

Shelf versus traditional seasoned equity offerings: the impact of manipulative short selling

Marie Dutordoir

The University of Manchester

Department of Accounting and Finance

marie.dutordoir@mbs.ac.uk

Norman Strong

The University of Manchester

Department of Accounting and Finance

norman.strong@mbs.ac.uk

Ping Sun

The University of Manchester

Department of Accounting and Finance

ping.sun@postgrad.mbs.ac.uk

Abstract

This paper presents evidence that firms take manipulative short selling into account when choosing their SEO offer method. We argue that firms with higher anticipated manipulative short selling prefer shelf to traditional offerings, as shelf issues provide less time for short sellers to set up their positions. As predicted, we find that the probability of using a shelf offering is positively related to manipulative short selling determinants. The impact of manipulative short selling on placement choice weakens after an SEC amendment in 2007 intended to curb manipulative short selling before SEOs. Our findings illustrate how anticipated investor behavior can affect corporate finance decisions.

1. Introduction

In the U.S., firms can register and conduct seasoned equity offerings (SEOs) through traditional or shelf offerings. In a traditional offering, firms file a registration for each security issue. Shelf registration currently allows qualified firms to file one registration every three years, which covers all issues in that period.¹ The introduction of shelf registration by the SEC in 1982 through Rule 415 was unsuccessful initially. Firms still showed a strong preference for traditional offerings in the 1980s (Denis, 1991). Since the early 1990s, however, shelf offerings have grown dramatically in popularity (Autore et al., 2008). Despite the increasing importance of shelf offerings, few studies investigate firms' choice between traditional and shelf offerings.

We test the impact of manipulative short selling on firms' choice of seasoned equity offer method.² Our work draws on Gerard and Nanda's (1993) theory of SEO underpricing. In their model, manipulative short sellers disguise their private information through heavy short selling between the announcement and issue dates of an SEO, thereby reducing the informativeness of the pre-issue order flow and increasing information uncertainty. This strategy of manipulative short selling leads to higher underpricing. Although informed short selling could also take place between SEO announcement and issue dates, Henry and Koski (2010) find that higher levels of short selling between the announcement and the issue dates is associated with larger issue discounts and a post-issue price recovery, confirming that

¹ Firms qualify for shelf registration only if they (i) have not defaulted on dividend payments and indebtedness since the end of the last fiscal year, and (ii) have a public float above a stipulated minimum (Autore et al., 2008). In 2005, the SEC amended the Rule 415 that expanded two-year limitation to three-year. Appendix A, panel A explains this amendment in detail.

² In Gerard and Nanda's (1993) model, manipulative short sellers are also informed traders, but trade against their private information. In this study, following the terminology of Henry and Koski (2010), we use the term "informed short selling" to describe trading by informed short sellers who trade in line with their private information, and "manipulative short selling" to describe trading by informed short sellers who trade against their private information.

manipulative short selling dominates between SEO announcement and issue dates. Therefore, for offerings with less time between announcement and issuance, the impact of manipulative short selling on the offering discounts is likely to be weaker because there is less time for short sellers to set up their positions.

In this study, we focus exclusively on manipulative short selling that take place between the announcement and issue dates. Shelf offerings allow qualified firms to issue securities with little advance notice, because issuers do not need to specify the timing of offerings, the number of shares offered, or the expected use of proceeds under the shelf registration rule. The shorter execution of shelf offerings mainly affects manipulative traders. As the potential manipulative short sellers are generally not aware of a shelf offering until its occurrence, they have little time to set up positions before most shelf SEOs. In contrast, traditional SEOs are typically well-anticipated due to the fact that their announcement and issue dates tend to be several weeks apart, giving manipulative short sellers more time to set up their positions. We therefore predict that firms with higher anticipated manipulative short selling are more likely to opt for a shelf offering instead of a traditional offering, as they want to mitigate the impact of manipulative short sellers' activities on the offering discount.

Using a sample of traditional and shelf U.S. SEOs between 2004 and 2014, we construct a composite index of determinants of short selling based on four variables. We use this short selling determinants index (*SSDI*) in a logistic regression that models a firm's choice between traditional and shelf offerings. Our key findings are as follows. First, when analysed separately, each individual component of the index has the correct sign in support of the hypothesis that firms prefer shelf to traditional offerings if short sellers are more likely to

target their stocks. Second, we find a positive relation between the probability of choosing a shelf offering and the *SSDI*. This result is also economically significant. A one standard deviation increase in the *SSDI* increases the probability of choosing a shelf offering by 6.48%. Our findings thus confirm that shelf offerings appeal most to issuers with high potential manipulative short selling. Furthermore, we find that the likelihood of using accelerated instead of non-accelerated shelf offerings is also positively associated with manipulative short selling, consistent with it being even more difficult to set up short positions before accelerated shelf offerings.

We then examine the impact of a regulatory amendment in October 2007, which strengthened restrictions on manipulative short selling before SEOs, on the relation between manipulative short selling and the choice of offer method.³ Our results show that the impact of manipulative short selling on the decision to use shelf instead of traditional offers weakens after this amendment. This finding suggests that the amendment in 2007 had its intended effect of reducing manipulative short selling before SEOs, and corroborates that firms take manipulative short selling into account when deciding on security offer methods.

We also employ a two-stage model to estimate hypothetical SEO discounts to gain further insight into the question of whether shelf issuers can avoid the costs of manipulative short selling. We find that the hypothetical discounts for shelf issuers if they had opted for a traditional offering instead are higher than their actual discounts. This finding confirms that shelf offerings provide protection from manipulative short selling and result in lower offering discounts.

³ Appendix A, panel B explains the 2007 amendment in detail.

We conduct a number of tests to verify the robustness of our key findings that predicted manipulative short selling affects SEO offering choices. Shelf offerings allow overvalued firms to access the market quickly to exploit windows of opportunity. At the same time, stocks of overvalued firms are more likely to be sold short. As our index capture short selling in the aggregate level, informative short selling may drive our results. We therefore include firm overvaluation measures as control variables to assess this possibility. None of these overvaluation measures is significant or has the correct sign to support the overvaluation explanation. In a further test, we investigate firms that switch offer method during the sample period. This test allows us to assess the possibility that our results are driven by differences in unobservable firm characteristics between shelf and traditional issuers, under the assumption that these unobservable characteristics do not change substantially over time. We find that shelf (traditional) issuers are more likely to switch to traditional (shelf) offerings following decreases (increases) in the *SSDI*, suggesting that our baseline result is not driven by the influence of unobservable firm characteristics. Our final robustness tests uses an alternative measure for predicted manipulative short selling, derived from actual daily short interest data between SEO announcement and issue dates. We find that the counterfactual predicted short interest for shelf issuers is higher than the predicted short interest for traditional issuers, confirming our main result that issuers with higher predicted manipulative short selling are more likely to choose shelf offerings.

Our study extends the literature through three contributions. First, we contribute to the literature on manipulative short selling before SEOs. Previous studies mainly focus on the relation between short selling and SEO discounts (Safieddine and Wilhelm, 1996; Corwin,

2003; Kim and Shin, 2004; Singal and Xu, 2005; Henry and Koski, 2010; Autore, 2011; Autore and Gehy, 2013).⁴ Most related to our study, Henry and Koski (2010) find that higher pre-issue short selling (as measured with daily short selling data in 2005 and 2006) is associated with larger issue discounts for traditional offerings, while there is no such relation for shelf offerings. They suggest that the increasing popularity of shelf offerings may be attributable to the fact that shelf registration allows issuers to avoid the costs of manipulative short selling, but do not formally test this claim. We are the first to statistically test the validity of this conjecture by examining the impact of manipulative short selling determinants on firms' SEO offer choice.

Second, we contribute to literature on the determinants of firms' choice of security offer method. Denis (1991) finds that high volatility firms who face greater under-certification costs are less likely to choose shelf offerings. Opposite to the of Denis' (1991) finding, Autore et al. (2008) find a positive relation between stock volatility and the likelihood of shelf offerings. They claim shelf issuers in the 1990s valued the option associated with shelf registration to delay or abandon the equity issue, explaining the increasing use of shelf offerings in the 1990s. Furthermore, Autore et al. (2008) document that shelf issuers in the 1990s on average had conducted more previous SEOs, and had lower stock run-ups before the announcement. Bethel and Krigman (2008) provide evidence that firms with high levels of asymmetric information experience larger issue discounts if they choose shelf offerings, indicating that the costs of asymmetric information is a determinant of making offering

⁴ Safieddine and Wilhelm (1996) find a reduction in short selling and issue discounts after Rule 10b-21. Corwin (2003), Kim and Shin (2004), and Singal and Xu (2005) find that Rule 10b-21 led to an unintended increase in SEO issue discounts. Henry and Koski (2010) provide evidence of a positive relation between SEO discounts and pre-issue short selling after Rule 105. Autore (2011) finds that a September 2004 amendment had no effect on SEO discounting. Autore and Gehy (2013) find that a 2007 amendment led to an unintended increase in issue discounts of overnight offerings. Appendix A, Panel B explains SEC short sale constraints in detail.

decisions. Gao and Ritter (2010) study the underwriter's role in creating investor demand for stocks and find that firms with more elastic demand curves are more likely to choose accelerated shelf offerings. We find that manipulative short selling has a first-order effect on the choice between shelf and traditional offerings, and conditional on a shelf registration, on the choice between accelerated and ordinary shelf offerings.

Third, on a more general level, we add to several recent studies that examine the impact of short sellers' investment activities on corporate finance decisions. Mitchell et al. (2004) provide evidence of price pressure effects caused by arbitrage-driven short selling around mergers. De Jong et al. (2011) find that convertible bond issuers repurchase their own stocks to facilitate arbitrage-induced short selling. Lamont (2012) documents various mechanisms that firms use to reduce short selling activity (e.g., stock splits, lawsuits). Using a regulatory change that relaxed short sale constraints, Grullon et al. (2015) find that small firms experienced a decline in stock price, and firms react to decreases in stock price by reducing equity issues and investment. We provide evidence that firms adjust their SEO offer method choice to impede short selling, further corroborating the notion that firms consider short selling activity when making financial decisions.

The remainder of the paper continues as follows. Section 2 discusses the relevant theory and constructs hypotheses. Section 3 describes the sample and explains our short selling determinants index. Section 4 presents results on the determinants of the offer method choice. Section 5 examines the effect of the 2007 regulatory change. Section 6 reports the results on offering discounts, while section 7 discusses robustness tests. Section 8 concludes.

2. Theoretical background and testable hypotheses

Several studies show that SEOs are associated with substantial offering discounts (Asquith and Mullins, 1986; Masulis and Korwar, 1986; Altinkiliç and Hansen, 2003). These discounts are considered as a typical component of SEO issuance costs, together with underwriter fees and negative stock price reactions around the offering's announcement date (Autore et al., 2008; Bethel and Krigman, 2008).⁵ Gerard and Nanda (1993) develop a theoretical model showing that SEO offering discounts may be affected by manipulative short selling activity. In their model, the issuer sets the offer price at a discount from the closing price the day before the issue. The discount depends on the informativeness of the secondary market net order flow, with a more informative order flow resulting in lower offer discounts and higher offer prices. Manipulative short selling takes place between SEO announcement and issuance. Short sellers with private opinion that the stock is undervalued trade against their private information for the purpose of diminishing the informativeness of the secondary market net order flow. As a result of their manipulative trading, short sellers are therefore able to purchase the newly issued stock at a discounted price. The greater the offering discount, the higher their profits. A further effect of an increase in the net order flow due to manipulative short selling is to increase the market maker's inventory. This creates downward price pressure and drives down the pre-issue stock price. If market makers rationally anticipate pre-issue short selling, however, manipulative short sellers cannot profit from the impact on the stock price (Kyle, 1985), but only from their impact on the offering discount.

⁵ Autore et al. (2008) find underwriter charge less for shelf issuers with greater equity market experience and these issuers are not significantly penalized by the market, suggesting a cost advantage for shelf issuers that mitigate the under-certification problem. Bethel and Krigman (2008) show that shelf issuers pay lower gross spreads than traditional issuers, but incur higher discounts and more negative market reactions if they have higher level of asymmetric information.

A major feature of shelf offerings is that firms can issue securities with little advance notice of the offering. In contrast, for traditional SEOs, the announcement date is typically several weeks before the issue date. As shelf offerings were not as susceptible to manipulation as traditional offerings, the SEC originally exempted shelf offerings from pre-issue short sale constraints. In September 2004, the SEC removed the shelf exemption with the argument that shelf offerings today are very similar to traditional offerings.⁶ Although potential investors may have notice of a shelf offering before it occurs, the execution of shelf offerings is generally shorter than that of traditional offerings. For example, Henry and Koski (2010) report that, for SEOs between 2005 and 2006, there are on average 6.8 trading days between the announcement and issue dates for shelf offerings, and 29.5 trading days for traditional offerings. Using our sample from 2004 to 2014, the average number of trading days between announcement and issue dates for shelf offerings is 2.9, and is 60.7 for traditional offerings. Given that the interval between announcement and offering is so short for a shelf offering, it is difficult for manipulative short sellers to set up their positions. Moreover, the SEC prohibits the participation in issues of investors who short sell within five days of issuance. In our sample, only 15.13% of shelf offers have more than five trading days between announcement and issuance, suggesting that manipulative traders are unlikely to short before most of shelf offerings.⁷ Thus, firms might choose shelf offerings in order to mitigate the effect of manipulative short sellers' investment activities on their SEO issuance costs. This leads to our first testable hypothesis.

⁶ Appendix A, panel B explains this amendment in 2004 in detail.

⁷ We provide the distribution of number of days between announcement and issuance for shelf and traditional offerings in Figure 1.

Hypothesis 1: Firms with characteristics that are attractive to manipulative short sellers are more likely to choose a shelf over a traditional offering.

In the U.S., shelf SEOs are classified into accelerated and ordinary offerings based on the issuance speed. Over the past decade, accelerated shelf offerings have become common in the U.S. equity market (Bortolotti et al., 2008; Gao and Ritter, 2010). There are two types of accelerated SEOs, bought deals and accelerated bookbuilt offers. For bought deals, investment banks bid for the shares that issuers wish to sell, and the winning bank resells these shares to investors, primarily institutions. This procedure usually takes 24 hours, so that bought deals are also known as overnight offerings. Unlike bought deals, accelerated bookbuilt SEOs are issued in a similar way to fully marketed SEOs, but without road shows. This procedure is typically completed within 48 hours from the SEC filing. As both bought deals and accelerated bookbuilt offers can access the market quicker than ordinary shelf offers, manipulative short sellers are even less likely to set up their positions before accelerated shelf offerings. This leads to our second hypothesis.

Hypothesis 2: Firms with characteristics that are attractive to manipulative short sellers are more likely to choose accelerated over ordinary shelf offerings.

The regulations aimed at restricting manipulative short selling around SEOs have changed over time. On October 9, 2007, the SEC approved an amendment to strengthen Rule 105. Rule 105 allowed short sellers to buy shares in the offering, but not to use them to cover short positions established in the five days before an SEO. Henry and Koski (2010) find substantial abnormal short selling within the restricted period, suggesting that Rule 105 was not effective at curbing manipulative short selling prior to an SEO. Manipulative short sellers

may have been able to use cross-trading strategies to evade Rule 105. For example, a short sale in the restricted period and a nearly simultaneous purchase of shares in the offering would be offset without records of trading on the exchange, and thus not be marked as a violation of Rule 105 (SEC Release No. 34-54888; Autore and Gehy, 2013).

The new rule adopted in October 2007 prohibited anyone who shorted in the five days before the offering from buying shares in the offering, irrespective of the intended purposes of this share purchase. If this amendment effectively curbed manipulative short selling around SEOs, firms would no longer need to protect themselves from short sellers by using shelf offers. Therefore, we expect that, after the implementation of this new rule, the impact of manipulative short selling on offer method choice is less strong.

Hypothesis 3: The impact of manipulative short selling determinants on the offer method choice is weaker after October 9, 2007.

3. Data and SEO sample characteristics

3.1 SEO data

We collect our sample of U.S. common stock seasoned equity offerings from the Securities Data Corporation (SDC) Global New Issues database between September 2004 and December 2014. We begin in September 2004 as the SEC only restricted manipulative short selling before traditional offerings prior to that point. Since September 2004, all SEOs have been subject to Rule 105.⁸ We exclude IPOs, rights offerings, unit issues, closed-end funds, REITs, simultaneous international offerings, offerings by non-U.S. firms, and pure secondary offerings. The issuer's stock must be listed on the New York Stock Exchange (NYSE), NYSE

⁸ Appendix A, panel B explains the amendment in September 2004 in detail.

MKT (previously AMEX), or NASDAQ.⁹ These initial screens provide a sample of 3,035 SEOs, consisting of 696 traditional offers and 2,339 shelf offers.

We then impose the following additional requirements. The sample firms must have at least 30 days of prior return data available from the CRSP database, and company accounts data available from Compustat. According to D'Avolio (2002), stocks with prices under \$5 are impossible to short. Therefore, we exclude traditional SEOs with a stock price the day before the filing date of less than \$5, and shelf SEOs with a stock price the day before the offer date of less than \$5. An issuer must have a pre-filing market capitalization of \$75 million to meet the requirement to file a shelf registration. Hence, we require the issuer to have at least \$75 million in market capitalization two days before the filing date. After imposing these exclusion criteria, the final sample contains 1,697 SEOs with 316 traditional offerings and 1,381 shelf offerings.

In a next step, we identify the announcement and issue date of our sample offerings. For traditional offerings, we use the filing date obtained from SDC as the announcement date, in line with Duca et al. (2012). For shelf offerings, SDC provides the filing date of the original shelf registration, the launch date and the issue date. Autore et al. (2008) find that most shelf filings never lead to an offering. This suggests that shelf registration filing dates are not useful for our research purpose as they bear no strong relation with an actual offering taking place. According to SDC, the launch date is the earliest date on which the actual shelf takedown itself was first filed. Therefore, we use the launch date as the shelf SEO announcement date. We illustrate the timeline of traditional and shelf offerings in Figure 2.

⁹ On October 1, 2008, NYSE Euronext completed the acquisition of American Stock Exchange (AMEX) and renamed AMEX as NYSE Alternext. In March 2009, NYSE Alternext was changed to NYSE AMEX Equities. In May 2012, NYSE AMEX Equities was renamed as NYSE MKT.

Lease et al. (1991) and Saffieddine and Wilhelm (1996) report that issue dates obtained from SDC often do not account for offerings taking place after the close of trading. To identify the appropriate issue date, we therefore apply a volume-based offer date correction in line with Corwin (2003) and Henry and Koski (2010). We assign the issue date as the trading day following the SDC offer date if trading volume on this day is more than twice the volume on the SDC issue date and more than twice the average daily volume during the prior 250 trading days. This correction procedure changes 57.87% of the issue dates obtained from SDC.

3.2 SEO sample characteristics

Table 1 reports the number and total proceeds of traditional and shelf SEOs over 2004–2014. The use of shelf offerings has increased over the sample period. In 2005, shelf offerings accounted for 72% of total SEOs. Over the final five years over the sample period, 2010–2014, 85% of SEOs were shelf offerings. The total amounts of proceeds exhibit a similar trend.

Table 2 reports firm and offer characteristics categorized by offer method. Compared with traditional issuers, shelf issuers are larger based on total book assets and market value of equity. They make larger offers based on offer proceeds, and issue a smaller fraction of secondary shares. Relative offer size for traditional offerings is on average larger than for shelf offerings, suggesting that traditional issuers typically issue a higher fraction of shares. Shelf offering firms have a mean of 3.13 prior SEOs since their IPO, compared to a mean of 2.19 for traditional SEOs. This is consistent with Autore et al.'s (2008) argument that firms have a reduced need for certification later in a sequence of offers. The issue discount is 5.36

for shelf offerings and 8.36 for traditional offerings, and underwriters change less for shelf offerings. Additionally, shelf issuers have lower stock volatility but higher leverage than traditional issuers, which is inconsistent with the findings of Autore et al. (2008), but consistent with Denis' (1991) finding that low-volatility firms face lower under-certification costs and are more likely to choose shelf offerings.

3.3 Determinants of short selling

As outlined earlier, we expect firms that are more attractive to manipulative short sellers to be more likely to opt for a shelf instead of a traditional offering. In a first step, we construct a short selling determinants index (*SSDI*) capturing firms' attractiveness to manipulative short sellers following the methodology of Maskara and Mullineaux (2011). Maskara and Mullineaux (2011) argue that an index-based approach is advisable when measuring multi-faceted constructs such as asymmetric information. Similarly, anticipated manipulative short selling is hard to capture in a single proxy variable, leading us to choose an index approach. However, we also assess the impact of each index component individually in our empirical tests. Our index is based on four variables that the literature identifies as affecting short selling activity, namely institutional ownership, average short interest, put options outstanding, and bid-ask spread. We assign the components equal weights. We now motivate the individual component in more detail.

If a stock's institutional ownership is high, more of its shares are available for lending (D'Avolio, 2002). Thus, short selling activity should be positively related to institutional ownership. We collect institutional holdings data from Thomson Reuters' CDA/Spectrum Institutional (13f) Holdings database and measure institutional ownership (*IO*) as the ratio of

shares held by institutions divided by shares outstanding at the end of the latest quarter before the SEO announcement date. Some firms have more than 100% institutional ownership due to 13f data only including long positions (Lewellen, 2011). If some institutions report their long positions in shorted stocks, the gross number of shares increases. In order to mitigate this issue, we cap IO at one.

The short interest ratio measures short selling activity in the issuer's stock (Graham and Hughen, 2007). If the average short interest ratio of an issuer's stock is high, the issuer's stock is likely to be more attractive to short sellers. Short interest data are from the Compustat Supplemental Short Interest File. Average short interest ($AvSI$) is the average short interest over the three months ending one month before the announcement date divided by shares outstanding on the last trading day of the month before the announcement.

Individual investors who cannot sell short directly in the stock market can take equivalent positions by purchasing put options. As such, their desire to short is transformed into actual short sales by a market professional who faces fewer constraints. Whether a firm has put options outstanding may therefore act as a proxy for investors' desire to short sell the firm's stock (Figlewski and Webb, 1993; Danielson and Sorescu, 2001; Graham and Hughen, 2007). Put options outstanding ($Option$) is a dummy variable equal to one if the issuers' stock has put options outstanding in the three months ending one month before the SEO announcement, and equal to zero otherwise. Daily option trading volume data are from OptionMetrics.

If a stock is more liquid as indicated by a smaller bid-ask spread, short selling increases. Hence, bid-ask spread serve as an inverse measure of manipulative short sellers' potential

interest in the stock. Bid-ask spread (*BAS*) is the average daily bid-ask spread scaled by stock price, over trading days -240 to -40 .

We emphasize that informed and manipulative short selling are not necessary mutually exclusive. Informed short sellers typically target firms perceived to be overvalued based on past returns and fundamental ratios. Accordingly, Desai et al. (2002) find a positive relation between past stock returns and short interest, and Dechow et al. (2001) and Diether et al. (2009) find a positive relation between market to book ratios and short interest. We do not include overvaluation measures such as past stock returns and market to book ratios in our index. The reason is that our index aims to capture anticipated manipulative short selling aimed at obtaining a better price in an SEO, rather than at exploiting stock overvaluation. Although the variables in our index affect short selling in the aggregate level, we do include firm overvaluation proxies as control variables in our analysis to disentangle the effects of manipulative and informative short selling.

To create our short selling determinants index (*SSDI*), we categorize issuers each year into quintiles based on their institutional ownership, average short interest, put options outstanding, and bid-ask spread. We then assign issuers in the quintiles with the highest propensity to be shorted a value of five and issuers in the quintiles with the lowest propensity a value of one. We compute the index for each issuer in an issuing year by taking the average ranking value based on the four measures. A higher index value indicates that short selling of an issuer's stock is higher.

Table 3, panel A reports summary statistics for the four variables comprising the *SSDI*, categorized by the offer method. The first two columns report means and medians for

traditional offerings and the third and fourth columns report means and medians for shelf offerings. The last two columns report p -values for differences in means and medians between traditional and shelf offerings based on standard t -tests and Wilcoxon signed-rank tests. Compared with traditional issuers, shelf issuers have higher institutional ownership, and larger average short interest ratio. Additionally, 76% of shelf issuers have put options traded before the announcement, whereas this proportion is only 49% for traditional issuers. Shelf issuers tend to have smaller bid-ask spreads compared with traditional issuers. All of these univariate results are in line with our expectations. Table 3, panel B reports the mean and median *SSDI* for traditional and shelf offers. The mean for shelf offerings indicates that, as predicted, shelf issuers are more attractive to short sellers than traditional issuers (mean of 3.400 for shelf issuers versus 2.603 for traditional offerings). Differences in means and medians for all four proxies and the index between shelf and traditional offerings are highly significant.

4. Determinants of the offer method choice

To test our first hypothesis, we use a logistic regression to model the determinants of the offer method choice. The dependent variable equals one for shelf offerings and zero for traditional offerings. We first use four individual short selling proxies as explanatory variables to capture their individual effects on firms' offer method choice. We don't include all four proxies in one regression because these proxies are correlated to varying degrees. For example, institutional ownership is positively correlated with average short interest ratio (coefficient = 0.38), and negatively correlated with bid-ask spread (coefficient = -0.47). Including all proxies at once may create a multicollinearity problem. In the second step, we

use *SSDI* as the explanatory variable to measure manipulative short selling. To disentangle the effect of manipulative short selling from firm- and offer-specific characteristics, we include a set of control variables. According to Autore et al. (2008), there is a positive relation between the probability of using shelf offers and firm size. Larger firms are likely to have lower levels of asymmetric information, resulting in a less negative market reaction when using shelf offerings. To capture this effect, we include *LnMV* calculated as the logarithm of the firm's market capitalization the day before the announcement. Issuers may have less need for certification for later seasoned equity issues in a sequence of offerings. Certification from earlier SEOs mitigates the under-certification problem and results in less negative market reactions to shelf issues (Autore et al., 2008). To control for the effect of under-certification, we include the number of seasoned equity offerings since the firm's IPO (*Sequence*). We obtain *Sequence* from the Securities Data Corporation (SDC) Global New Issues database. Firm-specific residual volatility is a further determinant of a firm's offer method choice. Autore et al. (2008) argue that firms value the real option to defer or abandon an equity issue associated with shelf registration. Consistent with the positive relation between option value and volatility, they find that high-volatility firms prefer shelf offerings. To capture this effect, we include *Volatility*, the residual volatility of a market model regression over the 250 trading days before the announcement date.

A potential concern with our results is that overvalued firms are more likely to choose shelf offerings, as shelf issues allow issuers to access the market more quickly and exploit windows of opportunity in the market. At the same time, overvalued firms are more likely to experience informed short selling, which may lead to a spurious association between short

selling determinants and offer choice. To disentangle the effects of manipulative and informative short selling, we include firm overvaluation measures in our regressions as additional control variables. We use three proxies for firm overvaluation: pre-announcement stock price run-up (*Pre-180*), market-to-book ratio (*MTB*), and the fraction of secondary shares (*Secondary*). Issuers with higher stock price run-ups increase the market perception of firm overvaluation (Autore et al., 2008). We include pre-announcement stock price run-up (*Pre-180*) calculated as the 180-day buy-and-hold stock return before the SEO announcement net of the CRSP value-weighted market return. According to Dechow et al. (2001), stocks with high ratios of price relative to fundamentals tend to be overvalued by the market and more attractive to informed short sellers. We include market-to-book ratio (*MTB*), equal to the market value of equity divided by the book value of equity. The market and the book values of equity are from Compustat, and are financial year-end figures for the latest year before the SEO announcement. Finally, Bortolotti et al. (2008) find that SEOs with a higher percentage of secondary shares incur more negative market reactions. The market interprets selling secondary shares as a signal that insiders think the firm is overvalued. Therefore, for offerings with a higher percentage of secondary shares, there is an increased market perception of firm overvaluation. To capture this effect, we include the fraction of secondary shares (*Secondary*).

Table 4 reports the estimates of logistic regressions of SEO offer method choice on four individual variables proxying for manipulative sellers' interest in the issuer's stock. All models include year and industry dummies. Industry dummies are based on the Fama–French 12 classification (Fama and French, 1997). During our sample period, 363 firms conduct more

than one SEO.¹⁰ To account for dependence within firms and produce unbiased estimates, we use standard errors clustered at the firm level. The signs of the coefficients on institutional ownership (*IO*) and average short interest ratio (*AvSI*) are positive. This result is consistent with the prediction that firms with larger institutional ownership and average short interest are more likely to be targeted by short sellers, and therefore tend to choose shelf over traditional offerings. There is also a positive relation between the probability of choosing shelf offerings and *Option*. This supports the prediction that issuers whose stocks have put options outstanding prefer shelf offerings because their stocks are more attractive to short sellers. There is a negative relation between the probability of choosing shelf offerings and *BAS*, indicating that issuers with more liquid stocks are more likely to use shelf offers to impede manipulative short selling. Overall, each component of our index has the correct sign in support of our hypothesis that a higher level of manipulative short selling activity encourages firms to choose a shelf instead of a traditional offering.

For model 1 in Table 5, we replace the four individual short selling determinants by *SSDI*. The coefficient on *SSDI* is positive, consistent with the hypothesis that issuers with higher index values prefer a shelf to a traditional offering. We also report marginal effects to better illustrate the magnitude of each explanatory variable's contribution to the probability of choosing shelf offerings. Holding other variables at their means, the marginal effect is the difference between the two probabilities of choosing a shelf offering when the variable is \pm 0.5 standard deviations from its mean. A one standard deviation increase in *SSDI* increases the

¹⁰ Among these multiple issuers, 102 firms conduct both traditional offerings and shelf offerings.

probability of choosing a shelf offering by 6.48%, which is an economically significant magnitude.

Regarding control variables, the choice of shelf offerings is not related to the number of SEOs since the IPO (*Sequence*), inconsistent with Autore et al.'s (2008) argument that firms have a reduced need for certification later in a sequence of offers. Residual volatility (*Volatility*) has a weak negative effect on the choice of shelf offerings, inconsistent with the findings of Autore et al. (2008), but consistent with Denis' (1991) finding that low-volatility firms face lower under-certification costs and are more likely to choose shelf offerings. This finding suggests that firms with greater pricing uncertainty prefer traditional offerings to satisfy the need for underwriter certification. Neither *Pre-180* nor *MTB* is significant in supporting the argument that shelf offerings are motivated by firm overvaluation. Moreover, a larger fraction of secondary shares (*Secondary*) decreases the probability of using shelf offerings, suggesting that shelf issuers are less likely to be perceived as overvalued. As predicted by H1, issuers prefer shelf to traditional offerings to prevent manipulative short selling, and the firm overvaluation explanation does not hold.

To test our second hypothesis, we examine firms' choice between accelerated and ordinary shelf offerings in model 2, Table 5. Accelerated shelf offerings include bought deals and accelerated bookbuilt offerings. The SDC labels bought deals as 'block trades'. Accelerated bookbuilt offerings are always completed within three days from filing with the SEC (Gao and Ritter, 2010). We therefore identify a shelf offering as an accelerated bookbuilt offering if the number of days between the SEC filing date and the issue date is less than or equal to three. The dependent variable in model 2 equals one if shelf offerings are either

bought deals or accelerated bookbuilt offerings, and zero for ordinary shelf offerings. The explanatory variable of interest is *SSDI*. As predicted by H2, the coefficient on *SSDI* is positive ($t = 4.32$), indicating that the likelihood of choosing an accelerated shelf offering increases if issuers have a higher value of the short selling index. The probability of choosing accelerated shelf offerings increases by 6.00% when the *SSDI* increases by one standard deviation.

5. Regulation change in 2007

We next turn our attention to the 2007 SEC regulatory change, which tightened Rule 105 by prohibiting anyone who shorted in the five days before the offering from buying shares in the offering. If this amendment was effective in curbing manipulative short selling, issuers would be less concerned about manipulative short selling when making offering decisions. To test this hypothesis (H3), we add a dummy variable (*Rule2007*) that equals one if the offering takes place after the implementation of the amendment, and an interaction of *SSDI* with *Rule2007* to our benchmark model. Table 6 presents the logistic estimates and the two marginal effects to show the differential impact of the amendment. The first marginal effect is calculated when *Rule2007* equals zero, the second when *Rule2007* equals one. The coefficient of *SSDI* is positive, indicating that manipulative short selling played an important role in the offer method choice before the amendment. The sign of the interaction term is negative, indicating that the impact of *SSDI* on the probability of using shelf offers fell after October 9, 2007. Before the amendment, a one standard deviation increase in the index value increases the probability of choosing shelf offerings by 9.39%. The marginal effect decreases to 3.61% after the amendment, suggesting that the amendment reduced the impact of manipulative

short selling on the choice of shelf offerings by 5.78%. This finding is consistent with our prediction that the impact of manipulative short selling weakened after October 9, 2007.

The SEC reacted to the recent financial crisis by imposing temporary and permanent bans on short selling. Effective on July 21st of 2008, the SEC adopted a temporary emergency order prohibiting naked short selling of 19 financial stocks (SEC Release No. 34-58166).¹¹ The regulation aimed at curbing naked short selling that led to excessive downward price pressure and substantial disruption in the securities markets. On October 17th of 2008, the SEC adopted a permanent rule banning naked short selling (SEC Release No. 34-58774). We do not believe these temporary and permanent short selling bans drive our results. According to Gerard and Nanda's (1993) model, manipulative short sellers only profit from their impact on the offering discount, not from a fall in the pre-issue stock price. Therefore, we predict that manipulative short selling does not affect the offer method choice via its effect on pre-issue stock price. To test this prediction, we include a price elasticity measure ($\ln A1$) following Gao and Ritter (2010), and an interaction of *SSDI* with $\ln A1$ to our benchmark model. $A1$ is the average daily inverse elasticity over the 250 trading days ending one day before the announcement date. Daily inverse elasticity is measured as the absolute value of the stock return divided by turnover. The larger is $A1$, the less elastic is the demand curve. In line with Gao and Ritter (2010), we apply a log transformation of $A1$ to reduce the influence of extreme values. Table 7 reports the regression results. The results indicate that shelf offers are positively associated with *SSDI* after controlling for price elasticity. $\ln A1$ has no effect on the likelihood of choosing shelf offerings. The interaction of *SSDI* with $\ln A1$ is insignificant, supporting the

¹¹ On September 18th of 2008, the SEC extended July Emergency Order, banning naked short selling of over 1,000 financial stocks; See SEC Release No. 34-58592.

prediction that manipulative short selling does not affect the offer method choice via its effect on the pre-issue stock price.

6. Offering discounts

Firms care about manipulative short selling because it results in a larger offering discount, and fewer gross proceeds. Henry and Koski (2010) find that shelf offerings provide protection from manipulative short selling, resulting in lower discounts. Therefore, we expect that the hypothetical discounts for shelf issuers if they had opted for a traditional offering instead are higher than their actual discounts. The model we use is a generalization of the two-stage model to control for the potential selection bias in the offer method choice, but with two discount equations in the second stage (Lee, 1978; Fang, 2005; Reisel, 2014). The first-stage is estimated as Model 1 in Table 5. In the second stage, we capture various firm- and offer-specific characteristics that are known to influence SEO discounts, including *LnMV* (Altinkilic and Hensen, 2003), *Volatility* (Corwin, 2003; Henry and Koski, 2010; Autore, 2011), relative offer size (Henry and Koski, 2010; Autore, 2011), a dummy variable for NASDAQ, and the use of integer pricing (Mola and Loughran, 2004; Henry and Koski, 2010; Autore, 2011).¹² We also include the inverse mills ratio (*lamda*) calculated from the first stage.¹³ We then use the coefficients from the second stage to estimate the hypothetical discounts for shelf issuers conditional on a traditional offering being selected.

Table 8, Panel A presents the estimation results for the two second-stage discount equations, one for the shelf offerings and the other for the traditional offerings. For shelf

¹² Appendix B explains definitions of these control variables in details.

¹³ The inverse mills ratio equals to $\phi(\gamma\mathbf{Z}_i)/\Phi(\gamma\mathbf{Z}_i)$ for shelf SEO discount equation, and $-\phi(\gamma\mathbf{Z}_i)/[1-\Phi(\gamma\mathbf{Z}_i)]$ for traditional SEO discount equation. \mathbf{Z}_i and γ represent the independent variables and coefficients estimated from Model 1 in Table 5. ϕ and Φ are the density and cumulative distribution functions of the normal distribution.

offerings, SEO discount is positively related to relative offer size, suggesting that the cost of placement pressure increases when more capital is needed relative to issuer size. This is likely because shelf issuers receive fewer marketing efforts from. For traditional offerings, SEO discount is negatively related to $\text{Ln}MV$, indicating that offering discount decreases with greater information asymmetry. Overall, these findings are consistent with prior studies.

Panel B compares the means of the actual discounts with their hypothetical counterparts for shelf issuers. For shelf offerings, the mean actual discounts is 5.36%, while mean hypothetical discount that the same issue would obtained using a traditional offering is 8.51%. According to a t -test, the difference is highly significant. This result suggests that the shelf issuers would have had higher offering discounts if they had chosen traditional offerings. The findings support the argument that shelf offerings protect against exacerbated issue discounts caused by manipulative short selling.

7. Robustness tests

7.1 Switching issuers

Our dataset contains many firms that conduct both shelf and traditional SEOs. Examining these switching issuers allows us to keep observable and unobservable firm characteristics more or less constant.¹⁴ We use logistic regressions to compare shelf issuers that switch to traditional offerings and traditional issuers that switch to shelf offerings. Table 9 reports the logistic estimates and marginal effects of these regressions. In model 1, the dependent variable equals one for shelf issuers that switch to traditional offerings and zero for those do not change the offer method. In model 2, the dependent variable equals one for

¹⁴ Clearly, this rests on an assumption that firm characteristics remain reasonably constant between switches.

traditional issuers that switch to shelf offerings and zero for those that do not switch. All independent variables represent changes from their values at the time of the prior issue. The change in the short selling determinants index ($\Delta SSDI$) is negative ($t = -2.33$) in model 1, indicating that shelf issuers with decreases in manipulative short selling since their previous SEO are more likely to switch to traditional offerings. The probability of switching to traditional offerings increases by 18.64% when the index value falls by one standard deviation. In model 2, $\Delta SSDI$ is positive ($t = 2.86$) and a one standard deviation increase in $SSDI$ increases the probability of switching to shelf offerings by 12.20%. Together, these results indicate that unobservable firm characteristics do not drive our findings.

7.2 Predicted short interest

To verify the credibility of our baseline results, we conduct an analysis based on actual short interest data rather than hypothesized short selling determinants. Henry and Koski (2010) show the importance of daily short interest data, and find no evidence of manipulative short selling before SEOs using monthly short interest data. To avoid the lower power of monthly short interest data, we collect daily short-sale data from TAQ Reg SHO (NYSE Short Sales) for the period January 1, 2005, through June 6, 2007, and from NASDAQ for the period August 3, 2009, through July 30, 2010.

In particular, we model abnormal short interest of traditional offerings as a function of four components (IO , $AvSI$, $Option$, and BAS) of our short selling index. We define abnormal short interest as the change in short interest from the day before announcement to the day before the offer, scaled by shares outstanding one month before the SEO issue date. We then use the coefficients from this regression to estimate predicted abnormal short interest for shelf

issuers if they had opted for a traditional offering instead. We expect shelf issuers to have higher predicted abnormal short interest than traditional issuers.

Table 10, panel A reports the results of regressing abnormal short interest of traditional issuers on potential determinants. In line with expectation, institutional ownership (*IO*) and average short interest ratio (*AvSI*) positively affect the short interest between SEO announcement and issuance. Put option dummy (*Option*) and bid-ask spread (*BAS*) are not significant. Our model has a high explanatory power (Adjusted $R^2 = 30\%$, F -statistic = 2.37). We use the coefficients of this regression to calculate the counterfactual predicted abnormal short interest for shelf issuers had they made traditional offerings instead. Panel B presents the mean and median predicted abnormal short interest for traditional offerings and counterfactual predicted abnormal short interest for shelf offerings. For traditional offerings, mean (median) predicted short interest before the issue date is 0.004 (0.003), while mean (median) counterfactual predicted short interest for shelf offerings is 0.005 (0.004). According to a t -test and a Wilcoxon signed-rank test, the differences are significant at 1%. The results suggest that shelf issuers would have had higher predicted abnormal short interest than traditional issuers if they had chosen traditional offerings, consistent with the argument that issuers with higher predicted abnormal short selling before issue dates are more likely to choose shelf offerings.

8. Conclusions

This paper examines the impact of manipulative short selling on firms' choice of SEO offer method. In the model of Gerard and Nanda (1993), manipulative short sellers conceal their private information through heavy short selling between the announcement and issuance

of an SEO, thereby reducing the informativeness of the pre-issue order flow and increasing offering discounts. For offerings with less time between the announcement and issuance, the impact of manipulative short selling on offering discounts is weaker because there is less time for short sellers to set up short positions. Shelf offerings allow qualified firms to issue securities with little advance notice of the offering. This feature makes it difficult for short sellers to set up their positions before shelf offerings, as the time between announcement and issuance is so short. In contrast, announcement and issue dates for SEOs tend to be several weeks apart. We argue that firms with high anticipated manipulative short selling are therefore more likely to choose shelf over traditional offerings, as these firms are likely to be most concerned about the impact of short sellers on their offering discounts.

To test this prediction, we analyze the relation between manipulative short selling and the choice of offer method. We find that firms whose stocks are likely to be more attractive to manipulative short sellers are more likely to choose shelf offers to protect themselves against manipulative short selling. This result is also economically significant. Furthermore, we find that firms likely to appeal more to manipulative short sellers are more likely to use an accelerated than an ordinary shelf offer. After controlling for firm overvaluation measures, our results hold, suggesting that overvaluation do not drive our findings.

We then examine a 2007 SEC rule designed to reinforce short sale constraints before SEOs. After the implementation of this rule, we find a weaker impact of manipulative short selling on offer method choice. The result indicates that the 2007 amendment appears to have been effective in curbing manipulative short selling.

We also estimate the hypothetical offering discounts for shelf issuers if had chosen traditional offerings instead. Compared with their actual discounts, we find higher hypothetical discounts for shelf issuers if had chosen traditional offerings. This finding confirms that shelf offerings provide protection from manipulative short selling and results in lower issue discounts.

Our main results survive a series of robustness checks. The results of these tests suggest that unobservable firm characteristics do not drive our findings, and that our results hold for an alternative measure of short selling based on actual daily short interest data rather than hypothesized short selling determinants.

Overall, we conclude that manipulative short selling has a first-order effect on the choice between shelf and traditional offerings, and on the choice between accelerated and ordinary shelf offerings. Given the increasing importance of shelf offerings, our results provide new insights on firms' choice of security offer method. Our findings are not mutually exclusive with other determinants such as firm volatility and information asymmetry identified in prior studies. Issuers balance the gain from avoiding manipulative short selling with costs associated with under-certification and information asymmetry. Other determinants help explain why the use of shelf offerings continues growing after more restrictive short sale regulations, and why some shelf-eligible firms still choose traditional offerings.

References

- Altinkiliç, O. and Hansen, R.S. 2003. Discounting and Underpricing in Seasoned Equity Offers. *Journal of Financial Economics* 69, 285–323.
- Asquith, R. and Mullins, D. 1986. Equity Issues and Offering Dilution. *Journal of Financial Economics* 15, 61–89.
- Autore, D.M. 2011. Does Rule 10b-21 increase SEO discounting? *Journal of Financial Intermediation* 20, 231–247.
- Autore, D.M. and Gehy, D. 2013. Changing the rules again: Short selling in connection with public equity offers. *Journal of Banking and Finance* 37, 1974–1985.
- Autore, D.M., Kumar, R. and Shome, D.K. 2008. The revival of shelf-registered corporate equity offerings. *Journal of Corporate Finance* 14, 32–50.
- Bethel, J.E. and Krigman, L. 2008. Managing the costs of issuing common equity: the role of registration choice. *Quarterly Journal of Finance and Accounting* 47, 57–85.
- Bortolotti, B., Megginson, W. and Smart, S. 2008. The rise of accelerated seasoned equity underwritings. *Journal of Applied Corporate Finance* 20, 35–57.
- Corwin, S.A. 2003. The determinants of underpricing for seasoned equity offers. *Journal of Finance* 58, 2249–2279.
- Danielson, B.R. and Sorescu, S.M. 2001. Why do option introductions depress stock prices? A study of diminishing short-sale constraints. *The Journal of Financial and Quantitative Analysis* 36, 451–484.
- D’Avolio, G. 2002. The market for borrowing stock. *Journal of Financial Economics* 66, 271–306.
- Dechow, P., Hutton, A., Meulbroek, L. and Sloan, R. 2001. Short-sellers, fundamental analysis and stock returns. *Journal of Financial Economics* 61, 77–106.
- De Jong, A., Dutordoir, M. and Verwijmeren, P. 2011. Why do convertible issuers simultaneously repurchase stock? An arbitrage-based explanation. *Journal of Financial Economics* 100, 113–129.
- Denis, D.J. 1991. Shelf registration and the market for seasoned equity offerings. *Journal of Business* 64, 189–212.
- Desai, H., Ramesh, K., Thiagarajan, S.R. and Balachandran, B.V. 2002. An investigation of the informational role of short interest in the Nasdaq market. *Journal of Finance* 57, 2263–2287.
- Diether, K.B., Lee, K.H. and Werner, I.M. 2009. Short sale strategies and return predictability. *Review of Financial Studies* 22, 575–607.
- Duca, E., Dutordoir, M., Veld, C. and Verwijmeren, P. 2012. Why are convertible bond announcements associated with increasingly negative issuer stock returns? An arbitrage-based explanation. *Journal of Banking and Finance* 36, 2884–2899.

- Fama, E.F. and French, K.R. 1997. Industry costs of equity. *Journal of Financial Economics* 43, 153–193.
- Fang, L.H. 2005. Investment bank reputation and the price and quality of underwriting services. *The Journal of Finance* 60, 2729–2761.
- Figlewski, S. and Webb, G.P. 1993. Options, short sales, and market completeness. *Journal of Finance* 48, 761–777.
- Gao, X. and Ritter, J.R. 2010. The marketing of seasoned equity offerings. *Journal of Financial Economics* 97, 33–52.
- Gerard, B. and Nanda, V. 1993. Trading and manipulation around seasoned equity offerings. *Journal of Finance* 48, 213–245.
- Graham, J.E. and Hughen, J.C. 2007. Ownership structure, expectations, and short sales on the Nasdaq. *Journal of Economics and Finance* 31, 33–48.
- Grullon, G., Michenaud, S. and Weston, J.P. 2015. The real effects of short-selling constraints. *Review of Financial Studies* 28, 1737–1767.
- Guo, S. and Fraser, M.W. 2014. *Propensity score analysis: Statistical methods and applications*. Sage Publications.
- Henry, T.R. and Koski, J.L. 2010. Short selling around seasoned equity offerings. *Review of Financial Studies* 23, 4389–4418.
- Kim, K. and Shin, H. 2004. The puzzling increase in the underpricing of seasoned equity offerings. *Financial Review* 39, 343–65.
- Kyle, A.S. 1985. Continuous Auctions and Insider Trading. *Econometrica* 53, 1315–35.
- Lamont, O.A. 2012. Go down fighting: short sellers vs. firms. *Review of Asset Pricing Studies* 2, 1–30.
- Lease, R.C., Masulis, R.W. and Page, J.R. 1991. An investigation of market microstructure impacts on event study returns. *Journal of Finance* 46, 1523–1536.
- Lee, L.F. 1978. Unionism and wage rates: a simultaneous equations model with qualitative and limited dependent variables. *International Economic Review* 19, 415–433.
- Lewellen, J. 2011. Institutional investors and the limits of arbitrage. *Journal of Financial Economics* 102, 62–80.
- Maskara, P.K. and Mullineaux, D.J. 2011. Information asymmetry and self-selection bias in bank loan announcement studies. *Journal of Financial Economics* 101, 684–694.
- Masulis, R.W. and Korwar, A.N. 1986. Seasoned Equity Offerings: An Empirical Investigation. *Journal of Financial Economics* 15, 91–118.
- Mitchell, M., Pulvino, T and Stafford, E. 2004. Price Pressure around mergers. *Journal of Finance* 59, 31–63.
- Mola, S. and Loughran, T. 2004. Discounting and clustering in seasoned equity offering prices. *Journal of Financial and Quantitative Analysis* 39, 1–23.
- Reisel, N. 2014. On the value of restrictive covenants: empirical investigation of public bond issues. *Journal of Corporate Finance* 27, 251–268.

- Ritter, J. 2003. Investment Banking and Securities Issuance. In Constantinides, G.M., Harris, M. and Stulz R. (Eds.). Handbook of Economics of Finance. Amsterdam, Netherlands: North Holland.
- Rubin, D.B. 2001. Using propensity scores to help design observational studies: application to the tobacco litigation. Health Services and Outcomes Research Methodology 2, 169–188.
- Safieddine, A. and Wilhelm, W.J. 1996. An empirical investigation of short-selling activity prior to seasoned equity offerings. Journal of Finance 51, 729–749.
- Singal, V. and Xu, L. 2005. Do short sellers know more? Evidence from a natural experiment. Working Paper: Virginia Polytechnic Institute and State University.

Figure 1 Distribution of number of days between announcement and issuance for shelf and traditional offerings

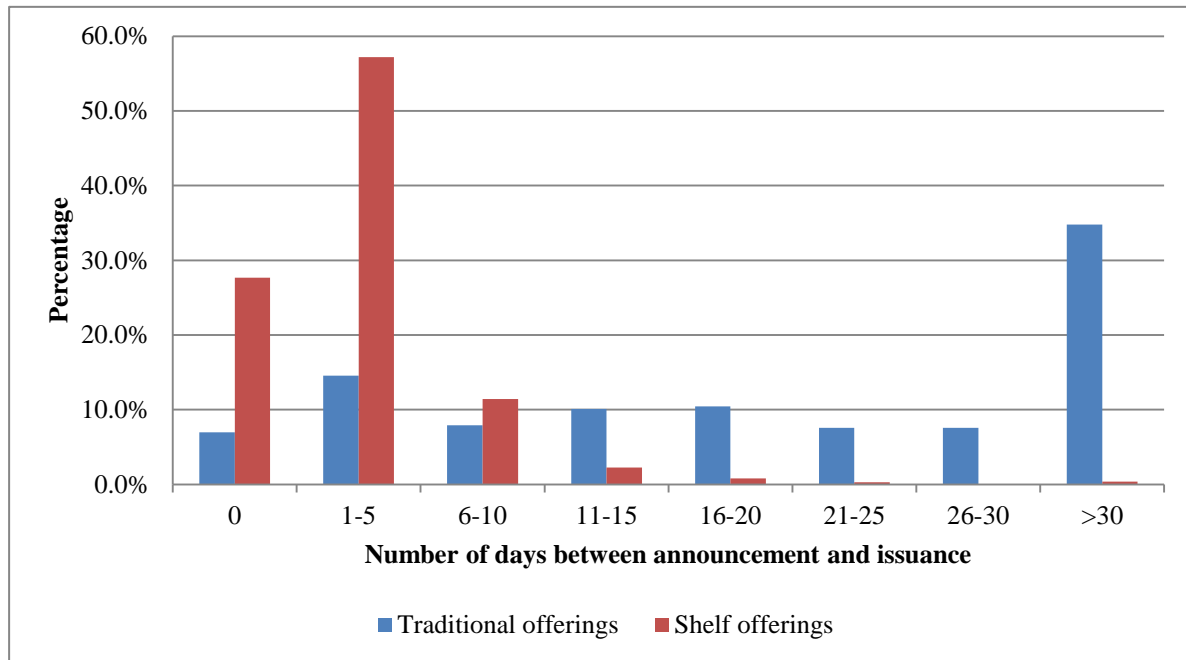


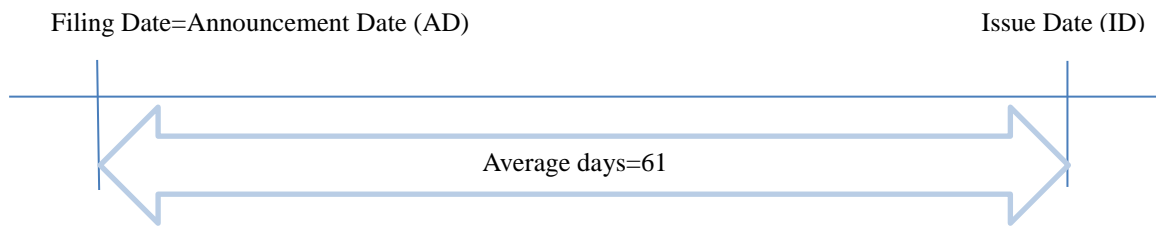
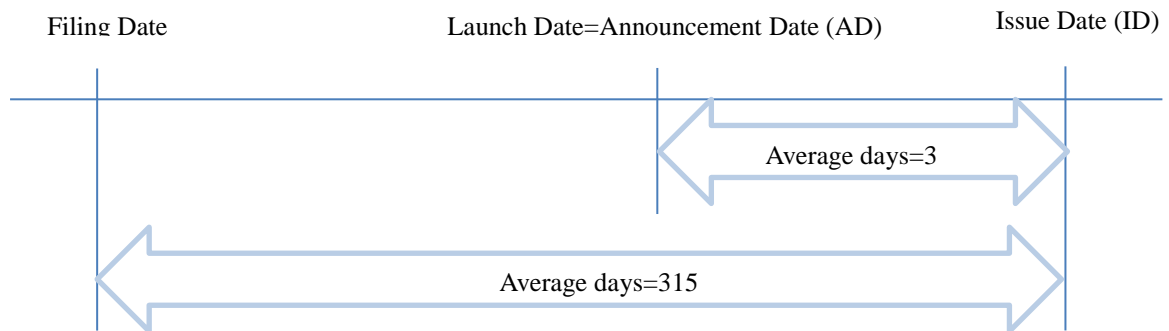
Figure 2 Timeline of traditional and shelf offerings**Traditional offerings****Shelf offerings**

Table 1**Sample summary statistics**

This table gives the total number proceeds by year for all sample seasoned equity offerings. The sample includes 1,697 seasoned equity offerings in the SDC database from September 2004 to December 2014, comprising 316 traditional offerings and 1,381 shelf offerings. The issuer must be a U.S.-based company listed on the New York Stock Exchange (NYSE), NYSE MKT or NASDAQ. We exclude IPOs, rights offerings, unit issues, closed-end funds, REITs, simultaneous international offerings, offerings by non-U.S. firms and pure secondary offerings. The issuer must have more than a \$75 million market capitalization before the offer. The issuing firm must be present on the University of Chicago Center for Research in Security Prices database.

Year	Sample SEOs		Traditional offerings		Shelf offerings	
	Number	Total proceeds (\$ million)	Number	Total proceeds (\$ million)	Number	Total proceeds (\$ million)
2004	58	7,878.4	15	1,518.7	43	6,359.7
2005	144	18,590.8	41	3,346.1	103	15,244.7
2006	151	21,425.8	47	4,936.1	104	16,489.7
2007	131	23,975.4	36	5,005.1	95	18,970.3
2008	112	79,322.4	21	3,896.8	91	75,425.6
2009	281	104,342.5	47	24,588.9	234	79,753.6
2010	183	36,689.7	20	4,089.7	163	32,600.0
2011	118	39,893.4	24	2,678.6	94	37,214.8
2012	149	20,572.3	8	680.1	141	19,892.2
2013	195	30,929.3	24	3,503.5	171	27,425.8
2014	175	29,341.9	33	5,031.0	142	24,310.9
Total	1,697	412,961.9	316	59,274.6	1,381	353,687.3

Table 2**Firm and offer characteristics**

This table reports the mean and median values of various firm and offering characteristics for our sample. The sample includes 1,697 seasoned equity offerings in the SDC database from September 2004 to December 2014, comprising 316 traditional and 1,381 shelf offerings. Total assets are total book assets (in \$ millions) at the fiscal year end before the offer announcement. Market value of equity (in \$ millions) is the stock price on the last day before the offer announcement multiplied by the number of shares outstanding. Proceeds is the total amount raised (in \$ millions). Fraction of secondary shares equals secondary shares divided by the total number of shares offered. Relative offer size equals offered shares divided by shares outstanding before the issue. Number of SEOs since IPO is the number of seasoned equity offerings since the firm's IPO. Offering discount is the logarithm of the ratio of the pre-offer-day closing price to the offer price. Gross spread is the ratio of gross spread (management fee and underwriter fee) to the total proceeds of the offer. Residual volatility is calculated from the market model over the 250 trading days before the announcement date. Leverage is the ratio of long-term debt to total book assets at the fiscal year end before the announcement of the offer. *p*-values for differences in means and medians between shelf and traditional offerings are based on standard *t*-tests and Wilcoxon signed-rank tests.

	Traditional offerings		Shelf offerings		Differences	
	Mean	Median	Mean	Median	Mean	Median
					<i>p</i> -value	<i>p</i> -value
Total assets (\$ m)	11,014.70	263.48	17,372.38	643.24	0.383	0.000
Market value of equity (\$ m)	1,492.32	533.26	3,187.45	727.13	0.016	0.000
Proceeds (\$ m)	187.58	81.20	256.11	90.00	0.178	0.072
Fraction of secondary shares	0.19	0.00	0.04	0.00	0.000	0.000
Relative offer size	0.20	0.17	0.16	0.13	0.000	0.000
Number of SEOs since IPO	2.19	1.00	3.13	2.00	0.000	0.000
Offering discount (%)	8.36	5.73	5.36	3.22	0.004	0.000
Gross spread (%)	5.05	5.00	4.58	4.99	0.000	0.000
Residual volatility (%)	3.23	2.98	3.14	2.73	0.450	0.004
Leverage	0.15	0.08	0.23	0.18	0.000	0.000

Table 3**Summary statistics of the manipulative short selling determinants**

This table reports the mean and median of individual proxies that affect short selling activity and the short selling determinants index. The sample includes 1,697 seasoned equity offerings in the SDC database from September 2004 to December 2014, comprising 316 traditional offerings and 1,381 shelf offerings. Panel A lists means and medians of variables hypothesized to affect manipulative short selling activity. Panel B reports the manipulative short selling determinants index value. *IO* is the ratio of shares held by institutions divided by shares outstanding at the end of the latest quarter before the SEO announcement date. *AvSI* is the average short interest in the three months ending one month before the announcement date divided by shares outstanding on the last trading day of the month before the announcement. *Option* is a dummy variable equal to one if the issuers' stock has put options outstanding in the three months ending one month before the SEO announcement date, and zero otherwise. *BAS* is the average daily bid-ask spread, scaled by stock price over trading days -240 to -40 . *SSDI* is the average quintile ranking of an issue based on four measures of manipulative short selling (*IO*, *AvSI*, *Option*, and *BAS*). *p*-values for differences in means and medians between shelf and traditional offers are based on standard *t*-tests and Wilcoxon signed-rank tests.

	Traditional offerings		Shelf offerings		Differences	
	Mean	Median	Mean	Median	Mean <i>p</i> -value	Median <i>p</i> -value
Panel A: Individual measures						
<i>IO</i>	0.483	0.434	0.604	0.629	0.000	0.000
<i>AvSI</i>	0.046	0.026	0.071	0.050	0.000	0.000
<i>Option</i>	0.491	0.000	0.759	1.000	0.000	0.000
<i>BAS</i>	0.580	0.351	0.337	0.188	0.000	0.000
Panel B: Index						
<i>SSDI</i>	2.603	2.500	3.400	3.750	0.000	0.000
<i>N</i>	316	316	1,381	1,381		

Table 4
Logistic regression results for the choice of offer method

This table presents the estimates of regressions that model the determinants of the offer method choice. The sample period is from September 2004 to December 2014. The dependent variable is the offer method, equal to one for shelf offerings and zero for traditional offerings. Four variables proxying manipulative short selling are explanatory variables in each model. *IO* is the ratio of shares held by institutions divided by shares outstanding at the end of the latest quarter before the SEO announcement date. *AvSI* is the average short interest in the three months ending one month before the announcement date divided by shares outstanding on the last trading day of the month before the announcement. *Option* equals one if the issuers' stock has put options outstanding in the three months ending one month before the SEO announcement date, and zero otherwise. *BAS* is the average daily bid-ask spread, scaled by the stock price over trading days -240 to -40 . *LnMV* is the logarithm of the firm's market capitalization the day before the announcement. *Sequence* is the number of SEOs since IPO. *Volatility* is the residual volatility of a market model regression over the 250 trading days before the announcement. *Pre-180* is the 180-day buy-and-hold stock return before the SEO announcement net of the CRSP value-weighted market return. *MTB* is the market value of equity divided by the book value of equity, measured at the financial year-end for the latest year before the SEO announcement. *Secondary* is the ratio of the number of secondary shares divided by total shares offered. *t*-statistics are in parentheses. Pseudo *R*-sqr is the likelihood-based pseudo *R*-square. *N* is the number of observations.

*, **, *** indicate significance at 10%, 5%, and 1%

	1	2	3	4
<i>IO</i>	1.36*** (3.84)			
<i>AvSI</i>		5.47*** (3.26)		
<i>Option</i>			0.81*** (4.56)	
<i>BAS</i>				-0.68*** (-3.77)
<i>LnMV</i>	0.08 (1.15)	0.17*** (2.73)	0.06 (0.92)	0.05 (0.77)
<i>Sequence</i>	0.08 (1.62)	0.07 (1.33)	0.05 (1.06)	0.06 (1.25)
<i>Volatility</i>	-0.05 (-1.06)	-0.09* (-1.90)	-0.07* (-1.67)	-0.02 (-0.54)
<i>Pre-180</i>	0.05 (0.88)	0.06 (0.99)	0.04 (0.77)	0.09 (1.30)
<i>MTB</i>	-0.00 (-0.19)	-0.00 (-1.00)	-0.00 (-0.26)	-0.00 (-0.67)
<i>Secondary</i>	-2.21*** (-6.76)	-2.27*** (-6.93)	-2.28*** (-6.86)	-2.43*** (-7.49)
Pseudo <i>R</i> -sqr	0.15	0.15	0.15	0.15
<i>N</i>	1,697	1,697	1,697	1,697

Table 5**Logistic regression results for the choice of offer method**

This table presents the estimates and marginal effects of regressions that model the determinants of the offer method choice. The marginal effect is the difference in the two probabilities when we increase and decrease a variable's value by 0.5 standard deviations from the mean and hold the other variables at their mean levels. In model 1, the dependent variable equals one for shelf offers and zero for traditional offers. In model 2, the dependent variable equals one for accelerated shelf offers and zero for normal shelf offers. *SSDI* is the average quintile ranking of an issue based on four measures of manipulative short selling (*IO*, *AvSI*, *Option*, and *BAS*). *LnMV* is the logarithm of the firm's market capitalization the day before the announcement. *Sequence* is the number of SEOs since IPO. *Volatility* is the residual volatility of a market model regression over the 250 trading days before the announcement. *Pre-180* is the 180-day buy-and-hold stock return before the SEO announcement net of the CRSP value-weighted market return. *MTB* is the market value of equity divided by the book value of equity, measured at the financial year-end for the latest year before the SEO announcement. *Secondary* is the ratio of the number of secondary shares divided by total shares offered. *t*-statistics are in parentheses. Pseudo *R*-sqr is the likelihood-based pseudo *R*-square. *N* is the number of observations.

*, **, *** indicate significance at 10%, 5%, and 1%

	1		2	
	Estimates	Marginal Effect (%)	Estimates	Marginal Effect (%)
<i>SSDI</i>	0.52*** (5.90)	6.48	0.50*** (4.32)	6.00
<i>LnMV</i>	-0.08 (-1.10)	-0.96	0.34*** (4.97)	4.02
<i>Sequence</i>	0.03 (0.72)	0.39	0.03 (1.06)	0.38
<i>Volatility</i>	-0.06 (-1.35)	-0.74	0.00 (0.06)	0.03
<i>Pre-180</i>	0.08 (1.21)	0.97	-0.02 (-0.49)	-0.26
<i>MTB</i>	-0.00 (-0.29)	-0.01	0.00 (0.98)	0.03
<i>Secondary</i>	-1.90*** (-5.77)	-23.66	-0.47 (-0.64)	-5.64
Pseudo <i>R</i> -sqr	0.16		0.12	
<i>N</i>	1,697		1,374	

Table 6**Logistic regression results for the choice of offer method after the regulatory change in 2007**

This table presents the logistic estimates and the two marginal effects to show the differential impact of 2007 amendment. The dependent variable is the offer method, equal to one for shelf offerings and zero for traditional offerings. *SSDI* is the average quintile ranking of an issue based on four measures of manipulative short selling (*IO*, *AvSI*, *Option*, and *BAS*). *LnMV* is the logarithm of the firm's market capitalization the day before the announcement. *Sequence* is the number of SEOs since IPO. *Volatility* is the residual volatility of a market model regression over the 250 trading days before the announcement. *Pre-180* is the 180-day buy-and-hold stock return before the SEO announcement net of the CRSP value-weighted market return. *MTB* is the market value of equity divided by the book value of equity, measured at the financial year-end for the latest year before the SEO announcement. *Secondary* is the ratio of the number of secondary shares divided by total shares offered. *Rule2007* equals one if the offering takes place after the implementation of the 2007 SEC regulatory amendment. *t*-statistics are in parentheses. Pseudo *R*-sqr is the likelihood-based pseudo *R*-square. *N* is the number of observations.

*, **, *** indicate significance at 10%, 5%, and 1%

	Estimates	Marginal effects (%)	
		<i>Rule2007</i> = 0	<i>Rule2007</i> = 1
<i>SSDI</i>	0.93*** (7.08)	9.39	3.61
<i>LnMV</i>	-0.05 (-0.63)	-0.46	-0.59
<i>Sequence</i>	0.04 (0.87)	0.40	0.51
<i>Volatility</i>	-0.05 (-1.17)	-0.52	-0.66
<i>Pre-180</i>	0.07 (1.14)	0.69	0.89
<i>MTB</i>	-0.00 (-0.35)	-0.01	-0.01
<i>Secondary</i>	-1.87*** (-5.58)	-18.89	-24.32
<i>Rule2007</i>	1.77** (2.54)		
<i>SSDI</i> × <i>Rule2007</i>	-0.65*** (-4.56)		
Pseudo <i>R</i> -sqr	0.18		
<i>N</i>	1,697		

Table 7**Logistic regression results for the choice of offer method**

This table presents the estimates of regressions that model the determinants of the offer method choice. The dependent variable equals one for shelf offers and zero for traditional offers. *SSDI* is the average quintile ranking of an issue based on four measures of manipulative short selling (*IO*, *AvSI*, *Option*, and *BAS*). *LnMV* is the logarithm of the firm's market capitalization the day before the announcement. *Sequence* is the number of SEOs since IPO. *Volatility* is the residual volatility of a market model regression over the 250 trading days before the announcement. *Pre-180* is the 180-day buy-and-hold stock return before the SEO announcement net of the CRSP value-weighted market return. *MTB* is the market value of equity divided by the book value of equity, measured at the financial year-end for the latest year before the SEO announcement. *Secondary* is the ratio of the number of secondary shares divided by total shares offered. *A1* is the absolute value of the daily return divided by daily turnover, averaged over 250 trading days before the announcement. *t*-statistics are in parentheses. Pseudo *R*-sqr is the likelihood-based pseudo *R*-square. *N* is the number of observations.

*, **, *** indicate significance at 10%, 5%, and 1%

	Estimates
<i>SSDI</i>	0.58*** (5.33)
<i>LnMV</i>	-0.06 (-0.83)
<i>Sequence</i>	0.04 (0.88)
<i>Volatility</i>	-0.07 (-1.46)
<i>Pre-180</i>	0.07 (1.18)
<i>MTB</i>	-0.00 (-0.21)
<i>Secondary</i>	-1.93*** (-5.60)
<i>LnA1</i>	-0.07 (-0.84)
<i>SSDI</i> × <i>LnA1</i>	0.02 (0.43)
Pseudo <i>R</i> -sqr	0.16
<i>N</i>	1,697

Table 8**Analysis of offering discounts**

This table presents the results of offering discounts analysis. Panel A reports the estimation results for the second-stage discount equations, one for shelf offerings and the other for traditional offerings. the dependent variable is the offering discount, calculated as the logarithm of the ratio of the pre-offer-day closing price to the offer price. *LnMV* is the logarithm of the firm's market capitalization the day before the announcement. *Volatility* is the residual volatility of a market model regression over the 250 trading days before the announcement. *RelOfrSize* is the ratio of shares issued to shares outstanding prior to the offering. *Nasdaq* is a dummy variable equal to one if an issuer's stock is listed on NASDAQ, and zero otherwise. *Cluster* is a dummy variable equal to one if the decimal portion of the offer price is 0.00, 0.25, 0.50, or 0.75. *Lambda* is the inverse mills ratio calculated from Model 1 in Table 5. *t*-statistics are in parentheses. *N* is the number of observations. Panel B compares the means of the actual discounts with their hypothetical counterparts for shelf (the first row) and traditional offerings (the second row). *p*-values for differences in means and medians between shelf and traditional offers are based on standard *t*-tests.

*, **, *** indicate significance at 10%, 5%, and 1%

Panel A: Regression analysis of offering discounts			
	Shelf offerings	Traditional offerings	
<i>LnMV</i>	0.005 (1.48)	-0.041*** (-3.21)	
<i>Volatility</i>	-0.004 (-1.61)	-0.018* (-1.83)	
<i>RelOfrSize</i>	0.243*** (6.86)	0.015 (0.26)	
<i>Nasdaq</i>	0.038*** (3.76)	-0.008 (-0.23)	
<i>Cluster</i>	-0.003 (-0.40)	0.029 (1.00)	
<i>Lambda</i>	-0.023 (-0.86)	0.067* (1.73)	
<i>N</i>	1,381	316	
Panel B: Comparison of actual discounts with hypothetical discounts			
	Actual (%)	Hypothetical (%)	Difference
	Mean	Mean	<i>p</i> -value
Shelf	5.361	8.507	0.000

Table 9
Analysis of the decision to switch offer method

This table presents results of logistic regressions comparing shelf issuers that switch to traditional offerings and traditional issuers that switch to shelf offerings. The marginal effect is the difference in the two probabilities when we increase and decrease a variable's value by 0.5 standard deviations from the mean and hold the other variables at their mean levels. In model 1, the dependent variable equals one for shelf issuers switching to the traditional method in the next issue and zero for those that do not change the offer method. In model 2, the dependent variable equals one for traditional issuers that switch to shelf offerings and zero for those that do not switch. All independent variables are changes from their values at the time of the prior issue. *SSDI* is the average quintile ranking of an issue based on four measures of manipulative short selling (*IO*, *AvSI*, *Option*, and *BAS*). *LnMV* is the logarithm of the firm's market capitalization the day before the announcement. *Sequence* is the number of SEOs since IPO. *Volatility* is the residual volatility of a market model regression over the 250 trading days before the announcement. *Pre-180* is the 180-day buy-and-hold stock return before the SEO announcement net of the CRSP value-weighted market return. *MTB* is the market value of equity divided by the book value of equity, measured at the financial year-end for the latest year before the SEO announcement. *Secondary* is the ratio of the number of secondary shares divided by total shares offered. *t*-statistics are in parentheses. Pseudo *R*-sqr is the likelihood-based pseudo *R*-square. *N* is the number of observations.

*, **, *** indicate significance at 10%, 5%, and 1%

	1		2	
	Estimates	Marginal Effect (%)	Estimates	Marginal Effect (%)
$\Delta SSDI$	-1.04** (-2.33)	-18.64	1.42*** (2.86)	12.20
$\Delta LnMV$	-0.36 (-0.81)	-6.51	1.35* (1.95)	11.58
$\Delta Sequence$	0.51*** (3.02)	9.10	-0.34 (-0.31)	-2.95
$\Delta Volatility$	0.15 (1.03)	2.68	0.02 (0.13)	0.21
$\Delta Pre-180$	-0.73** (-2.18)	-13.22	-0.20 (-0.32)	-1.74
ΔMTB	-0.03 (-0.61)	-0.49	-0.14** (-2.46)	-1.22
$\Delta Secondary$	-2.49 (-0.67)	-44.87	-0.38 (-0.26)	-3.25
Pseudo <i>R</i> -sqr	0.10		0.18	
<i>N</i>	135		109	

Table 10
Analysis of counterfactual short selling for shelf offerings

This table reports the results of an analysis based on actual daily short interest data. Panel A reports the result of a regression analysis of short interest before traditional offerings. The dependent variable is the abnormal short interest defined as the change in short interest from the day before announcement to the day before the offer, scaled by shares outstanding one month before the SEO issue date. *IO* is shares held by institutions divided by shares outstanding at the end of the latest quarter before the SEO announcement date. *AvSI* is the average short interest in the three months ending one month before the announcement date divided by shares outstanding on the last trading day of the month before the announcement. *Option* equals one if the issuers' stock has put options outstanding in the three months ending one month before the SEO announcement date, and zero otherwise. *BAS* is the average daily bid-ask spread scaled by stock price over trading days -240 to -40 . *t*-statistics are in parentheses. Adj. *R*-sqr is the adjusted *R*-square. Panel B reports the results of a univariate comparison of predicted short interest for traditional offerings and counterfactual predicted short interest for shelf offerings, where the latter uses the coefficient from panel A applied to the values of the independent variables for shelf issuers. *p*-values for differences in means and medians between shelf and traditional offers are based on standard *t*-tests and Wilcoxon signed-rank tests. *N* is the number of observations.

*, **, *** indicate significance at 10%, 5%, and 1%.

Panel A: Regression analysis of pre-issue short interest for traditional offerings

	Abnormal short interest	
Intercept	0.01	(1.06)
<i>IO</i>	0.006*	(2.04)
<i>AvSI</i>	0.036**	(2.32)
<i>Option</i>	-0.002	(-1.13)
<i>BAS</i>	0.001	(1.07)
Adj. <i>R</i> -sqr	0.304	
<i>F</i> -statistic	2.37*	
<i>N</i>	26	

Panel B: Analysis of (counterfactual) predicted short interest for traditional (shelf) offerings

	Traditional offerings		Shelf offerings		Differences	
	Mean	Median	Mean	Median	Mean <i>p</i> -value	Median <i>p</i> -value
<i>PSI</i>	0.0036	0.0034	0.0045	0.0041	0.0000	0.0000
<i>N</i>	316	316	1,381	1,381		

Appendix A: Overview of relevant SEC regulations

This appendix shows the SEC regulations relating to shelf registration and short sale constraints. Information is from the SEC website (www.sec.gov).

Panel A: Shelf registration

Rule	Date	Summary
Rule 415	1982	Eligible firms can file one registration statement every two years, without disclosing detailed information about the actual amount, timing of offerings, or the expected use of proceeds.
Universal shelf procedure	October 1992	Firms can register debt, equity, and other securities on a single shelf registration statement, without disclosing the type of securities until the issue date.
Amendment to Rule 415	December 2005	The SEC eliminates the two-year limitation. Shelf registration statement can be used for three years.

Panel B: Short sale constraints

Rule	Date	Summary
Rule 10b-21	August 1988	This rule prohibited short sellers from covering positions established any time between the filing and offer dates by purchasing securities out of a public offering.
Rule 105	April 1997	This rule relaxed Rule 10b-21 by prohibiting short sellers from covering short sales made within five days of the offering with shares obtained in the offering. The rule applied only to traditional offerings.
Amendment to Rule 105	September 2004	This rule extended Rule 105 to shelf offerings.
Amendment to Rule 105	October 2007	This rule prohibited anyone who shorted in the five days before the offering from buying shares in the offering. Rule 105 allowed short selling sellers to purchase shares in the offerings, but not to use those shares to cover short positions within restricted period. This amendment makes it unlawful for short sellers to purchase shares in the offering.

Appendix B: Variable definitions

Panel A: Components of the shorting demand index

Institutional holdings data are from Thomson Reuters' CDA/Spectrum Institutional (13f) Holdings database. Short interest data are from the Compustat Supplemental Short Interest File. Daily put option trading volume data are from OptionMetrics. Stock price data and trading volume data are from CRSP.

Variable	Definition
<i>IO</i>	Institutional ownership is the number of shares held by institutions divided by shares outstanding at the end of the latest quarter before the SEO announcement date.
<i>AvSI</i>	Average short interest is the average short interest in the three months ending one month before the announcement date divided by shares outstanding on the last trading day of the month before the announcement.
<i>Option</i>	Put options outstanding is a dummy variable equal to one if the issuers' stock has put options outstanding in the three months ending one month before the SEO announcement, and equal to zero otherwise.
<i>BAS</i>	Bid-ask spread is the average daily bid-ask spread as a percentage of stock price over trading days -240 to -40 .

Panel B: Firm and offer characteristics

Firm-specific data are from the CRSP and the Compustat databases. Offer-specific data are from the Securities Data Corporation (SDC) Global New Issues database.

Variable	Definition
<i>LnMV</i>	The natural logarithm of the firm's market capitalization the day before the announcement.
<i>Volatility</i>	The residual volatility of a market model regression over the 250 trading days before the announcement.
<i>Pre-180</i>	The 180-day buy-and-hold abnormal return prior to the announcement net of the CRSP value-weighted market return.
<i>MTB</i>	The ratio of the market value of equity to the book value of equity. The market and the book values of equity are financial year-end figures for the latest year before the SEO announcement.
<i>LnA1</i>	The natural logarithm of $A1$. $A1$ is a price elasticity measure equal to the average daily inverse elasticity over the 250 trading days ending one day before SEO announcement dates. Daily inverse elasticity is measured as the absolute value of the stock return divided by turnover.
<i>Secondary</i>	The number of secondary shares divided by total shares offered.
<i>RelOfrSize</i>	The ratio of shares issued to shares outstanding prior to the offering.
<i>Nasdaq</i>	A dummy variable equals one if an issuer's stock is listed on NASDAQ, and zero otherwise.
<i>Cluster</i>	A dummy variable equals one if the decimal portion of the offer price is 0.00, 0.25, 0.50, or 0.75.
<i>Rule2007</i>	A dummy variable equals one if the offering takes place after the implementation of the 2007 SEC regulatory amendment