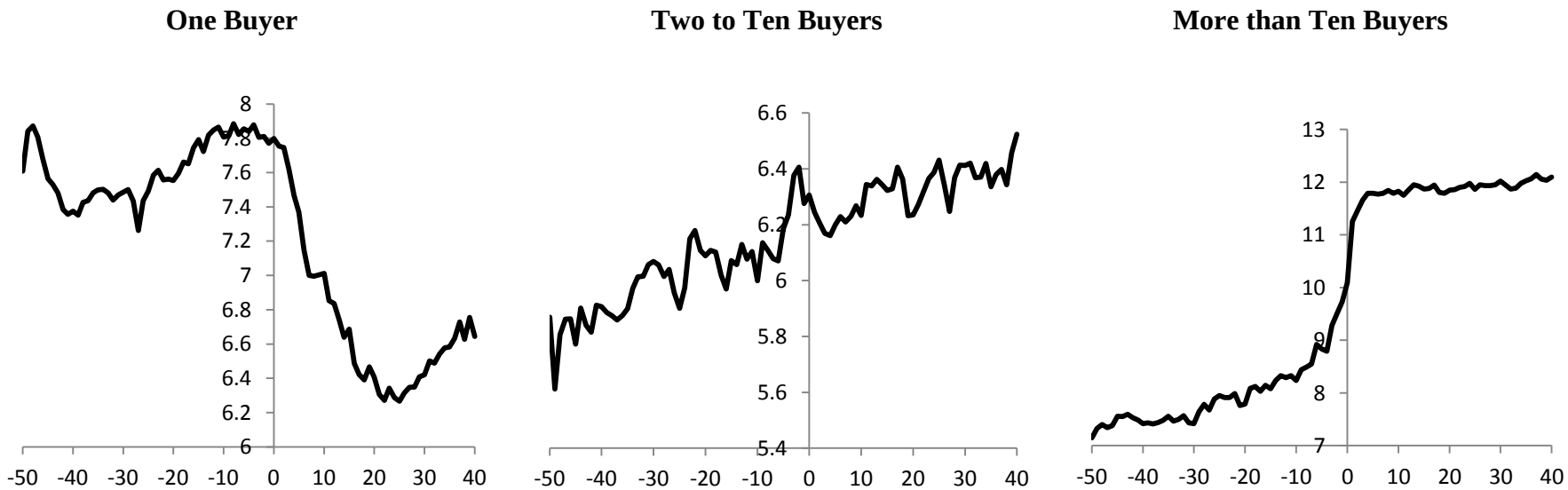
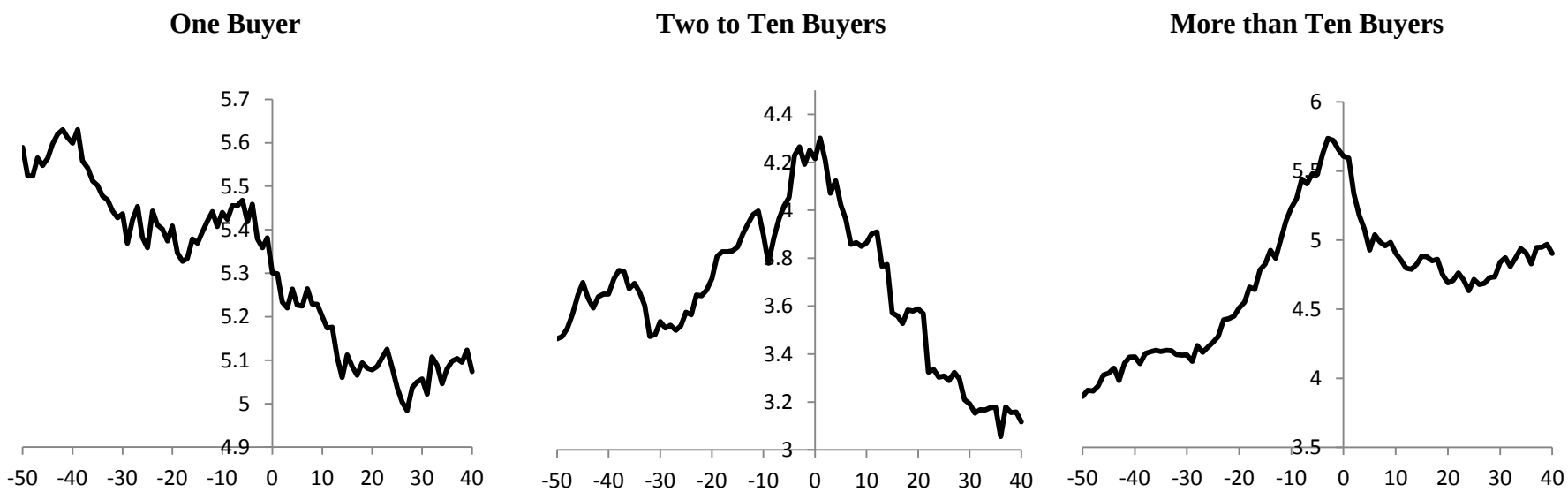


**Figure 3**
**Changes in Short Interest Around the Announcement of a Private Placement of Common Stock Distinguishing Between the Number of Buyers**

This figure presents a plot of the average short interest (as a percentage of shares outstanding) in the period of -50 to +40 days around the announcement of a private placement of common stock, where the sample is split into three groups based on the number of buyers: the first group consists of private placements with one buyer; the second group consists of private placements with 2 to 10 buyers; and the third group consists of private placements with more than 10 buyers.



## Table 1
## Descriptive Statistics

Panel A presents descriptive statistics for the main variables used in this study, where the description of the variables is presented in Appendix B. We obtain a sample of 662 common stock and convertible bond private placements from Securities Data Company (SDC) and Sagient's PlacementTracker. The sample period is from January 2007 to August 2011, the period for which we have daily short interest data from Dataexplorers. The total sample of 662 private placements comprises 323 convertible bond issues (152 are 144A offerings and 171 are PIPE offerings) and 339 common stock issues by 536 unique firms. Panel B presents the average values for the variables when we distinguish between the type of issue. The final three rows contain additional information specific to the 144A and PIPE convertible issues.

Panel A: All Private Placements

| | Mean | Median | Standard Deviation |
|---|---|---|---|
| Market Capitalization | 1,811 | 199 | 11,057 |
| Total Assets | 8,279 | 219 | 67,661 |
| Proceeds | 166 | 25 | 621 |
| Relative Proceeds | 0.22 | 0.14 | 0.42 |
| Market-to-Book Ratio | 2.71 | 1.68 | 3.05 |
| Return Volatility | 0.73 | 0.64 | 0.39 |
| Book Leverage | 0.23 | 0.17 | 0.24 |
| Dividend Paying | 0.19 | 0.00 | 0.39 |
| ROA | -0.18 | -0.01 | 0.35 |
| Short Interest | 6.20 | 3.61 | 7.39 |
| Beneficial Ownership | 13.25 | 8.90 | 12.49 |
| Lending Fee | 379 | 29 | 979 |
| Number of Buyers* | 14 | 5 | 30 |
| Hedge Fund Involved* | 0.51 | 1 | 0.41 |
| Number of Hedge Funds* | 7 | 2 | 10 |

Note: * - These summary metrics are for a restricted sample of the data as information on the number of buyers is not available for all observations.

Panel B: Average Values When Distinguishing Between Placement Type

| | Convertible Bond | | Common Stock |
|---|---|---|---|
| | 144A | PIPEs | PIPEs |
| Market Capitalization | 4,947 | 1,673 | 475 |
| Total Assets | 8,720 | 21,289 | 1,519 |
| Proceeds | 319 | 281 | 40 |
| Relative Proceeds | 0.18 | 0.31 | 0.20 |
| Market-to-Book Ratio | 2.24 | 2.16 | 3.20 |
| Return Volatility | 0.52 | 0.74 | 0.81 |
| Book Leverage | 0.25 | 0.26 | 0.21 |
| Dividend Paying | 0.22 | 0.32 | 0.12 |
| ROA | 0.03 | -0.12 | -0.30 |
| Short Interest | 9.17 | 6.01 | 4.95 |
| Beneficial Ownership | 26.37 | 10.84 | 8.58 |
| Lending Fee | 100 | 385 | 539 |
| Number of Buyers* | 38 | 14 | 9 |
| Hedge Fund Involved* | 0.73 | 0.38 | 0.53 |
| Number of Hedge Funds* | 21 | 4 | 5 |
| Conversion Premium | 28 | 26 | - |
| Delta | 0.76 | 0.77 | - |
| Years-to-Maturity | 10 | 5 | - |

Note: * - These summary metrics are for a restricted sample of the data as information on the number of buyers is not available for all observations.

**Table 2**
**Cumulative Abnormal Returns Around Private Placement Announcements**

This table presents the sum of abnormal returns on the announcement day (day 0) and the next trading day (day 1) for the full sample of private placements as well as for each class of asset issued. The sample consists of 152 convertible bond 144A offerings, 171 convertible bond PIPE offerings, and 339 common stock PIPE issues. The abnormal daily return is the difference between the actual return and the return on the same day of a value-weighted portfolio of all firms in the same size and book-to-market quintiles.

| | Mean | t-statistic | Median | Standard Deviation |
|---|---|---|---|---|
| Full Sample | 1.06 | 2.2 | -0.06 | 12.64 |
| Convertibles – Rule 144A | -3.51 | -5.4 | -2.59 | 8.08 |
| Convertibles – PIPE | 2.48 | 2.0 | 0.75 | 16.10 |
| Common Stock – PIPE | 2.40 | 3.7 | 1.61 | 11.84 |

## Table 3
## Average Abnormal Activity Around Private Placement Announcements

This table presents average abnormal short interest, beneficial ownership, lending fee and turnover in the days around the announcement of private placements of convertible bonds and private placements of common stock. For each event and for each variable, we first calculate the average value over the 30-day period from day -50 to -21. Next, for each event day, we subtract this average from the actual value and average these daily abnormal values across all observations in each group. For each group, the *t*-statistics are based on the standard deviation across these daily abnormal values. We report t-statistics in parentheses. Detailed definitions of the variables are in Appendix B.

| | Convertible Issues | | | | Common Stock Issues | | | |
|---|---|---|---|---|---|---|---|---|
| Event Day | Abnormal Short Interest | Abnormal Beneficial Ownership | Abnormal Lending Fee | Abnormal Turnover | Abnormal Short Interest | Abnormal Beneficial Ownership | Abnormal Lending Fee | Abnormal Turnover |
| -20 | 0.109 (1.4) | 0.290 (3.8) | -4.975 (-0.4) | 1.158 (1.1) | 0.134 (2.2) | 0.066 (0.7) | 10.105 (0.4) | 0.223 (0.2) |
| -19 | 0.206 (2.2) | 0.353 (4.2) | 16.057 (0.9) | 0.037 (0.1) | 0.144 (2.1) | 0.078 (0.7) | -20.708 (-0.7) | 4.043 (0.9) |
| -18 | 0.202 (2.1) | 0.256 (2.6) | 41.335 (1.6) | 0.719 (0.6) | 0.176 (2.3) | 0.177 (1.4) | 33.053 (1.3) | 5.090 (0.9) |
| -17 | 0.174 (1.8) | 0.265 (2.5) | 53.350 (2.0) | 3.821 (1.0) | 0.171 (2.1) | 0.250 (2.2) | 62.184 (3.1) | 1.305 (0.7) |
| -16 | 0.208 (2.1) | 0.284 (3.0) | 20.376 (1.2) | 2.157 (1.3) | 0.218 (2.5) | 0.108 (0.9) | 15.226 (0.6) | 0.638 (0.3) |
| -15 | 0.221 (2.0) | 0.237 (2.4) | 29.494 (1.4) | 5.314 (1.4) | 0.237 (2.6) | 0.146 (1.2) | 16.631 (0.9) | 0.347 (0.2) |
| -14 | 0.211 (2.0) | 0.298 (3.4) | 15.709 (0.8) | 1.219 (0.7) | 0.282 (3.0) | 0.027 (0.2) | 31.400 (1.2) | 0.966 (0.5) |
| -13 | 0.253 (2.3) | 0.222 (2.1) | 17.024 (0.8) | 0.844 (0.6) | 0.277 (2.8) | 0.140 (1.1) | 77.018 (2.6) | -0.248 (-0.3) |
| -12 | 0.243 (2.2) | 0.235 (2.3) | -16.44 (-0.8) | 1.824 (1.2) | 0.326 (3.0) | 0.164 (1.3) | 15.697 (0.5) | 1.064 (0.7) |
| -11 | 0.244 (2.0) | 0.254 (2.4) | 6.772 (0.4) | 2.971 (1.2) | 0.359 (3.1) | 0.070 (0.6) | 32.835 (1.3) | 2.161 (0.8) |
| -10 | 0.230 (1.8) | 0.270 (2.5) | 31.593 (1.5) | 0.895 (0.9) | 0.377 (3.2) | 0.148 (1.2) | 2.157 (0.1) | -0.989 (-1.5) |
| -9 | 0.312 (2.2) | 0.268 (2.3) | -2.739 (-0.1) | 1.615 (1.5) | 0.368 (3.1) | 0.033 (0.2) | 14.073 (0.5) | 0.556 (0.5) |
| -8 | 0.323 (2.3) | 0.138 (1.0) | 46.420 (2.3) | 1.635 (1.5) | 0.435 (3.6) | 0.113 (0.8) | 27.937 (1.4) | -0.370 (-0.4) |
| -7 | 0.334 (2.3) | -0.017 (-0.1) | 28.236 (1.5) | 2.155 (1.7) | 0.453 (3.7) | 0.133 (1.0) | 44.192 (1.8) | -0.196 (-0.2) |
| -6 | 0.399 (2.5) | 0.073 (0.5) | 69.149 (1.9) | -0.094 (-0.1) | 0.501 (3.8) | 0.020 (0.1) | 41.005 (1.5) | 2.045 (1.2) |
| -5 | 0.421 (2.8) | 0.078 (0.5) | 45.192 (2.7) | 1.745 (1.1) | 0.506 (3.8) | 0.037 (0.3) | 33.991 (1.1) | 2.367 (0.6) |
| -4 | 0.426 (2.8) | 0.094 (0.7) | 31.655 (1.5) | 1.095 (0.8) | 0.600 (4.2) | 0.064 (0.5) | 51.785 (1.8) | -0.039 (0.0) |
| -3 | 0.747 (4.5) | 0.011 (0.1) | 35.748 (2.0) | 1.451 (1.0) | 0.608 (4.1) | 0.136 (0.9) | 35.790 (1.4) | -0.323 (-0.3) |
| -2 | 0.855 (4.6) | 0.084 (0.6) | 53.931 (3.1) | 5.612 (1.6) | 0.586 (3.9) | 0.058 (0.4) | 28.640 (1.3) | 0.720 (0.5) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -1 | 0.912 (5.0) | -0.01 (-0.1) | 56.962 (2.4) | 2.843 (3.0) | 0.573 (3.9) | -0.017 (-0.1) | 33.066 (1.2) | 2.020 (0.8) |
| 0 | 1.263 (6.5) | 0.109 (0.7) | 42.181 (2.8) | 31.262 (10.6) | 0.515 (3.4) | 0.019 (0.1) | 68.324 (2.4) | 19.854 (4.9) |
| 1 | 1.858 (8.6) | 0.194 (1.3) | 86.372 (4.7) | 35.392 (10.8) | 0.521 (3.4) | 0.043 (0.3) | 58.069 (2.0) | 6.665 (2.7) |
| 2 | 1.974 (8.9) | 0.144 (0.9) | 70.046 (3.6) | 8.147 (6.8) | 0.407 (2.7) | -0.098 (-0.7) | 46.682 (1.5) | 2.613 (1.7) |
| 3 | 2.014 (8.9) | 0.162 (1.0) | 66.075 (3.2) | 5.798 (5.3) | 0.312 (2.0) | -0.143 (-0.9) | 45.321 (1.8) | 3.242 (1.0) |
| 4 | 2.041 (8.7) | 0.090 (0.5) | 54.993 (3.0) | 3.218 (3.1) | 0.302 (1.9) | -0.210 (-1.3) | 39.215 (1.4) | 2.946 (1.4) |
| 5 | 2.063 (8.6) | 0.060 (0.4) | 30.745 (1.5) | 2.603 (2.2) | 0.220 (1.4) | -0.123 (-0.8) | 40.386 (1.2) | 3.864 (1.0) |
| 6 | 2.022 (8.5) | 0.180 (1.2) | 48.942 (2.7) | 2.795 (2.6) | 0.214 (1.4) | -0.270 (-1.7) | 36.731 (1.5) | 3.450 (1.1) |
| 7 | 1.998 (8.2) | 0.220 (1.4) | 50.817 (2.7) | 1.197 (1.2) | 0.197 (1.3) | -0.204 (-1.3) | 21.969 (0.9) | 3.859 (1.3) |
| 8 | 2.012 (8.2) | 0.209 (1.3) | 28.640 (1.6) | 1.617 (1.4) | 0.171 (1.1) | -0.262 (-1.6) | 40.044 (1.1) | 1.629 (0.8) |
| 9 | 2.000 (8.2) | 0.210 (1.4) | 46.371 (3.2) | 1.274 (1.1) | 0.185 (1.2) | -0.276 (-1.7) | 53.170 (2.0) | 0.676 (0.6) |
| 10 | 2.017 (8.0) | 0.208 (1.3) | 41.601 (2.4) | 1.807 (1.2) | 0.150 (0.9) | -0.218 (-1.4) | 27.146 (0.7) | 2.564 (0.8) |

## Table 4
## Does the Change in Short Interest Predict Announcement Returns?

The following table presents the estimation results for equation (1), i.e.:

$$\Delta SI(-T,-1)_i = \alpha_0 + \alpha_1 CAR(0,+1)_i + \alpha_2 CAR(-T,-1)_i + \alpha_3 ATurn(-T,-1)_i + \alpha_4 Fee(-T,-1)_i + \alpha_5 Rel_Proceeds_i + \varepsilon_i,$$

where the dependent variable, $\Delta SI(-T,-1)_i$, is the change in short interest in stock *i* over day –T to day -1 , where T = 10 or 20. The independent variables are the cumulative abnormal return (CAR), the average daily abnormal turnover (ATurn), the average daily stock lending fee (Fee), and the relative proceeds of the issue (Rel_Proceeds). For convertible issues, the model includes an additional dummy variable that indicates whether the convertible issue is a Rule 144A offering ($D_{144A}$) and an interactive term that captures the cross effects between a Rule 144A offering and the announcement return ($D_{144A}$*CAR(0,+1)). Panel A presents the estimation results for convertible debt private placements and Panel B presents the estimation results for common stock private placements. All continuous firm-level variables are winsorized at the 1 percent and 99 percent levels and reported p-values are based on standard errors that are clustered by firm and quarter.

Panel A: Convertible Debt (323 observations)

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | 0.093 | 0.66 | 0.077 | 0.75 |
| $CAR(0,+1)_i$ | -3.271 | 0.02 | -3.058 | 0.05 |
| $CAR(-T,-1)_i$ | -2.372 | 0.77 | -4.097 | 0.86 |
| $ATurn(-T,-1)_i$ | 0.026 | 0.01 | 0.052 | 0.00 |
| $Fee(-T,-1)_i$ | -0.023 | 0.06 | -0.039 | 0.05 |
| $Rel_Proceeds_i$ | 0.535 | 0.12 | 0.563 | 0.17 |
| $D_{144A}$ | 0.312 | 0.35 | -0.073 | 0.84 |
| $D_{144A}*CAR(0,+1)_i$ | 0.229 | 0.92 | 0.203 | 0.93 |
| Adjusted $R^2$ | 0.11 | | 0.12 | |

Panel B: Common Stock (339 observations)

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | 0.194 | 0.03 | 0.421 | 0.02 |
| $CAR(0,+1)_i$ | -1.338 | 0.02 | -3.208 | 0.00 |
| $CAR(-T,-1)_i$ | 2.005 | 0.77 | 15.535 | 0.09 |
| $ATurn(-T,-1)_i$ | 0.009 | 0.22 | 0.016 | 0.18 |
| $Fee(-T,-1)_i$ | -0.016 | 0.00 | -0.034 | 0.01 |
| $Rel_Proceeds_i$ | 0.182 | 0.02 | 0.418 | 0.02 |
| Adjusted $R^2$ | 0.01 | | 0.04 | |

## Table 5
## Estimating the Impact of the Number of Buyers

The following table presents the estimation results for equation (2), i.e.:

$$\Delta SI(-T,-1)_i = \alpha_0 + \alpha_1 D_{B,2\text{-}10} + \alpha_2 D_{B,>10} + \alpha_3 CAR(0,+1)_i + \alpha_4 D_{B,2\text{-}10}*CAR(0,+1)_i + \alpha_5 D_{B,>10}*CAR(0,+1)_i + \alpha_6 CAR(-T,-1)_i + \alpha_7 ATurn_i(-T,-1)_i + \alpha_8 Fee(-T,-1)_i + \alpha_9 Rel_Proceeds_i + \varepsilon_i$$

where the dependent variable, $\Delta SI(-T,-1)_i$, is the change in short interest in stock *i* over day –T to day -1, where T = 10 or 20. The independent variable $D_{B,2\text{-}10}$ ($D_{B,>10}$) is a dummy variable that takes a value of one if the number of buyers in the private placement is between 2 and 10 (greater than 10) and is zero otherwise. The other independent variables are the cumulative abnormal return (CAR), the average daily abnormal turnover (ATurn), the average daily stock lending fee (Fee), and the relative proceeds of the issue (Rel_Proceeds). All continuous firm-level variables are winsorized at the 1 percent and 99 percent levels and reported p-values are based on standard errors that are clustered by firm and quarter. There are 451 private placements for which we have information on the total number of buyers.

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | -0.150 | 0.18 | -0.197 | 0.19 |
| $D_{B,2\text{-}10}$ | 0.315 | 0.14 | 0.405 | 0.10 |
| $D_{B,>10}$ | 0.974 | 0.00 | 1.237 | 0.00 |
| $CAR(0,+1)_i$ | -0.514 | 0.55 | -0.957 | 0.41 |
| $CAR(0,+1)_i * D_{B,2\text{-}10}$ | -1.064 | 0.59 | -2.445 | 0.29 |
| $CAR(0,+1)_i * D_{B,>10}$ | -3.978 | 0.01 | -4.052 | 0.09 |
| $CAR(-T,-1)_i$ | 2.590 | 0.65 | 10.502 | 0.45 |
| $ATurn(-T,-1)_i$ | 0.016 | 0.01 | 0.034 | 0.01 |
| $Fee(-T,-1)_i$ | -0.023 | 0.01 | -0.040 | 0.01 |
| $Rel_Proceeds_i$ | -0.076 | 0.64 | 0.080 | 0.80 |
| Adjusted $R^2$ | 0.11 | | 0.12 | |

## Table 6
## Estimating the Impact of Hedge Fund Involvement in Private Placements

The following table presents the estimation results for equations in which the dependent variable is $\Delta SI(-T,-1)_i$, i.e. the change in short interest in stock *i* over day –T to day -1, where T = 10 or 20. The independent variables are the cumulative abnormal return (CAR), the average daily abnormal turnover (ATurn), the average daily stock lending fee (Fee), and the relative proceeds of the issue (Rel_Proceeds). Panel A also includes variables for the number of hedge funds involved, the number of non-hedge funds involved, and the interaction terms between these variables and CAR. Panel B and C include a dummy variable that takes a value of one if the number of buyers in the private placement is greater than one and is zero otherwise ($D_{B,>1}$). Panel B presents the estimation results for the sample in which there is no hedge fund involvement (n=142, of which 96 placements had one buyer, i.e. $D_{B,>1} = 0$, and 46 placements had more than 1 buyer, i.e. $D_{B,>1} = 1$). Panel C presents the estimation results for the sample in which hedge funds are the sole participants (n=95, of which 61 placements had one buyer, i.e. $D_{B,>1} = 0$, and 34 placements had more than 1 buyer, i.e. $D_{B,>1} = 1$). All continuous firm-level variables are winsorized at the 1 percent and 99 percent levels and reported p-values are based on standard errors that are clustered by firm and quarter. There are 451 private placements for which we have information on the total number of buyers.

Panel A: Number of (Non) Hedge Funds

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | 0.070 | 0.51 | 0.170 | 0.31 |
| Number Non-Hedge Funds | 0.010 | 0.13 | 0.013 | 0.16 |
| Number Hedge Funds | 0.032 | 0.01 | 0.026 | 0.03 |
| $CAR(0,+1)_i$ | -0.887 | 0.16 | -2.083 | 0.02 |
| $CAR(0,+1)_i$ * Number Non-Hedge Funds | 0.028 | 0.57 | 0.050 | 0.51 |
| $CAR(0,+1)_i$ * Number Hedge Funds | -0.259 | 0.02 | -0.253 | 0.05 |
| $CAR(-T,-1)_i$ | 2.192 | 0.69 | 9.591 | 0.51 |
| $ATurn(-T,-1)_i$ | 0.011 | 0.04 | 0.028 | 0.02 |
| $Fee(-T,-1)_i$ | -0.021 | 0.01 | -0.039 | 0.00 |
| $Rel_Proceeds_i$ | -0.107 | 0.45 | 0.133 | 0.67 |
| Adjusted $R^2$ | 0.13 | | 0.11 | |

Panel B: Issues with No Hedge Fund Involvement

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | -0.020 | 0.89 | -0.064 | 0.77 |
| $D_{B,>1}$ | 0.154 | 0.54 | -0.151 | 0.63 |
| $CAR(0,+1)_i$ | -0.247 | 0.74 | -1.206 | 0.44 |
| $CAR(0,+1)_i * D_{B,>1}$ | -1.080 | 0.55 | -0.769 | 0.68 |
| $CAR(-T,-1)_i$ | 17.239 | 0.01 | 24.741 | 0.25 |
| $ATurn(-T,-1)_i$ | 0.016 | 0.10 | 0.032 | 0.20 |
| $Fee(-T,-1)_i$ | -0.009 | 0.52 | -0.022 | 0.27 |
| $Rel_Proceeds_i$ | -1.159 | 0.16 | -0.501 | 0.49 |
| Adjusted $R^2$ | 0.07 | | 0.06 | |

Panel C: Issues Solely Purchased by Hedge Funds

| | T =10 | | T =20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | -0.009 | 0.95 | -0.086 | 0.66 |
| $D_{B,>1}$ | 0.220 | 0.53 | 0.717 | 0.04 |
| $CAR(0,+1)_i$ | 2.228 | 0.32 | 3.648 | 0.37 |
| $CAR(0,+1)_i * D_{B,>1}$ | -8.168 | 0.03 | -13.831 | 0.04 |
| $CAR(-T,-1)_i$ | 4.931 | 0.58 | 18.063 | 0.44 |
| $ATurn(-T,-1)_i$ | -0.001 | 0.91 | 0.013 | 0.37 |
| $Fee(-T,-1)_i$ | -0.007 | 0.55 | -0.011 | 0.51 |
| $Rel_Proceeds_i$ | -0.705 | 0.37 | -1.537 | 0.25 |
| Adjusted $R^2$ | 0.03 | | 0.18 | |

## Table 7
## Additional Control Variables

The following table presents the estimation results when we include additional control variables. The first two additional variables are Psi, which is the Durnev, Morck, Yeung and Zarowin (2003) measure for information asymmetry, and Probability of Private Placement, which follows from the logit model in Appendix C. The other additional variables are the natural logarithm of market capitalization, the issuer's normal turnover over days [-50, -21], and the bid-ask spread at day –T. The dependent variable is $\Delta SI(-T,-1)_i$, i.e. the change in short interest in stock *i* over day –T to day -1, where T = 10 or 20. The other variables are as in Table 4 (for Panel A and B) and Table 6 (for Panel C) and the description of these variables is presented in Appendix B. Panel A presents the estimation results for convertible debt private placements, Panel B presents the estimation results for common stock private placements, and Panel C includes both convertible debt and common stock private placements. All continuous firm-level variables are winsorized at the 1 percent and 99 percent levels and reported p-values are based on standard errors that are clustered by firm and quarter.

Panel A: Convertible Debt (308 observations)

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | 1.699 | 0.13 | 1.832 | 0.18 |
| $CAR(0,+1)_i$ | -2.427 | 0.05 | -2.311 | 0.11 |
| $CAR(-T,-1)_i$ | -1.734 | 0.83 | -6.978 | 0.76 |
| $ATurn(-T,-1)_i$ | 0.024 | 0.06 | 0.069 | 0.01 |
| $Fee(-T,-1)_i$ | -0.030 | 0.06 | -0.052 | 0.03 |
| $Rel_Proceeds_i$ | 0.168 | 0.64 | 0.217 | 0.58 |
| Psi | -0.046 | 0.93 | 0.215 | 0.77 |
| Probability Private Placement | 4.937 | 0.07 | 5.507 | 0.08 |
| Log Market Capitalization | -0.135 | 0.15 | -0.155 | 0.19 |
| Normalized Turnover | 0.011 | 0.54 | -0.020 | 0.36 |
| % Bid Ask Spread | -15.518 | 0.04 | -15.753 | 0.04 |
| $D_{144A}$ | 0.481 | 0.24 | 0.236 | 0.61 |
| $D_{144A}*CAR(0,+1)_i$ | 0.029 | 0.99 | 0.747 | 0.75 |
| Adjusted $R^2$ | 0.11 | | 0.11 | |

Panel B: Common Stock (294 observations)

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | -0.805 | 0.57 | -1.849 | 0.37 |
| $CAR(0,+1)_i$ | -1.451 | 0.04 | -3.383 | 0.01 |
| $CAR(-T,-1)_i$ | 2.557 | 0.78 | 13.914 | 0.27 |
| $ATurn(-T,-1)_i$ | 0.010 | 0.39 | 0.027 | 0.07 |
| $Fee(-T,-1)_i$ | -0.018 | 0.01 | -0.035 | 0.02 |
| $Rel_Proceeds_i$ | 0.246 | 0.00 | 0.506 | 0.02 |
| Psi | -0.192 | 0.73 | -0.339 | 0.64 |
| Probability Private Placement | 1.153 | 0.28 | 0.176 | 0.89 |
| Log Market Capitalization | 0.096 | 0.31 | 0.225 | 0.16 |
| Normalized Turnover | -0.004 | 0.74 | -0.021 | 0.15 |
| % Bid Ask Spread | -4.627 | 0.48 | -7.104 | 0.39 |
| Adjusted $R^2$ | 0.01 | | 0.06 | |

Panel C: Number of (Non) Hedge Funds (406 observations)

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | 0.315 | 0.64 | 0.387 | 0.72 |
| Number Non-Hedge Funds | 0.010 | 0.13 | 0.014 | 0.15 |
| Number Hedge Funds | 0.029 | 0.03 | 0.023 | 0.13 |
| $CAR(0,+1)_i$ | -0.970 | 0.23 | -2.036 | 0.07 |
| $CAR(0,+1)_i$ * Number Non-Hedge Funds | 0.032 | 0.50 | 0.062 | 0.42 |
| $CAR(0,+1)_i$ * Number Hedge Funds | -0.244 | 0.04 | -0.262 | 0.08 |
| $CAR(-T,-1)_i$ | 2.414 | 0.66 | 5.926 | 0.74 |
| $ATurn(-T,-1)_i$ | 0.010 | 0.12 | 0.042 | 0.03 |
| $Fee(-T,-1)_i$ | -0.024 | 0.01 | -0.038 | 0.01 |
| $Rel_Proceeds_i$ | -0.069 | 0.58 | 0.150 | 0.60 |
| Psi | -0.307 | 0.38 | -0.431 | 0.53 |
| Probability Private Placement | 1.442 | 0.16 | 0.083 | 0.96 |
| Log Market Capitalization | 0.003 | 0.94 | 0.027 | 0.64 |
| Normalized Turnover | -0.002 | 0.84 | -0.026 | 0.06 |
| % Bid Ask Spread | -11.764 | 0.09 | -13.182 | 0.12 |
| Adjusted $R^2$ | 0.10 | | 0.10 | |

## Table 8
## Offering Discount, Expected Announcement Return, and Changes in Short Interest

The following table presents the estimation results of a variant of equation (1), in which $CAR(0,+1)_i$ is replaced by either the offering discount of the issue (Panel A) or the expected announcement return for the issue (Panel B). The dependent variable is $\Delta SI(-T,-1)_i$, which is the change in short interest in stock *i* over day –T to day -1, where T = 10 or 20. The offering discount of the issue is the percentage difference between the stock price before the announcement of the offering and the price per share offered to the security buyers. For example, a value of -0.1 indicates that the offering price is 10 percent below the pre-announcement stock price (i.e. the closing price on day -1). The expected announcement return is based on the regression model in Appendix D. The offering discount is available for 301 observations, all of which are common stock PIPEs, and the expected announcement return can be calculated for 222 of these observations. The other independent variables are the cumulative abnormal return (CAR), the average daily abnormal turnover (ATurn), the average daily stock lending fee (Fee), and the relative proceeds of the issue (Rel_Proceeds). All continuous firm-level variables are winsorized at the 1 percent and 99 percent levels and reported p-values are based on standard errors that are clustered by firm and quarter.

Panel A: Offering Discount (301 observations)

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | 0.198 | 0.04 | 0.406 | 0.03 |
| Offering $Discount_i$ | -0.550 | 0.15 | -1.455 | 0.03 |
| $CAR(-T,-1)_i$ | 2.072 | 0.78 | 12.613 | 0.21 |
| $ATurn(-T,-1)_i$ | 0.008 | 0.30 | 0.013 | 0.25 |
| $Fee(-T,-1)_i$ | -0.018 | 0.02 | -0.042 | 0.01 |
| $Rel_Proceeds_i$ | 0.149 | 0.13 | 0.365 | 0.04 |
| Adjusted $R^2$ | 0.00 | | 0.03 | |

Panel B: Expected Announcement Return (222 observations)

| | T = 10 | | T = 20 | |
|---|---|---|---|---|
| | Parameter Estimate | p-value | Parameter Estimate | p-value |
| Intercept | 0.441 | 0.00 | 0.746 | 0.01 |
| Expected Announcement $Return_i$ | -4.975 | 0.01 | -9.044 | 0.01 |
| $CAR(-T,-1)_i$ | 8.742 | 0.24 | 21.578 | 0.14 |
| $ATurn(-T,-1)_i$ | -0.003 | 0.62 | 0.010 | 0.42 |
| $Fee(-T,-1)_i$ | -0.028 | 0.01 | -0.056 | 0.01 |
| $Rel_Proceeds_i$ | 0.146 | 0.23 | 0.523 | 0.14 |
| Adjusted $R^2$ | 0.02 | | 0.04 | |

**Appendix A: Summary of SEC Cases of Alleged Pre-Announcement (Short) Selling after Wall-Crossings**

| SEC versus | Complaint filed | Security | Number of securities | Alleged violation | Outcome |
|---|---|---|---|---|---|
| Pollet | April 2005 | PIPE | 10 (a) | Shorting in 2001 | Settled at $150,000 |
| Shane | May 2005 | PIPE | 1 | Shorting in 2001 | Settled at $1,075,015 |
| Langley Partners | March 2006 | PIPE | 7 | Shorting during 2000-2002 | Settled at $15,817,928 |
| Deephaven | May 2006 | PIPE | 19 | Shorting during 2001-2004 | Settled at $5,819,958 |
| Mangan | Dec. 2006 | PIPE | 1 | Shorting in 2001 | Not guilty (b) |
| Gryphon Partners | Dec. 2006 | PIPE | 4 | Shorting during 2001-2004 | Settled at $778,016 |
| Berlacher | Sept. 2007 | PIPE | 1 | Shorting in 2004 | Not guilty (c) |
| Cuban | Nov. 2008 | PIPE | 1 | Selling in 2004 | At trial |
| Mannion | Oct. 2010 | PIPE | 1 | Shorting in 2004 | At trial |

(a) In four issues Pollet represented the PIPE issuer's investment bank
(b) The judge ruled that the announcement effect of the PIPE was too small for information to be deemed "material"
(c) The judge ruled that the announcement effect of the PIPE was too small for information to be deemed "material". Berlacher was found guilty of misrepresenting his short position to the issuer and sentenced to paying $352,364.

## Appendix B: Variable Definitions

Variables are calculated at the end of the fiscal year-end preceding the announcement date, unless indicated otherwise.

| Variable | Definition |
|---|---|
| Market Capitalization | Market value of equity (closing price multiplied by number of shares outstanding) 20 days before the announcement of the private placement. |
| Total Assets | The value of total assets (Compustat Item #AT) at the end of the fiscal year-end preceding the announcement date (in millions of dollars). |
| Proceeds | The gross proceeds of the issue in millions of dollars, as reported in the SDC database or in Sagient. |
| Relative Proceeds | Proceeds divided by Market Capitalization (abbreviated to Rel_Proceeds in the estimation equations). |
| Market-to-Book Ratio | Market value of common stock over the book value (Compustat Items (#AT - #CEQ + #PRCC_F * #CSHO) / #AT), measured at the end of the fiscal year-end preceding the announcement date. |
| Return Volatility | The annualized volatility of monthly stock returns based on the 12 months before the announcement month. |
| Book Leverage | Total Debt calculated as the sum of long-term debt and debt in current liabilities divided by total assets (Compustat Items (#DLC + #DLTT) / #AT), measured at the end of the fiscal year-end preceding the announcement date. |
| Dividend Paying | A dummy variable equal to one if Compustat Item #DVC exceeds zero at the fiscal-year end preceding the issue date, and zero otherwise. |
| ROA | Earnings before interest and taxes over the fiscal year-end preceding the announcement date (Compustat Item #EBIT) over total assets at the end of the fiscal year-end preceding the announcement date (Compustat Item # AT). |
| Short Interest | The total number of shares lent according to the Dataexplorers database divided by the number of shares outstanding. |
| Beneficial Ownership | The total number of shares held by all beneficial owners according to the Dataexplorers database divided by the total number of shares outstanding. |

| | |
|---|---|
| Lending Fee | Value weighted average fee for all new trades 10 days before the announcement, in basis points per annum as reported in the Dataexplorers database. |
| Number Buyers | The total number of buyers in the private placements is either from the Sagient database, or, if missing, from the registration statements, which we download from SEC Edgar. |
| Hedge Fund Involved | Dummy variable equals 1 if there is at least one hedge fund among the buyers in the private placement, and zero if there is no hedge fund among the buyers in the private placement. |
| Number Hedge Funds | The total number of hedge funds among the buyers in the private placements is either from the Sagient database, or, if missing, from the registration statements, which we download from SEC Edgar. |
| Conversion Premium | The conversion premium is obtained from either SDC or Sagient and is the excess of the conversion price over the stock price at the time of issue expressed as a percentage of the stock price. |
| Delta | Delta is the convertible's dollar sensitivity to small changes in the value of the underlying. It is calculated as $$Delta = e^{-T} N\left\{\frac{\ln(\frac{S}{X}) + (r + \frac{\sigma^2}{2})T}{\sigma\sqrt{T}}\right\}.$$ where N(•) is the cumulative probability under a standard normal distribution; S is the price of the underlying stock measured at day −5 relative to the issue date (from CRSP); X is the conversion price (from SDC or Sagient); r is the yield on a ten-year U.S. Treasury bond (from Datastream), σ is the annualized stock return volatility, and T represents the stated maturity of the convertible as of its issuance date. |
| Years-to-Maturity | Years to maturity is the number of years until the convertible matures at the time of issuance, and is obtained from either SDC or Sagient. |

## Appendix C: Forecasting the Probability of a Private Placement

This table presents the results of a logit regression model, estimating the probability of a private placement of convertible debt or common stock. The sample period is 2006–2010. The dependent variable equals one if the firm privately places a convertible or common stock issue in the subsequent year, and equals zero otherwise, and is thus collected for the period 2007–2011. Firm characteristics are measured at the fiscal year-end. Firm size is the natural logarithm of total assets in millions of dollars (Compustat Item #AT), Turnover is sales (#SALE) divided by assets, Slack is cash and short-term investments (#CHE) over total assets, R&D intensity are R&D expenses (#XRD) over sales, Profitability is #EBIT over total assets, Leverage is book leverage, calculated as (#DLC + #DLTT) / #AT, Patents is intangibles (#INTAN) minus goodwill (#GDWL), divided by total assets, Capital expenditures is #CAPX over total assets, Market-to-book ratio is (#AT - #CEQ + #PRCC_F * #CSHO) / #AT, Tangibility is #PPEGT / #AT, R&D growth is R&D (#XRD) over assets divided by R&D over assets in the prior year, minus one, Sales growth is sales divided by sales in the prior year, minus one, Return volatility is the annualized volatility of monthly stock returns, Stock price run-up is the average monthly stock return in a year, and Number of analysts is the number of analysts providing one-year earnings forecasts, obtained from IBES. We only include firms with all required data in Compustat, CRSP, and IBES. Our regression model includes industry and year dummies. Industry dummies are based on two-digit SIC codes. The number of observations is 7,482.

| | Parameter Estimate | p-value |
|---|---|---|
| Firm Size | –0.136 | 0.00 |
| Turnover | –0.343 | 0.04 |
| Slack | –0.356 | 0.35 |
| R&D Intensity | 0.042 | 0.16 |
| Profitability | –0.917 | 0.00 |
| Leverage | 0.890 | 0.00 |
| Patents | 0.155 | 0.84 |
| Capital Expenditures | 6.244 | 0.00 |
| Market-To-Book Ratio | –0.036 | 0.28 |
| Tangibility | –0.344 | 0.29 |
| R&D Growth | 0.086 | 0.14 |
| Sales Growth | 0.053 | 0.26 |
| Return Volatility | 0.480 | 0.03 |
| Stock Price Run-up | 0.119 | 0.93 |
| Number of Analysts | 0.005 | 0.53 |
| Pseudo Adjusted $R^2$ | 0.094 | |

## Appendix D: Predicting the Announcement Return

This table presents the results of an OLS regression model that generates the predicted announcement returns, used in Table 8. The dependent variable is the announcement return, CAR(0,+1), for common stock PIPE issues. The independent variables are the offering discount (the percentage difference between the stock price on day -1 and the price per share offered to the security buyers) and several variables that have been used to explain the variation across announcement returns for common stock PIPE issues (see Dai, 2007; Brophy, Ouimet and Sialm, 2009; Floros and Sapp, 2012). Firm characteristics are measured at the fiscal year-end in the year preceding the PIPE issue. Leverage is book leverage, calculated as Compustat Items (#DLC + #DLTT) / #AT; Tangibility is #PPEGT / #AT; Proceeds is the natural log of the gross proceeds of the issue, as reported in Sagient; Firm size is the natural log of market capitalization measured 20 days before the announcement; Market-to-book ratio is (#AT - #CEQ + #PRCC_F * #CSHO) / #AT; R&D intensity is R&D expenses (#XRD) over sales (#SALE); Sales proportion is sales (#SALE) divided by total assets (#AT); Dilution is defined as the number of shares issued in the private placement divided by the number of shares outstanding; Earlier PIPE offering is a dummy variable that equals 1 if the issuer was involved in one or more PIPE issues between the date of the observation and the start of the Sagient database in 2000; Number of buyers is the number of buyers involved in the issue; and Number of hedge funds is the number of hedge funds among these buyers. There are 222 observations with information on all variables.

| | Parameter Estimate | p-value |
|---|---|---|
| Offering discount | 0.144 | 0.01 |
| Leverage | 0.017 | 0.59 |
| Tangibility | -0.001 | 0.98 |
| Proceeds | 0.024 | 0.01 |
| Firm Size | -0.242 | 0.03 |
| Market-To-Book Ratio | 0.003 | 0.24 |
| R&D Intensity | 0.002 | 0.21 |
| Sales Proportion | 0.000 | 0.46 |
| Dilution | -0.004 | 0.82 |
| Earlier PIPE Offering | 0.003 | 0.83 |
| Number of Buyers | 0.002 | 0.19 |
| Number of Hedge Funds | -0.007 | 0.00 |
| Adjusted $R^2$ | 0.143 | |