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The type of short selling and issue discounts in seasoned equity offerings

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The type of short selling and issue discounts in seasoned equity offerings[†]

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Abstract

This paper examines whether issue discounts and stock return around seasoned equity offerings (SEOs) differ according to the type of short selling, manipulative or informative, in Japan where a special short selling regulation around SEOs, such as Rule 105 in the United States, does not exist. Following Gerard and Nanda (1993), this paper measures the type of short selling based on the ratio of covering short sales with new shares (SCR). This paper finds that a higher level of short selling with a high SCR has a negative effect on the informativeness of secondary market prices, but a higher level of short selling with a low SCR has a positive effect on the information content. We also find evidence that short selling with a high SCR is associated with a price recovery, but short selling with a low SCR is associated with a price drop. Although the level of short selling has a negative effect on issue discounts, the level of short selling with a high SCR has a positive effect on underpricing. These results indicate that manipulative short selling increases by covering shorts with new shares.

JEL classification: G24; G38; G39
Keywords: Seasoned equity offerings; Short sales; Discounts; Price pressure; Manipulative short sales; Informative short sales

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1. Introduction

There are at least two motives for short selling during a seasoned equity offering (SEO) period: manipulative short selling and informative short selling. The motive for manipulative short selling is that the investors launch short selling to artificially depress offering prices, which are lower than anticipated offering prices, and cover the short sales with the discounted new shares. To prevent the occurrence of such transactions in the United States, the Securities and Exchange Commission (SEC) formulated Rule 105 as part of Regulation M (an anti-manipulative rule concerning securities offerings). Rule 105, short selling in connection with a public offering, prohibits any person from *purchasing* a new public securities offering share if that person has sold short within five days prior to the pricing date.[1] On the other hand, the motive of informative short selling is that investors decide to short sell based on private information concerning the issuers. Many academics find that short sellers enhance the informational efficiency of the price (e.g., Boehmer, 2009; Boehmer, Jones, and Zhang, 2008; Reed, 2007). If informative short selling is regulated within pre-pricing dates, the private negative information may not have been fully reflected in offering prices, and investors may purchase the over-valued stocks or require more issue discounts from issuers.

The purpose of this paper is verifying whether issue discounts and stock return around SEOs differ according to the type of short selling, manipulative or informative, in Japan where a special short selling regulation around SEOs, such as SEC Rule 105 in the United States, is not introduced.

Gerarad and Nanda (1993) develop models of interaction for the type of secondary market short selling prior to the pricing of an offering. According to their model, manipulative short selling activity prior to the pricing occurs among issuers which the investors expect that they can cover their positions with discounted new shares, even if their information is positive. Manipulative short selling activity prior to the pricing will reduce the informativeness of the secondary market net order

[1] On June 2007, the SEC tightened Rule 105. This is an important change from the prior Rule 105, which prohibited the use of offering shares to *cover* short sales affected within the five days prior to the pricing.

flow and exacerbate the winner's curse problem. As a result, a larger discount is required to sell the offered shares. On the other hand, informative strategy occurs among issuers which the investor's expected allocation is so small. Informed short selling activity prior to pricing will generate more informative prices and will decrease issue discounts.

Whereas much empirical work has focused on testing the model, there is no broad consensus. Corwin (2003), Kim and Shin (2004), Safieddine and Wilhelm (1996) and Singal and Xu (2005) test whether the issue discount changed after the introduction of Rule 10b-21, which was designed to curtail manipulative short selling around SEOs.[2] However, these empirical studies do not use the level of daily short selling data.[3] Henry and Koski (2010) examine the relationship between returns and short sales over the entire SEO period, using daily level short selling data. However, they cannot distinguish between informed and manipulative short selling. The findings of Safieddine and Wilhelm (1996) and Henry and Koski (2010) are consistent with manipulative short sellers. In contrast, Corwin (2003), Kim and Shin (2004) and Singal and Xu (2005) find evidence consistent with informed short sellers.[4]

This paper differs from previous empirical research in some respects. First, we use not only daily stock-borrowing data but also daily short-covering data. Gerard and Nanda (1993) argue that the types of short selling differ by whether investors can cover their short positions with discounted new shares. Previous empirical research does not use daily short-covering data and cannot directly investigate the validity of Gerard and Nanda (1993) model. This paper investigates the number of short selling stocks that are covered on an issue date and whether the types of short selling prior to

[2] SEC Rule 10b-21 was adopted in 1988. Rule 10b-21 prohibits the use of shares purchased in an SEO to cover short positions established between the announcement date and the offer date. In April 1997, the SEC adopted Rule 105 as a replacement for Rule 10b-21.

[3] Corwin (2003) and Kim and Shin (2004) do not use the level of short selling data. Safieddine and Wilhelm (1996) and Singal and Xu (2005) use the monthly short interest data.

[4] Chemmanur, He, and Hu(2009) find that institutional investors trade in the same direction as their private information, and their post-SEO trading significantly outperforms a naive buy-and-hold trading strategy. They state with institutions possessing private information about SEOs and with information production instead of a manipulative trading role for institutional investors in the United States with Rule 105.

the pricing differ based on the difference in a short covering ratio.

Second, short selling regulations around SEOs, such as SEC Rule 105 in the United States, do not exist in Japan. If short selling before pricing is manipulative trading, a short selling regulation around SEOs will prevent the inefficient formation of the price and reduce the cost of raising funds for an issuing firm. However, if the informative short selling is regulated prior to the pricing, the negative private information may not be fully reflected in the offering prices, and investors may purchase over-valued stocks or demand more SEO discounts from issuers. In this case, it is more desirable to abolish the regulation around SEO. This paper directly examines the relationship between short selling and its SEO offer price without SEO short selling regulations in Japan, and it suggests whether a regulation around SEOs, i.e., Rule 105 in the United States, is necessary.

Third, the issuers in Japanese SEO markets must set the pricing date five or more trading days prior to an offering date. These data show that the mean number of days between the pricing date and the issue date is about seven trading days. In an offering date, a large number of new shares flow into the market. A great amount of research indicates that these large inflows (outflows) result in a permanent decrease (increase) in the stock price due to a "downward-sloping demand curve" effect (Lock-up provisions: Field and Hanka (2005), Stock splits: Greenwood, 2009)[5]. The "price pressure" effect also may have an effect on stock price around the issue date. A temporary price drop may be necessary in equilibrium in order to attract liquidity providers. Mikkelson and Partch (1988) and Barclay and Litzenberger (1988) examine price changes around the issue date of SEOs. The large flow of new shares have an effect on not only a "downward-sloping demand curve" and a "price pressure" effect, but also on a "manipulative short selling" effect. Using Japanese SEO data, this

[5] In the presence of downward-sloping demand curve, if the market is semi-strong form market efficiency, a permanent stock price decrease may occur on the announcement day rather than the issue day. Harris and Gurel (1986) and Lynch and Mendenhall (1997) find temporary price changes around the announcement of S&P 500 index changes. However, Field and Hanka (2005) find that although the terms of the lockup, including the unlock date, are disclosed in the IPO prospectus, share price drop at the unlock date and is not quickly reversed, even though the expiration date is well-known.

paper can directly investigate whether short selling activity affects the secondary market price around the pricing date of SEOs, by dividing a "downward-sloping demand curve" effects and a "price pressure" effects that occur around the issue date.[6]

Finally, this paper examines an abnormal return around SEO by using a characteristic-based benchmark model. Event studies typically use data that are characteristically non-representative of the overall market and are often grouped by underlying traits such as size, momentum, and valuation. For instance, firms that initiate dividends, split their stock, or issue new shares are likely to be large with high prior returns. Under these conditions, Ahern (2009) run a hose race between eight methods, including a characteristic-based benchmark model, a market model, the Fama French Three-Factor and Carhart Four-Factor models, and four test statistics, to determine which method has the least mean bias and the best power and specification of the tests. He indicate that a characteristic-based benchmark model produces the least biased returns with the least rejection errors. To control for any possible selection bias in the estimation, this paper uses a benchmark portfolio sample, which employs a propensity score-matching estimation approach.

This paper contributes to the body of previous research in several ways. First, the paper finds that a high level of pre-pricing short selling with a high short covering ratio at the issue date has a negative effect on the informativeness of secondary market prices, but a high level of pre-pricing short selling with a low short covering ratio at the issue date has a positive effect on the information content. These results imply that manipulative short selling is more likely to occur in a firm with a higher short covering ratio, and informative short selling is more likely to occur in a firm with a lower short covering ratio. These findings are consistent with the predictions of the Gerard and Nanda (1993) model but have not been empirically proven by previous research.

Second, this paper finds that the level of short selling prior to the pricing is associated with a

[6] Kim and Musulis (2009) finds that in post-SEO issue date, the price support activity level affect post-issue return, "price support" effect. The paper can also directly investigate the short selling effect, dividing a "price support" effects.

price drop prior to pricing, consistent with Corwin (2003) and Henry and Koski (2010). However, depending on the short covering ratio on the issue date, a post-pricing return is different, inconsistent with previous empirical research. Short selling prior to the pricing with a high short covering ratio on the issue date is associated with a price recovery, but short selling with a low short covering ratio on the issue date is associated with a price drop. These results indicate that the price impact of short selling among issuers with higher levels of a short covering ratio on the issue date are temporary, but the price impact of short selling among issuers with lower levels of a short covering ratio are permanent, consistent with Gerard and Nanda (1993).

Finally, irrespective of the level of a short covering ratio, the level of pre-pricing short selling has a negative effect on issue discounts measured at the end of the prior day, inconsistent with Gerard and Nanda’s (1993) manipulative model. These results are consistent with Corwin (2003), Kim and Shin (2004) and Singal and Xu (2005) and are inconsistent with Safieddine and Wilhelm (1996) and Henry and Koski (2010). However, Gerard and Nanda (1993) discuss another effect, i.e., the underwriters' pricing effect, where underwriters who account for manipulative temporary price drops and price relative to the expected value set the discount of the issuers lower than the true discounts. The results obtained for issuers with a higher level of a short covering ratio do not support the manipulative prediction but rather the prediction of the underwriters' pricing effect. The evidence complements the results of other studies supporting a certification role for underwriters in Japan [Cooney, Kato, and Schallheim, 2003] and the United States. [Booth and Smith, 1986]. However, underpricing which is the ratio of the closing price of the day after the pricing date to the offer price is positively associated with the level of short selling with a high short-covering ratio on the issue date. These results indicate that although underwriters set a lower discount rate of issuers with a high short covering ratio, they cannot set a complete offer price on the issuer's intrinsic value completely through the discount rate.

Our findings indicate that manipulative short selling and informative short selling coexist in short selling before SEOs, and they provide some implications for the regulation of short selling activity around SEOs, e.g., Rule 105 in the United States. For issuers that do not cover the short position with the new offer, we find no evidence of manipulative short selling activity, which worsens the informativeness of secondary market prices and exerts a temporary price pressure around the pricing date. Therefore, these findings imply indirectly that Rule 105 in U.S. effectively restrict manipulative short selling before SEOs. However, if underwriters can account for manipulative temporary price drops and set an offer price at a suitable price, issuers may not suffer any loss by manipulative trading. In this case, the need for the regulation of short selling activity around an SEO may be low. However, our findings indicate that underwriters cannot set an offer price at the issuer's fundamental value accurately in Japan without regulation. The results imply that it is necessary to introduce a regulation on short selling, such as Rule 105, in many countries that lack such a regulation. Although this analysis is based on the Japanese experience, these results may have important implications for many countries.

The remainder of the paper is organized as follows. Section 2 discusses the relevant theories and develops our hypotheses. Section 3 describes the data and the measures of short selling activity. In Section 4, we report the empirical results of the tests used to evaluate the relationships between short selling activity and stock returns around the pricing date, the discount rate and the underpricing. Section 5 concludes the paper.

2. Relevant Theory and Hypotheses

2.1. Informativeness of secondary market prices

As discussed above, there are at least two motives for short selling activity during a seasoned equity offerings (SEOs) period: manipulative short selling and informative short selling. In markets where there are no regulations on short selling around SEOs, Gerard and Nanda (1993) argue that according to the possibility that new shares can be used to cover shorts, the types of short selling are different. When the possibility of covering shorts with new shares is high, manipulative short selling activity occurs. This trading strategy is profitable as long as the secondary market trading loss is smaller than the additional gain from a lower issue price. Therefore, Gerard and Nanda argue that the trader is willing to sell in the secondary market even when his or her signal is positive, to ensure a lower issue price and a larger gain on his or her share of the SEO. Furthermore, they argue that a trader might attempt to influence the offer price by selling heavily in the secondary market just prior to the offering, expecting to recoup his losses and make larger profits by bidding within the SEO. If manipulative short selling occurs among issuers when new shares are intended to cover short positions, the secondary market prices of these issuers may be less efficient on the pricing date. On the other hand, informed traders sell short in the secondary market when their information is negative, and the expected allocation of the new shares is so small that attempts to cover their short position with new shares are difficult. If informative short selling occurs among issuers when new shares are not used to cover short positions, the secondary market prices may be more efficient.

H1A. Higher levels of short selling before a SEO pricing date for issuers with high levels of covering short positions with new shares should be associated with less infomativeness of market prices on the pricing date.

H1B. Higher levels of short selling before a SEO pricing date for issuers with low levels of covering short position with new shares should be associated with the more infomativeness of market prices on the pricing date.

2.2. Pre-pricing and post-pricing performance

Types of short selling may change the secondary market price before or after the pricing date. Gerard and Nanda (1993) indicate that for the issuers where manipulative trading occurs before the pricing date, secondary market prices will drop in the days preceding the pricing date and will recover in the post-issue market. Corwin (2003) and Henry and Koski (2010) find that these price pressures are consistent with manipulative short selling. On the other hand, Gerard and Nanda (1993) also indicate that for the issuers in which informative short selling occurs, secondary market prices will drop in the days preceding the pricing date and will not change or drop in the post issue market. However, there are no empirical studies supporting the effects of informative short selling on changes in the stock price before and after the pricing date.

> H2A. Higher levels of short selling before a SEO pricing date for issuers with high levels of covering short positions with new shares should be associated with sliding prices in the days preceding the pricing date and recovering prices in the post-pricing days.

> H2B. Higher levels of short selling before a SEO pricing date for issuers with low levels of covering short positions with new shares should be associated with sliding prices in the days preceding the pricing date and dropping or unchanging prices in the post-pricing days.

2.3. Discount rate and underpricing

Many of the theories advanced to explain the price of new issue shares are based on uncertainty and information asymmetry.[7] Rock (1986) presents a model for the IPO market with two types of

[7] Allen and Faulhaber (1989), Beatty and Ritter (1986), Benveniste and Spindt (1989), Chemmanur (1993), and Welch (1989) present theoretical models of IPO underpricing based on uncertainty and information asymmetry.

investors: informed investors and uninformed investors. This information asymmetry may lead to a winner's curse problem. The uninformed investors primarily obtain the less successful IPOs. Keeping these investors in the market, therefore, requires an additional premium.[8] Gerard and Nanda (1993) extend these insights to the SEO discounts. They developed a model of SEO pricing in which the nature of information asymmetry at the time of the offering is depends on the type of short selling, manipulative or informative, in the secondary market preceding the offering. The manipulative short selling activity prior to the pricing reduces the informativeness of the secondary market net order flow and exacerbates the winner's curse problem. As a result, a larger discount is required to sell the offered shares. On the other hand, informed short selling activity prior to the pricing will increase the informative of the prices and decrease the issue discounts.

A large amount of empirical research has focused on testing the work of Gerard and Nanda (1993). Corwin (2003), Kim and Shin (2004), Safieddine and Wilhelm (1996), and Singal and Xu (2005) test whether the issue discount changed after the introduction of Rule 10b-21, which was designed to curtail manipulative short selling around SEOs. Corwin (2003) and Kim and Shin (2004) conclude that this rule resulted in larger issue discounts, but they do not use the level of short selling data prior to the pricing and covering shorts on the issue date. Using the monthly short interest data, Safieddine and Wilhelm (1996) conclude that Rule 10b-21 reduces short interest, and higher short interest is associated with larger issue discounts. Singal and Xu (2005) also use the monthly short interest data and find that the issue discount increases after the introduction of Rule 10b-21. Henry and Koski (2010) use the daily short selling data following the introduction of Rule 105 and examine the relationship between short selling and the issue discount. They find that higher levels of short selling are significantly associated with larger issue discounts.[9]

[8] Rock (1986) assumes that informed traders cannot purchase all new shares of public offerings.
[9] SEC Rule 105 in the United States prohibited traders from covering short sales made within five days of the offering with shares obtained in the SEO. Henry and Koski (2010) find that higher levels of short selling at least six days before an offering are significantly associated with larger issue discounts.

If, according to Gerard and Nanda (1993), the types of short selling prior to the pricing differ by the difference in covering shorts with new shares, the relationship between the level of short selling and discount rates may change with a short covering ratio.

H3A. Higher levels of short selling before a SEO pricing date for issuers with high levels of covering short positions with new shares should be associated with larger issue discounts.

H3B. Higher levels of short selling before a SEO pricing date for issuers with low levels of covering short positions with new shares should be associated with smaller issue discounts.

Easterbrook (1984) suggests that when a firm issues new securities, its affairs are reviewed by an investment banker or similar intermediary who acts as a monitor for the collective interests of the shareholders and purchasers of the new securities.[10] If the underwriters possess the information about the SEO's value, they may account for whether a temporary price drop depends on manipulative short selling prior to the pricing. Furthermore, the underwriters have incentives to set an appropriate offer price**.** Dunbar (2000) and Fernando, Gatchev, and Spindt (2005) indicate that mispricing in offer prices significantly affects changes in the underwriter market share and lead to changes in the lead underwriter. Cooney, Kato, and Schallheim (2003) argue that since the underwriter has the incentive to price appropriately to maintain its reputation for future business, the underwriter's agreement to issue the new stock certifies to the market in Japan. In U.S. issue markets, Booth and Smith (1986) argue that underwriters provide a valuable service by certifying the validity

[10] Corwin and Schutlz (2005) find that syndicate members product information about IPO firms.

of the issuing firm's current stock price. If underwriters account for these temporary price drops and the price relative to the expected value, the discount rate will be lower than the true discounts.

> H3C. Higher levels of short selling before a SEO pricing date for issuers with high levels of covering short positions with new shares should be associated with lower issue discounts.

To confirm whether the underwriters have set the offer price appropriately, it is necessary to verify the relationship between manipulative short selling and underpricing. This paper defines underpricing as the percent change from the offer price to the closing price on the day of trading after pricing. If the underwriters can set the offer price of issuers with high manipulative short selling appropriately through lowering the discount rate, the level of manipulative short selling will not affect the underpricing of SEOs. However, if the underwriter’s capacity to set an appropriate offer price is insufficient, underpricing may be associated with the level of manipulative short selling prior to the pricing.

> H4A. (Perfect adjustment) Higher levels of short selling before a SEO pricing date for issuers with high levels of covering short positions with new shares should not be associated with underpricing.

> H4B. (Imperfect adjustment) Higher levels of short selling before a SEO pricing date in issuers with high levels of covering short positions with new shares should be associated with larger underpricing.

3. Sample Selection and Data

3.1. SEO data

This paper employs a sample of seasoned equity offerings of common stock of Japanese public firms between 1998 and 2009. The paper exclude initial public offerings, rights offerings, unit issues, closed-end funds, and REITs. Consistent with previous studies, this paper excludes financial firms, investment corporations, and firms from regulated industries. In addition, the paper excludes SEOs that lack short selling data and that include other events such as account settlements, bonds, convertible bonds, private equity placements, stock splits, and stock repurchases, during the announcement date to the issue date.

To construct a proxy for the level of short selling and covering shorts, this paper uses the data on borrowing and covering stocks from the Japan Securities Finance Co., Ltd., which is the most important participant Japanese stock lending markets. In Japan, when investors borrow stocks from the Japan Securities Finance Co., Ltd., there are restrictions on the stocks that can be sold short, the reimbursement terms, and the fees, all of which are determined by the stock exchange according to various standards, such as individual stock liquidity. Borrowing is processed after brokerage firms accept short selling orders from investors. Lending stocks are borrowed from securities finance companies, whereas investors receive borrowed stocks from brokerage firms. The data cover all information concerning borrowings through brokerage firms and provide the following information: date, identification code, number of shares in inventory, number of shares that are newly lent and lent back, transaction price, and backwardation rate. The number of shares that are newly lent to the market maker refers to the number of shares short sellers borrow to sell short, whereas the number of shares lent back to the market maker refers to the number of shares short sellers cover to liquidate short positions.

This study obtained the data on borrowing and covering stocks from the Nikkei NEEDS Financial Quest database. Data on the age of the SEO firms and the timing of the listed changes were obtained from Quarterly Firms Statistics and the Nikkei NEEDS Financial Quest database. The present study also gathered data on equity issues, including the date of the announcement, pricing, issuing, offer price, proceeds, and original underwriter names from the IN Information Systems and the eol ESPer database. Data on stock market prices and returns were obtained from the Nikkei media marketing database. The remaining data were gathered from the Nikkei NEEDS Financial Quest database.

3.2. The timing of the announcement, pricing, and issue date

In contrast to the United States, the issuers in Japan must set the pricing date five or more days before an offering date in Japan. Figure 1 illustrates the timing of the announcement date (AD), pricing date (PD), and issue date (ID). The announcement date of the SEO is the next date of the first board meeting date.[11] The period between AD and PD is approximately one to three weeks. Figure 2 shows the frequency distribution of the number of trading days between AD and PD for the entire sample of SEOs. From AD to PD, most issuers are concentrated between six and seven days. The greatest frequency of issuers (approximately 80 issuers) falls at six business days. The offering price determines 90 percent of issuers within 10 business days of AD. The period between PD and ID is approximately one to two weeks. Figure 3 shows the frequency distribution of the number of trading days between PD and ID for the entire sample of SEOs. From the day after the pricing date until the end of the subscription period, formal stock price stabilization by the underwriter is permitted.[12] The

[11] Cooney, Kato, and Schallheim (2003) use the board meeting date to investigate market reactions to announcements regarding SEOs in Japan, whereas Kang and Stulz (1996) use the newspaper announcement date.
[12] The stabilization regulation is set under conditions of the Cabinet Order for Enforcement of the Securities and Exchange Law.

stabilized activities occur in the issuers whose stock price drop after the pricing date.[13] During the period from AD to PD, most issuers are concentrated between six to seven days. Figure 4 shows the frequency distribution of the number of trading days between AD and ID for the entire sample of SEOs. Over 50 percent of the full sample falls on days 13 and 14.

3.3. Data construction

3.3.1 Shorts selling and covering

To examine the relationship between short sale activity prior to the pricing and market stock returns and issue discounts, this paper constructs several statistics to measure abnormal short sale trading and returns. The paper defines abnormal the level of short selling for an individual firm i on day t, $ABSSVOL_{i,t}$, as

$$ABSSVOL_{i,t} = SSVOL_{i,t} - AVSSVOL_i \,, \tag{1}$$

$$SSVOL_{i,t} = \frac{SS_{i,t}}{VOL_{i,t}} \,, \tag{2}$$

$$AVSSVOL_i = \frac{1}{120} \sum_{d=-140}^{-21} \frac{SS_{i,d}}{VOL_{i,d}} \,, \tag{3}$$

where $SS_{i,t}$ is the total short selling volume on day t for that firm i, and $VOL_{i,t}$ is the total daily trading volume on day t for that firm i. $SSVOL_{i,t}$ is the total short selling volume $SS_{i,t}$ relative to the total volume $VOL_{i,t}$. $AVSSVOL_i$ is the average daily $SSVOL_i$ for that firm during the benchmark period. The benchmark period extends from day -140 to day -21 relative to the announcement date.[14]

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[13] To prevent sample selection bias, this paper does not exclude these samples. There is no difference in the following results, if the samples with the activity are excluded.

[14] The results are sufficiently robust for the use of different benchmark periods extending from day +21 to +140

Gerard and Nanda (1993) argue that the types of short selling differ according to whether the investors can cover their short position with discounted new shares; they indicate that investors launch manipulative short selling to increase the probability of covering their position with new shares. The sample in this paper indicates that there are few equity volumes of short sales and short covers between the pricing date and the issue date. The most intensive period of short selling is immediately prior to the pricing date.[15] On the other hand, the most intensive date of covering shorts is the issue date. Figure 5 shows the total number of short selling stocks without covered shorts divided by the total shares around the issue date. Although there is no change in the number of short selling stocks between ID-5 to ID-1, the number of short selling stocks decreases greatly on the issue date. This result implies that investors use new shares to cover their short position. Due to data restrictions, this research is unable specify whether the covered stocks are new shares. Therefore, the issuers with a high possibility of covering shorts with new shares may be the issuers with a high level of covering shorts relative to the total number of shorts on the issue date. This paper defines the level of covering shorts relative to the total number of shorts on the issue date for an individual firm i, SCR_i as

$$SCR_i = \frac{COVER_{i,ID}}{NSHORTS_{i,ID-1}}, \tag{4}$$

where $COVER_{i,ID}$ is the total number of covering shorts on the issue date for that firm i, and $NSHORTS_{i,ID-1}$ is the total number of shorts that are not covered one day prior to the issue date.

3.3.3 Abnormal return

relative to the issue date.

[15] The results are not shown in the table. The percentage of short sales is defined as the number of daily short sales divided by the total share. The percentage of short sales immediately before the pricing date is about four to six times higher than the percentage of short sales before and after the pricing date.

Following Ahern (2009), this paper uses a characteristic-based benchmark model to examine abnormal returns around the pricing date. This paper defines abnormal returns for an individual firm i, $AR_{i,t}$, and the cumulative abnormal return for that firm i, $CAR_{i,t}$, as

$$AR_{i,t} = \mathrm{Return}_{i,t} - \mathrm{Return}_{p,t}, \tag{5}$$

$$CAR_i[d,T] = \left(\prod_{t=d}^{T}(AR_{i,t}/100+1)-1\right)*100, \tag{6}$$

where $\mathrm{Return}_{i,t}$ is the daily stock return on day t for firm i, and $\mathrm{Return}_{i,t}$ is the daily stock return on day t for the matching portfolio p. A simple comparison of the ex-post performance of firms that issued equity and those that did not is inappropriate due to a possible selection bias. If firms with issuing securities are riskier than those without, then a simple comparison of the ex-post performance between these two groups confounds ex-ante riskiness and ex-post riskiness (changes in the riskiness of the borrowers after issuing the security). To circumvent this problem, we need to control for any possible selection bias in the estimation. To achieve this goal, this paper employs a propensity score matching estimation approach. The matching procedure is presented in Appendix A.

3.4. Description of the data

Table 1 presents the descriptive statistics for the sample. The mean (median) discount rate, where DISCOUNT is defined as the percent change from the closing price before an application to the offer price,[16] is 3.01% (3.02%). With respect to the discount rate, almost no difference was detected upon comparison to the level of U.S. offerings in the 1990s (Corwin, 2003; Mola and Loughran, 2004). Underpricing is defined as the percent change from the offer price to the closing price on the first day of trading after pricing. The mean underpricing is 4.24% (offer price to closing price on PD+3)

[16] This notion is consistent with previous studies. See Corwin (2003) and Mola and Loughran (2004).

and 1.89% (offer price to closing price on ID+10). Although the mean (median) CAR before pricing is negative [from PD-3 to PD: -2.82% (-2.79%)], the mean (median) CAR after the pricing date is positive [from PD+1 to PD+3: 1.03% (0.72%)]. These results are consistent with temporary price pressures around the pricing date. The mean (median) level of short selling relative to the trading volume on the pricing date, SSVOL [PD], is 0.24 (0.17). The mean (median) ABSSVOL on the pricing date, ABSSVOL [PD], is 0.19 (0.13). These results show that twenty percent of dealings on the pricing date occur via short selling. The mean (median) SCR is 53.94% (55.50%). Over half of the total numbers of short positions before the issue date are covered on the issue date.

The mean (median) market capitalization on the last day of the month immediately prior to the offer, Capitalization, is 353 (57.70) billion yen. The average offering raised 29.90 billion yen in proceeds. The mean relative offer size, RelSize, which represents the percentage of outstanding pre-issue shares that were issued in the offering, is 12%. Major UW is the dummy variable for a prestigious underwriter, which assumes a value equal to one if the lead underwriter is a major underwriter, such as Nomura, Nikko, or Daiwa, and a value of zero otherwise. The share of major underwriters in the Japanese SEO underwriter market is 79%. The stock price volatility of issuers, STDR, is defined as the standard deviation of daily stock returns over 20 trading days and ending 10 days prior to the offer. The mean (median) STDR is 2.92 (2.56). The periods from AD to PD and from PD to ID are, on average, 7.33 and 7.63 days, respectively.

Table 2 shows the level of short selling prior to PD. Panel A presents the average SSVOL prior to PD, and Panel B shows the average ABSSVOL prior to PD. In the first row of Panel A, the total sample, the average SSVOL on PD (0.24), is higher than the average SSVOL prior to PD. In the second to fifth rows, the total sample is divided into tertile based on SCR. The SSVOL in the highest tertile group is no different from the SSVOL in the lowest tertile group. Furthermore, in Panel B, the ABSSVOL in the highest tertile group is no different from the ABSSVOL in the lowest tertile group.

These results indicate that according to SCR, there is no difference with respect to the short selling scale.

4. Empirical Results

4.1. Information content of stocks prior to pricing

Gerard and Nanda's (1993) model indicates that the information content of issuers with manipulative short selling, as measured by the price change per unit of trade, would be smaller immediately prior to the pricing. Following Gerard and Nanda (1993), this paper defines information content for an individual firm i, $ILLQ_{i,t}$, as

$$ILLQ_{i,t} = \frac{\left|\mathrm{Return}_{i,t}\right|}{VOL_{i,t}}, \tag{7}$$

where $\mathrm{Return}_{i,t}$ is the daily stock return on day t for firm i, and $VOL_{i,t}$ is the total daily trading volume on day t for firm i. $ILLQ_{i,t}$ is defined as the average daily ratio between the absolute value of a stock.[17] $AVILLQ_{i,n}$ is the average daily $ILLQ_{i,t}$ for that firm during the benchmark period. The benchmark period extends from day -200 to day -21 (6 months) relative to the announcement date.[18] The $ILLQ_{i,t}$ relative to $AVILLQ_{i,t}$, $ABILLQ_{i,t}$ is defined as

$$ABILLQ_{i,t} = \frac{ILLQ_{i,t}}{AVILLQ_{i}}. \tag{8}$$

Table 3 presents the average ABILLQ prior to the pricing. In the first row of Panel A, the total sample, the average ABILLQ on PD (0.53), is lower than the average ABILLQ prior to PD. In the

[17] Amihud (2002) argues that this measure is positively related to the high-frequency measures used in the market microstructure literature, such as price impacts and trading costs.
[18] The results are sufficiently robust for the use of different benchmark periods extending from day +21 to +200 relative to the issue date.

second to fifth rows, the total sample is divided into quartiles based on the level of SCR. Although the ABILLQ in the highest quartile group before PD-2 is no different from the ABILLQ in the lowest tertile group before [PD-2], the ABILLQ in the highest tertile group on [PD] and [PD-1] is lower than the ABILLQ in the lowest quartile group on [PD] and [PD-1] (t-statistics = -2.13 and -2.06). Furthermore, the ABILLQ in the lowest tertile group from [AD] to [PD] and from [PD-3] to [PD] is higher than the ABILLQ in the lowest tertile group during the same periods.

To test hypotheses H1A and H1B, the paper estimates the following equation using an ordinary least squares regression (OLS):

$$\begin{aligned} \text{ABILLQ}_{i,PD} = {} & b_0 + b_1 \mathit{ABSSVOL}_{i,PD} + b_2 \text{HighestSCR*ABSSVOL}_{i,PD} \\ & + b_3 \text{MiddleSCR*ABSSVOL}_{i,PD} + b_4 \text{HighestSCR}_{i,PD} \\ & + b_5 \text{MiddleSCR}_i + b_6 \text{RelTurnover}_i + u_j . \end{aligned} \tag{9}$$

The most relevant information regarding the calculation of the offer price is the information content of stocks on the pricing date. The dependent variable, ABILLQ, is a proxy variable for the information content of stocks on the pricing date. The first independent variable is ABSSVOL on [PD], which is the variable that represents the primary interest. To investigate the impact of SCR and ABSSVOL on the ABILLQ, the paper two variable are included in the model: HighestSCR*ABSSVOL, MiddleSCR*ABSSVOL variable is cross-term of the dummy variable HighestSCR that assumes a value equal to one if issuers with highest tertile SCR and zero otherwise and ABSSVOL. The MiddleSCR*ABSSVOL variable is a cross-term of the dummy variable MiddleSCR, which assumes a value equal to one for issuers with a SCR in the second tertile of the total sample and zero otherwise, and their ABSSVOL. If hypotheses (1A) and (1B) are supported, the coefficient of ABSSVOL will be positively associated with ABILLQ, and the coefficient of HighestSCR*ABSSVOL will be negatively associated with ABILLQ.

Amihud and Mendelson (1986) indicate the turnover is related negatively to the illiquidity cost.

The present model includes the RelTurnover variable, which is the average daily turnover for a firm during the benchmark period. The benchmark period extends from day -200 to day -21 (6 months) relative to the announcement date.

The results in Panel B of Table 3 show that although in Model 2 the coefficient of the ABSSVOL variable does not have a statistically or economically significant effect on the ABILLLQ variable, in Model 3, the coefficient of the ABSSVOL variable is positively associated with the ABILLQ variable (t-value = 1.85), and the coefficient of HighestSCR*ABSSVOL is negatively associated with the ABSSVOL variable (t-value = -2.50). These results are consistent with (H1A), (H1B), and Gerard and Nanda's (1993) model, which shows that higher levels of short selling immediately prior to the pricing date for issuers with high levels of covering short positions with new shares should be associated with less informativeness.

4.2. Pre-pricing and post-pricing performance

To investigate the relationship between short selling immediately prior to pricing and the market price performance around the pricing date, this paper first examines abnormal returns (AR) and cumulative abnormal returns (CAR) around the pricing date. Table 4 illustrates AR and CAR around the pricing date. The first and second rows of Panel A show the average AR and CAR based on the total sample. In pre-pricing days (from PD-3 to PD), the market price return drops (average CAR = -2.84%). On the pricing date, the AR falls sharply (average AR = -1.38%). On the other hand, after the pricing date, the CAR increases gradually and within two days hits 1%. In the third and sixth rows of Panel A, this paper divides the data into a High ABSSVOL group and a Low ABSSVOL group based on the median of ABSSVOL on the pricing date. In pre-pricing days (from PD-3 to PD), the CAR in the High ABSSVOL group (average CAR = -3.68%) is lower than the CAR in the Low ABSSVOL group (average CAR = -1.95%). Furthermore, in post-pricing days (from PD+1 to PD+3), although the average CAR with the Low ABSSVOL group increases only 0.75%, the average CAR for the High ABSSVOL group increases about 1.20%.

Panel B of Table 4 shows the average AR and CAR around PD in the group divided into tertiles based on the level of SCR. Regarding the pre-pricing date, the average AR[PD] and CAR[PD-3 to PD] in the highest SCR group (AR[PD] = -2.11% and CAR[PD-3 to PD] = -4.60%) demonstrates the lowest value compared with the AR and CAR of the other groups. In addition, for the post-pricing date, the average AR[PD+1] and CAR[PD+1 to PD+3] in the highest SCR group (AR[PD+1] = 1.17% and CAR[PD+1 to PD+3] =2.35%) demonstrates the highest value compared with the AR and CAR of the other groups.

To test hypotheses H2A and H2B, the following equation is estimated using an ordinary least squares regression (OLS):

$$\begin{aligned}\mathrm{CAR}_i = {} & b_0 + b_1 \mathit{ABSSVOL}_i + b_2\mathrm{HighestSCR{*}ABSSVOL}_i \\ & + b_3\mathrm{MiddleSCR{*}ABSSVOL}_i + b_4\mathrm{HighestSCR}_i + b_5\mathrm{MiddleSCR}_i + u_j.,\end{aligned} \quad (10)$$

The dependent variable, CAR, is the cumulative abnormal returns around the pricing date. The first independent variable, ABSSVOL, is the proxy of the short selling scale prior to PD. According to the manipulative short selling hypothesis (H1A), ABSSVOL is expected to be negatively associated with the pre-pricing CAR and to be positively associated with the post-pricing CAR. On the other hand, according to the informative short selling hypothesis (H1A), ABSSVOL is expected to be negatively associated with the pre-pricing CAR and to not be (or to be negatively) associated with the post-pricing CAR. To investigate these hypotheses, two variables are included in the model: HighestSCR*ABSSVOL, MiddleSCR*ABSSVOL. If the issuers experience manipulative short selling over informative short selling prior to the pricing, the coefficient of the HighestSCR*ABSSVOL and the MiddleSCR*ABSSVOL should be positively associated with post-pricing CAR. In an informative scenario, this paper would expect ABSSVOL to be insignificantly different from zero or to be negatively associated with the post-pricing CAR.

Table 5 shows the effect of the level of short selling prior to the pricing date on the pre-pricing CAR. In Models 1 and 2, the dependent variable is CAR during PD-3 to PD, and in Models 3 and 4 the dependent variable is CAR during AD to PD. The ABSSVOL coefficient is negatively associated with the pre-pricing CAR in all Models, consistent with the hypotheses (H2A) and (H2B). In Model 2 and 4, according to the SCR, there is no difference in the influence of ABSSVOL on the pre-pricing CAR.

Table 6 presents the regression results for the post-pricing CAR. The post-pricing CAR period is three days from PD+1 to PD+3 in Models 1 to 4 and the period between PD+1 and ID+10 in Models 5 to 8. Models 1, 3, 5, and 7 exclude the two variables, HighestSCR*ABSSVOL, MiddleSCR*ABSSVOL, from the base model explained in equation (10). Although the coefficients of ABSSVOL in Models 1, 3, 5, and 7 are insignificantly different from zero, the coefficients of ABSSVOL in Models 2, 4, 6 and 8 are negatively associated with the post-pricing CAR. Furthermore, in Models 2, 4, 6 and 8, HighestSCR*ABSSVOL and MiddleSCR*ABSSVOL are positively correlated with the post-pricing CAR. The level of HighestSCR*ABSSVOL (8.09, t-value = 2.01) is larger than those of MiddleSCR*ABSSVOL (5.65, t-value = 1.83) in Model 4. The coefficient level of ABSSVOL with HighestSCR in Model 4 is 3.70 (= HighestSCR*ABSSVOL + ABSSVOL). These results indicate that higher levels of short selling prior to PD for issuers with the high levels of SCR are positively associated with post-pricing CAR, consistent with hypothesis (H2A). On the other hand, higher levels of short selling prior to PD for issuers with high levels of SCR and for issuers with low levels of SCR are negatively associated with the post-pricing CAR, consistent with hypothesis (H2B) and the Gerard and Nanda model.

4.3. Discount rate and Underpricing

To investigate the relation between the discount rate and the level of short selling prior to pricing date, this paper estimates the following equation using an ordinary least squares regression (OLS):[19]

$$\begin{aligned} Discount_i = {} & \alpha + \beta_1 ABSSVOL_i + \beta_2 \text{HighestSCR*ABSSVOL}_i \\ & + \beta_3 \text{MiddleSCR*ABSSVOL}_i + \beta_4 \text{HighestSCR}_i \\ & + \beta_5 \text{MiddleSCR}_i + \beta_6 \ln(Capitalization_i) \\ & + \beta_7 STDR_i + \beta_8 \text{Reloffsize}_i + \beta_9 MajorUW_i \\ & + \beta_{10} Days_i + \beta_k \sum_k \text{Exchange dummy}_{i,k} + \varepsilon_i \end{aligned} \qquad (11)$$

The dependent variable, DISCOUNT, is defined as the percent change from the closing price before an application to the offer price. The first independent variable is ABSSVOL, which is the variable of primary interest. The coefficient estimate of ABSVOL facilitates an understanding of whether higher levels of short selling before the SEO pricing date affect the discount rate. When short selling with superior information decreases the costs that are reflected in the discount rate (H3B), the discount rate should be negatively correlated with the ABSSVOL variable. According to the Gerard and Nanda (1993) model's manipulative effects (H3A), the discount rate should be positively correlated with the HighestSCR*ABSSVOL and MiddleSCR*ABSSVOL variable. On the other hand, according to the underwriters' ability of pricing effect (H3C), the discount rate should be significantly correlated with the HighestSCR*ABSSVOL variable.

The remaining independent variables are used to control for other factors that may affect the level of the discount rate. Several prior studies document the discount rate as a function of price uncertainty and information asymmetry. Rock (1986) assumes that some investors are better informed than are others and can thus avoid participating in overvalued IPOs. The resulting winner's curse experienced by uninformed investors must be countered by deliberate underpricing. Furthermore, the winner's curse results in a positive relationship between underpricing and ex-ante uncertainty concerning the value of the issue (Beatty and Ritter, 1986).

[19] In this equation, LN refers to the natural logarithm.

Following Corwin (2003), this paper defines two proxies, ln(Market Cap) and STDR, for asymmetric information and uncertainty, respectively. The first proxy is ln(Market Cap), defined as the natural logarithm of the total market capitalization on the day prior to the offer. The second proxy is STDR, defined as the standard deviation of the daily stock returns over 120 trading days ending 20 days prior to the offer. In the present paper, Discount is expected to be negatively associated with ln(Market Cap) and positively associated with STDR. Corwin (2003) argues that price pressures affect the discount rate. This price pressure hypothesis suggests that the discount rate should be most pronounced among the largest offers, reflecting the market's ability to absorb the new shares. Following Corwin (2003), this paper defines the relative offer size, Rel offer size, as the number of shares offered divided by the size of the existing market for the firm's shares.

Booth and Smith (1986) and Carter and Manaster (1990) argue that, by agreeing to be associated with an offering, prestigious underwriters certify the quality of an issue and alleviate informational asymmetry problems. As a proxy variable for prestigious underwriters, the MajorUW is used in the present study as the dummy variable for a prestigious underwriter, which assumes a value equal to 1 if the lead underwriter is the major underwriter, such as Nomura, Nikko, or Daiwa, and a value of zero otherwise. Based on the certification role of prestigious underwriters, MajorUW is expected to be positively associated with the discount rate. Days is defined as the number of days between PD and ID. If Days between PD to ID is high, the price uncertainty will increase (Corwin, 2003). In the present paper, Days is expected to be positively associated with the discount rate. EXCHANGE indicates sets of exchange dummy variables[20].

Table 7 shows the effect of the level of short selling on the discount rate. The relationship between pre-issue short selling and the issue discount is strongest for PD (Model 2). The coefficient of ABSSVOL[PD] is negative and significant at the 1% level (t-value = -2.91). In Models 7, the

[20] The paper uses the Nikkei medium classification (Nikkei chyu bunrui).

coefficient HighestSCR*ABSSVOL and MiddleSCR*ABSSVOL are not significantly associated with issue discounts. These results indicate that as the level of short selling increases, the issuers pay lower discounts, consistent with hypotheses (H3B) and (H3C) and inconsistent with hypothesis (H3A) and Gerard and Nanda's (1993) manipulative effect. The coefficient of the ln(Market Cap) variable is negative and significant in the discount rate, suggesting that the ex-ante uncertainty of a SEO firm has a positive impact on discount rates. The coefficients of the RelOfferSize are positive and significant in the discount rate model. The coefficients of MajorUW and STDR are insignificant. The coefficient of Days is positive and significant in the discount rate model.

The results shown in Table 7 preclude our assessment of whether underwriters set lower discounts on issuers with manipulative short selling prior to PD. If the underwriters adjust the offer price of issuers with manipulative short selling completely, the manipulative short selling should not be associated with underpricing, defined as the percent change from the offer price to the closing price on the day after pricing (H4A). If the adjustment is perfect, investors will not participate in manipulative short selling. However, if the adjustment of the offer price by underwriters is insufficient, the level of manipulative short selling may be correlated with the underpricing (H4B). This paper examines the regression analysis by using underpricing instead of discounting.

Table 8 shows the effects of the level of short selling prior to the pricing date on the underpricing. In Models 1 to 4, the dependent variable, Underpricing, is defined as the percent change from the offer price to the closing price on PD+3. The underpricing in Model 5 to 8 is defined as the percent change from the offer price to the closing price on ID+10. In Models 1, 3, 4, 5, 7, and 8, the ABSSVOL is not associated with the underpricing. However, in Models 2, and 6, which include the cross-term, ABSSVOL is negatively and significantly correlated with the underpricing. The coefficient of Highest*ABSSVOL is positive and significant at the 1% level in Models 2, 4, 6, and 8. The level of HighestSCR*ABSSVOL (9.32, t-value = 2.96) is larger than that of

MiddleSCR*ABSSVOL (3.44, t-value = 1.26) in Model 2. The coefficient of ABSSVOL with HighestSCR in Model 2 is 8.22 (= HighestSCR*ABSSVOL + ABSSVOL). These results indicate that higher levels of short selling prior to PD for issuers with high levels of SCR are positively associated with the underpricing, consistent with hypothesis (H4B). These results in Table 7 and 8 imply that even if underwriters adjust offer prices for issuers with manipulative short selling prior to PD, issuers with manipulative short selling must pay a higher discount for a suitable price.

5. Concluding Remarks

The present paper examines whether issue discounts and stock returns around seasoned equity offerings (SEOs) differ according to the type of short selling, manipulative or informative, in Japan, where a special short selling regulation around SEOs does not exist. First, the paper finds that a higher level of pre-pricing short selling with a high covering ratio at the issue date has a negative effect on the informativeness of secondary market prices. In addition, a higher level of pre-pricing short selling with a low cover ratio at the issue date has a positive effect on the information content.

Second, the paper finds that pre-pricing short selling is associated with a price drop prior to the issue date, consistent with Corwin (2003) and Henry and Koski (2010). Short selling prior to pricing with a high short covering ratio on the issue date is associated with a price recovery, but short selling with a low covering ratio on the issue date is associated with a price drop.

Finally, irrespective of the level of the cover ratio, the level of pre-pricing short selling has a negative effect on issue discounts measured from the prior day's close, consistent with Corwin (2003), Kim and Shin (2004), and Singal and Xu (2005). However, the underpricing is positively associated with the level of short selling with a high covering ratio on the issue date.

These results imply that manipulative practices are more likely in a firm with a higher short covering ratio, and informative practices are more likely in a firm with a lower short covering ratio, consistent with the predictions of Gerard and Nanda's (1993) model but not empirically proven by previous research. Furthermore, the discount and underpricing results indicate that although underwriters set a lower discount rate for issuers with a high covering ratio, they cannot lower a discount rate to the issuer's fundamental value completely, which is not consistent with the Gerard and Nanda (1993) model's manipulative hypothesis. The present paper attempts to include the influence of the price adjustment function of the underwriters in Gerard and Nanda's (1993) model.

Our findings provide some implications regarding the regulation of short selling activity around SEOs, e.g., SEC Rule 105 in the United States. For issuers who do not cover their short position with the new offer, this paper finds no evidence of manipulative short selling activity, which worsens the informativeness of secondary market prices and exerts temporary price pressure around the pricing date. Therefore, these findings imply indirectly that Rule 105 in the United States effectively restricts manipulative short selling before a SEO. In addition, our findings indicate that underwriters cannot set an offer price at the issuer's fundamental value completely in Japan without such a regulation. These results imply that it is necessary to introduce a short selling regulation, such as Rule 105, in many countries that lack such a regulation. Although this analysis is based on the Japanese experience, these results may have important implications for countries worldwide.

Appendix A: Matching Procedure

The matching procedure is as follows. First, I implement a probit estimation that models the probability of an equity offering in year *t* conditional on the covariates observed in year *t*-1. Firms that issue equity ($SEO_t = 1$) are labeled as treatment observations. Next, I attach a propensity score to each observation. The propensity score $e(\cdot)$ is defined as

$$e(X_{t-1}) \equiv \Pr(SEO_t = 1 | X_{t-1}), \tag{A1}$$

where X_{t-1} is a vector of covariates in the probit estimation.

Next, I implement another set of probit estimations, including cross-terms, multiplied by the variables that measure the extent of the external control of a firm. For each treatment observation, the paper identifies matched observations from the sample of firms without issuing securities. The matched observations are those that demonstrate the "closest" propensity scores to a particular treatment observation and are labeled as control observations. These matched observations are selected from the same calendar year as the treatment observation. It should also be noted that I use a non-treated observation more than once as a control; that is, a non-treatment observation may be used as a control for more than one treatment observation at the same time. Several matching algorithms can be used to find the "closest" control observations. As a baseline for this analysis, I employ the ten nearest matches in which the arbitrarily determined ten observations with propensity scores closest to each treatment observation are selected.[21]

One of the benefits of employing propensity score matching estimation is that I can match treatment and control observations using the scalar propensity score. The propensity score, which is

[21] This paper finds that the results obtained using different matching algorithms (nearest five matches) are similar to those obtained using the ten nearest matches.

the conditional probability of being treated given the value of the observed characteristics, is a very useful variable in dealing with highly dimensional vectors of covariates. Rosenbaum and Rubin (1983) show that treatment observations and control observations with the same propensity score value have the same distribution of the full vector of covariates. Thus, it is sufficient to match firms in terms of the propensity score to obtain the same probability distribution of covariates for treatment and control observations.

I start with the baseline probit estimation. In the probit estimation, this paper obtains the conditional probabilities of a firm issuing equity in year *t* given the values of the observed firm's characteristics in year *t-1*. The dependent binary variable represents a security offering in year *t* (SEO_t). The following explanatory variables are used. Regarding firm performance, the return on total assets (ROA_{t-1}) and the capitalization (CAP_{t-1}), which is defined as the natural logarithm of the total market capitalization, are employed. I employ the debt ratio ($DEBT_{t-1}$) as a variable for higher risk of bankruptcy and the market to book ratio (MTB_{t-1}) as a variable for the firm's value gap.

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Table 1
Summary Statistics for Seasoned Equity Offers

Statistics for a sample of 218 seasoned equity offers during 1998 to 2009. DISCOUNT is the percent change from the closing price before an application to the offer price. Underpricing is the percentage price change from the offer price to the closing price on the day after the pricing date. CAR is the cumulative abnormal return. SSVOL is the total short selling volume (SS) relative to the total volume (VOL). ABSSVOL is the SSVOL minus the average daily SSVOL from day -140 to day -21 relative to the announcement date. SCR is the total number of covering shorts on an issue date relative to the total number of shorts that is not covered on a day prior to the issue date. Capitalization is the market capitalization on the day of the month just prior to the offer. RelOffSize represents the percentage of pr-issue shares outstanding that were issued in the offering. MajorUW is the dummy variable for the prestigious underwriter that assumes a value equal to 1 if the lead underwriter is the major underwriter, such as Nomura, Nikko, or Daiwa, and a value of zero otherwise. STDR is the standard deviation of daily stock returns over 20 trading days, ending 10 days prior to offer. Days from the announcement date (AD) to the pricing date (PD), Days from PD to the issue date (ID), and Days from AD to PD are the periods from AD to PD, PD to ID, and AD to ID, respectively.

(Number of observation = 218)	Mean	Median	Std.dev.
Discount and Underpricing			
Discount (Closing price on PD to offer price) (%)	3.01	3.02	0.81
Underpricing (Offer price to closing price on PD+3) (%)	4.24	3.23	5.30
Underpricing (Offer price to closing price on ID+10) (%)	1.89	2.12	6.78
Cumlative Abnormal return			
CAR from PD-3 to PD (%)	-2.82	-2.79	6.43
CAR from PD to PD+3 (%)	1.03	0.72	4.86
CAR from PD to ID+10 (%)	-1.11	-0.79	6.84
Short selling			
SSVOL[PD]	0.24	0.17	0.30
ABSSVOL[PD]	0.19	0.13	0.27
SCR (%)	53.94	55.50	25.16
Offering characteristics			
Capitalization (billion yen)	353.00	57.70	1750.00
Proceeds (billion yen)	29.90	5.86	84.60
RelOffSize (%)	12.39	11.40	6.50
Major UW	0.79	1.00	0.41
STDR	2.92	2.56	1.47
Days from AD to PD	7.33	7.00	2.04
Days from PD to ID	7.63	7.00	2.30
Days from AD to ID	14.92	14.00	3.29

Table 2
The scale of short selling prior to the pricing date

This table reports the level of short selling prior to the pricing date (PD). Panel A presents the average SSVOL, defined as the total short selling volume relative to the total volume prior to PD, and Panel B shows the average ABSSVOL, defined as the SSVOL minus the average daily SSVOL from day -140 to day -21 relative to the announcement date prior to PD. In the second to forth row, the total number of offers is divided into tertile based on SCR. Test statistics are t-test results for difference in means (highest SCR group - lowest SRC group).

Panel A : SSVOL

		SCR				
	Total Sample	High (a)	Middle	Low (b)	(a)-(b)	t-statistics
[PD-5]	0.14	0.12	0.12	0.16	-0.04	-0.83
[PD-4]	0.14	0.12	0.14	0.15	-0.03	-0.41
[PD-3]	0.13	0.12	0.15	0.13	-0.01	-0.26
[PD-2]	0.17	0.17	0.18	0.17	0.00	-0.10
[PD-1]	0.20	0.19	0.22	0.18	0.01	0.15
[PD]	0.24	0.23	0.27	0.22	0.01	0.22
[PD-3 to PD]	0.19	0.18	0.21	0.17	0.00	0.03
[AD to PD]	0.16	0.16	0.18	0.14	0.02	0.73
Obs.	218	73	72	73		

Panel B : ABSSVOL

		SCR				
ABSSVOL	Total Sample	High (a)	Middle	Low (b)	(a)-(b)	t-statistics
[PD-5]	0.09	0.08	0.08	0.11	-0.03	-0.67
[PD-4]	0.09	0.08	0.10	0.09	-0.01	-0.23
[PD-3]	0.09	0.08	0.10	0.08	0.00	0.11
[PD-2]	0.13	0.12	0.14	0.12	0.01	0.17
[PD-1]	0.15	0.15	0.18	0.13	0.02	0.55
[PD]	0.19	0.19	0.23	0.16	0.02	0.46
[PD-3 to PD]	0.14	0.13	0.16	0.12	0.01	0.45
[AD to PD]	0.11	0.12	0.13	0.09	0.03	1.35
Obs.	218	73	72	73		

Table 3

Informativeness of secondary market prices prior to the pricing date

This table reports the informativeness of secondary market prices prior to the pricing date. ABILLQ is defined as the ILLQ, defined as the average daily ratio between the absolute value of a stock, relative to AVILLQ, defined as the average daily ILLQ for that firm from day -200 to day -21 (6 months) relative to the announcement date. Panel A presents the average ABILLQ prior to PD. The first row of Panel A shows the average of ABILLQ, which are based on the total sample. In the second to forth row of Panel A, the total number of offers is divided into tertile based on SCR. Test statistics are t-test results for difference in means (highest SCR group - lowest SRC group). Test statistics of Panel A are t-test results for difference in means. ** and * denote significance at the 5% and 10% levels, respectively. Panel B shows various ordinary least squares regressions that predict ABILLQ. The dependent variable is ABILLQ on the pricing date. The first independent variable is ABSSVOL on [PD]. The HighestSCR is the dummy variable that assumes a value equal to 1 if issuers with highest tertile SCR and zero otherwise. The MiddleSCR is the dummy variable that assumes a value equal to 1 if issuers with middle tertile SCR and zero otherwise. The HighestSCR*ABSSVOL variable is the cross-term of HighestSCR and their ABSSVOL. The MiddleSCR*ABSSVOL variable is the cross-term of MiddleSCR and their ABSSVOL. The RelTurnover variable is the average daily turnover for a firm during the benchmark period. The benchmark period extends from day -200 to day -21 (6 months) relative to the announcement date.T-ratios of robust standard errors are presented in parentheses. *** and ** denote coefficients significant at the 1% and 5% levels, respectively.

Panel A: the average ABILLQ prior to PD

[t]	Total Sample	SCR High (a)	SCR Middle	SCR Low (b)	(a)-(b)	t-statistics	
[PD-5]	0.72	0.72	0.76	0.68	0.04	0.36	
[PD-4]	0.70	0.74	0.67	0.68	0.05	0.38	
[PD-3]	0.62	0.62	0.61	0.64	-0.01	-0.11	
[PD-2]	0.62	0.56	0.71	0.58	-0.02	-0.22	
[PD-1]	0.79	0.45	0.74	1.18	-0.73	-2.13	**
[PD]	0.53	0.44	0.44	0.71	-0.27	-2.06	**
[PD-3 toPD]	0.64	0.52	0.62	0.78	-0.26	-2.34	**
[AD to PD]	0.68	0.61	0.67	0.76	-0.15	-1.70	*
Obs.	218	73	72	73			

Panel B: Ordinary least squares regressions predicting ABILLQ

ABILLQ [PD]	Model 1 Coeff.	Model 1 t-statistics	Model 2 Coeff.	Model 2 t-statistics	Model 3 Coeff.	Model 3 t-statistics
ABSSVOL[PD]			0.03	0.19	0.16	1.85 *
HighSCR*ABSSVOL[PD]					-0.66	-2.50 **
MiddleSCR*ABSSVOL[PD]					-0.24	-0.57
HighSCR dummy	-0.16	-1.78 *	-0.16	-1.82 *	0.03	0.27
MiddleSCR dummy	-0.12	-1.48	-0.13	-1.57	-0.10	-0.86
RelTurnover	-2.95	-3.01 ***	-2.87	-2.99 ***	-3.00	-3.19 ***
Intercept	0.58	8.57	0.58	7.43 ***	0.55	6.90 ***
R^2	0.05		0.05		0.07	
Observations	218		218		218	

Table 4
Pre-pricing and post-pricing performance

This table shows the abnormal return (AR) and cumulative abnormal return (CAR) around the pricing date (PD). Panel A presents the average AR and CAR prior to PD. The first row of Panel A shows the average of AR and CAR that are based on the total sample. In the third and sixth row of Panel A, the paper divides into the High ABSSVOL group and Low ABSSVOL group based on the median of ABSSVOL on the pricing date. Panel B shows the average AR and CAR around PD in the group divided into tertile based on the level of SCR. Test statistics are t-statistics for the significance of this difference from zero. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Total sample, High ABSVOL and Low ABSSVOL

	Total sample		High ABSSVOL[PD]		Low ABSSVOL[PD]	
	AR	CAR	AR	CAR	AR	CAR
[PD-3]	-0.35 *	-0.35 *	-0.04	-0.04	-0.58 *	-0.57 *
[PD-2]	-0.60 ***	-0.95 ***	-0.51 **	-0.55	-0.69 **	-1.27 ***
[PD-1]	-0.54 **	-1.48 ***	-1.24 ***	-1.78 ***	0.17	-1.10 **
[PD]	-1.38 ***	-2.84 ***	-1.94 ***	-3.68 ***	-0.86 **	-1.95 ***
[PD+1]	0.55 ***	-2.30 ***	0.48 *	-3.22 ***	0.60 **	-1.36 *
[PD+2]	0.46 **	-1.86 ***	0.49 *	-2.74 ***	0.37	-1.00
[PD+3]	0.00	-1.85 ***	0.23	-2.52 ***	-0.21	-1.20
Obs.	218		109		109	

Panel B: SCR

	HighSCR		MiddleSCR		LowSCR	
	AR	CAR	AR	CAR	AR	CAR
[PD-3]	-0.87 **	-0.87 **	0.09	0.09	-0.28	-0.28
[PD-2]	-1.23 ***	-2.08 ***	-0.22	-0.12	-0.34	-0.59
[PD-1]	-0.47	-2.57 ***	-0.58 **	-0.68	-0.55	-1.12 *
[PD]	-2.11 ***	-4.60 ***	-1.49 ***	-2.18 ***	-0.53	-1.63 *
[PD+1]	1.17 ***	-3.46 ***	0.13	-2.06 ***	0.36	-1.33
[PD+2]	1.05 **	-2.52 ***	0.23	-1.85 ***	0.10	-1.33
[PD+3]	0.03	-2.50 ***	0.33	-1.55 **	-0.36	-1.69 **
Obs.	73		72		73	

Table 5
The effect of the level of short selling prior to the pricing on the pre pricing performance

This table shows various ordinary least squares regressions that predict cumulative abnormal return (CAR) prior to the pricing date (PD). The dependent variable, CAR, is a cumulative abnormal return around the pricing date. The ABSSVOL, which is defined as the SSVOL minus the average daily SSVOL from day -140 to day -21 relative to the announcement date, is the proxy of the level of short selling prior to PD. The SCR is the total number of covering shorts on an issue date relative to the total number of shorts that is not covered on a day prior to the issue date. The HighestSCR is the dummy variable that assumes a value equal to 1 if issuers with highest tertile SCR and zero otherwise. The MiddleSCR is the dummy variable that assumes a value equal to 1 if issuers with middle tertile SCR and zero otherwise. The HighestSCR*ABSSVOL variable is the cross-term of HighestSCR and their ABSSVOL. The MiddleSCR*ABSSVOL variable is the cross-term of MiddleSCR and their ABSSVOL. T-ratios of robust standard errors are in parentheses. ***, ** and * denote coefficients significant at the 1%, 5%, 10% levels, respectively.

	CAR [PD-3 to PD]			
	Model 1	Model 2	Model 3	Model 4
ABSSVOL[PD]	-3.22 **	-3.31 **		
	(-2.39)	(-2.01)		
HighSCR*ABSSVOL[PD]		-0.09		
		(-0.02)		
MiddleSCR*ABSSVOL[PD]		0.71		
		(0.21)		
ABSSVOL[PD-3 to PD]			-4.06 *	-6.24 *
			(-1.97)	(-1.78)
HighSCR*ABSSVOL[PD-3 to PD]				3.63
				(0.58)
MiddleSCR*ABSSVOL[PD-3 to PD]				4.22
				(0.95)
HighSCR dummy	-3.13 ***	-3.11 **	-3.15 ***	-3.61 **
	(-2.81)	(-2.08)	(-2.80)	(-2.49)
MiddleSCR dummy	-0.49	-0.65	-0.53	-1.13
	(-0.48)	(-0.51)	(-0.51)	(-0.95)
Intercept	-0.96	-0.94	-0.99	-0.72
	(-1.04)	(-0.98)	(-1.14)	(-0.78)
R^2	0.064	0.064	0.058	0.061
Observations	218	218	218	218

Table 6

The effect of the level of short selling prior to the pricing on the post pricing performance

This table shows various ordinary least squares regressions that predict cumulative abnormal return (CAR) after the pricing date (PD). The dependent variable, CAR, is a cumulative abnormal return around the pricing date. The ABSSVOL, which is defined as the SSVOL minus the average daily SSVOL from day -140 to day -21 relative to the announcement date, is the proxy of the level of short selling prior to PD. The SCR is the total number of covering shorts on an issue date relative to the total number of shorts that is not covered on a day prior to the issue date. The HighestSCR is the dummy variable that assumes a value equal to 1 if issuers with highest tertile SCR and zero otherwise. The MiddleSCR is the dummy variable that assumes a value equal to 1 if issuers with middle tertile SCR and zero otherwise. The HighestSCR*ABSSVOL variable is the cross-term of HighestSCR and their ABSSVOL. The MiddleSCR*ABSSVOL variable is the cross-term of MiddleSCR and their ABSSVOL. T-ratios of robust standard errors are in parentheses. ***, ** and * denote coefficients significant at the 1%, 5%, 10% levels, respectively.

	CAR [PD+1 to PD+3]				CAR [PD+1 to ID+10]			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
ABSSVOL[PD]	0.19	-1.13			0.10	-1.90 *		
	(0.21)	(-1.37)			(0.07)	(-1.82)		
HighSCR*ABSSVOL[PD]		6.26 **				8.90 **		
		(2.44)				(2.49)		
MiddleSCR*ABSSVOL[PD]		2.24				3.92		
		(1.04)				(1.32)		
ABSSVOL[PD-3 to PD]			-0.83	-4.39 *			0.08	-3.34
			(-0.58)	(-1.80)			(0.03)	(-0.97)
HighSCR*ABSSVOL[PD-3 to PD]				8.09 **				9.09
				(2.01)				(1.63)
MiddleSCR*ABSSVOL[PD-3 to PD]				5.65 *				4.67
				(1.83)				(1.09)
HighSCR dummy	2.13 **	0.99	2.14 **	1.10	2.49 **	0.87	2.49 **	1.31
	(2.37)	(0.90)	(2.39)	(0.95)	(2.09)	(0.59)	(2.09)	(0.85)
MiddleSCR dummy	0.60	0.17	0.64	-0.13	1.66	0.91	1.67	1.05
	(0.72)	(0.17)	(0.78)	(-0.12)	(1.45)	(0.64)	(1.46)	(0.77)
Intercept	0.05	0.27	0.18	0.62 **	-2.53 ***	-2.21 **	-2.53 ***	-2.11 *
	(0.06)	(0.31)	(0.22)	(0.65)	(-2.61)	(-2.21)	(-2.61)	(-1.91)
R^2	0.034	0.050	0.035	0.049	0.023	0.039	0.023	0.022
Observations	218	218	218	218	218	218	218	218

Table 7

The effect of the level of short selling prior to the pricing date on the discount rate

This table shows various ordinary least squares regressions that predict the discount rate. The dependent variable, DISCOUNT, is defined as the percent change from the closing price before an application to the offer price. The ABSSVOL, which is defined as the SSVOL minus the average daily SSVOL from day -140 to day -21 relative to the announcement date, is the proxy of the level of short selling prior to PD. The SCR is the total number of covering shorts on an issue date relative to the total number of shorts that is not covered on a day prior to the issue date. The HighestSCR is the dummy variable that assumes a value equal to 1 if issuers with highest tertile SCR and zero otherwise. The MiddleSCR is the dummy variable that assumes a value equal to 1 if issuers with middle tertile SCR and zero otherwise. The HighestSCR*ABSSVOL variable is the cross-term of HighestSCR and their ABSSVOL. The MiddleSCR*ABSSVOL variable is the cross-term of MiddleSCR and their ABSSVOL. The ln (Market Cap) is defined as the natural logarithm of total market capitalization on the day prior to the offer. The STDR is defined as the standard deviation of daily stock returns over 120 trading days and ending 20 days prior to the offer. RelOffSize is defines as the number of offered shares divided by the size of the existing market for the firm's shares. The MajorUW is the dummy variable for prestigious underwriter that assumes a value equal to 1 if the lead underwriter is the major underwriter, such as Nomura, Nikko, or Daiwa, and a value of zero otherwise. Days is defined as the days between the pricing date (PD) to the issue date (ID). EXCHANGE are sets of exchange dummy variables. T-ratios of robust standard errors are in parentheses. ***, ** and * denote coefficients significant at the 1%, 5%, 10% levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
ABSSVOL[PD]		-0.38 ***				-0.44 **	-0.44 ***
		(-2.91)				(-2.12)	(-2.73)
ABSSVOL[PD-1]			-0.10			0.14	
			(-0.45)			(0.45)	
ABSSVOL[PD-2]				-0.14		-0.06	
				(-0.66)		(-0.21)	
ABSSVOL[PD-3]					0.39	0.42	
					(0.84)	(0.79)	
HighSCR*ABSSVOL[PD]							-0.12
							(-0.37)
MiddleSCR*ABSSVOL[PD]							0.24
							(0.57)
HighSCR	-0.19	-0.19	-0.20	-0.20	-0.21	-0.19	-0.17
	(-1.56)	(-1.54)	(-1.61)	(-1.62)	(-1.65)	(-1.58)	(-1.01)
MiddleSCR	-0.24 *	-0.22 *	-0.24 *	-0.24 *	-0.25 *	-0.24 *	-0.28
	(-1.78)	(-1.70)	(-1.76)	(-1.76)	(-1.82)	(-1.80)	(-1.61)
ln(Capitalization)	-0.21 ***	-0.22 ***	-0.21 ***	-0.21 ***	-0.19 ***	-0.20 ***	-0.21 ***
	(-6.14)	(-6.42)	(-6.14)	(-6.23)	(-5.15)	(-5.63)	(-5.88)
RelOffSize	1.83 **	1.76 **	1.77 **	1.78 **	1.66 **	1.63 **	1.75 **
	(2.38)	(2.30)	(2.25)	(2.28)	(2.03)	(2.01)	(2.28)
Major UW	-0.10	-0.16	-0.11	-0.11	-0.08	-0.13	-0.15
	(-0.61)	(-0.91)	(-0.66)	(-0.71)	(-0.43)	(-0.74)	(-0.84)
STDR	0.02	0.01	0.02	0.02	0.03	0.02	0.01
	(0.48)	(0.32)	(0.50)	(0.46)	(0.59)	(0.36)	(0.30)
Days[PD to ID]	0.06 **	0.06 **	0.06 **	0.06 **	0.06 **	0.06 **	0.06 *
	(2.01)	(2.03)	(2.01)	(2.01)	(1.99)	(2.00)	(1.90)
Exchange dummy	yes	yes	yes	yes	yes	yes	yes
Intercept	7.37 ***	7.71 ***	7.48 ***	7.53 ***	6.85 ***	7.12 ***	7.68 ***
	(9.05)	(9.26)	(8.80)	(8.97)	(7.00)	(7.67)	(8.63)
R^2	0.220	0.236	0.223	0.223	0.229	0.246	0.237
Observations	218	218	218	218	218	218	218

Table 8

The effect of the level of short selling prior to the pricing date on the underpricing

This table shows various ordinary least squares regressions that predict the underpricing. In Models 1 to 4, the definition of dependent variable Underpricing is the percent change from offer price to closing price on the pricing date (PD)+3. In Models 5 to 8, the definition of dependent variable Underpricing is the percent change from offer price to closing price on the issue date (ID) +10. The ABSSVOL, which is defined as the SSVOL minus the average daily SSVOL from day -140 to day -21 relative to the announcement date, is the proxy of the level of short selling prior to PD. The SCR is the total number of covering shorts on an issue date relative to the total number of shorts that is not covered on a day prior to the issue date. The HighestSCR is the dummy variable that assumes a value equal to 1 if issuers with highest tertile SCR and zero otherwise. The MiddleSCR is the dummy variable that assumes a value equal to 1 if issuers with middle tertile SCR and zero otherwise. The HighestSCR*ABSSVOL variable is the cross-term of HighestSCR and their ABSSVOL. The MiddleSCR*ABSSVOL variable is the cross-term of MiddleSCR and their ABSSVOL. The ln (Market Cap) is defined as the natural logarithm of total market capitalization on the day prior to the offer. The STDR is defined as the standard deviation of daily stock returns over 120 trading days and ending 20 days prior to the offer. RelOffSize is defines as the number of offered shares divided by the size of the existing market for the firm's shares. The MajorUW is the dummy variable for prestigious underwriter that assumes a value equal to 1 if the lead underwriter is the major underwriter, such as Nomura, Nikko, or Daiwa, and a value of zero otherwise. Days is defined as the days between PD to ID. EXCHANGE are sets of exchange dummy variables. T-ratios of robust standard errors are in parentheses. ***, ** and * denote coefficients significant at the 1%, 5%, 10% levels, respectively.

	Underpricing [Offer price to Closing price on PD+3]				Underpricing [Offer price to Closing price on PD+10]			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
ABSSVOL[PD]	0.56	-1.10 *			-0.57	-2.67 **		
	(0.47)	(-1.67)			(-0.32)	(-2.19)		
HighSCR*ABSSVOL[PD]		9.32 ***				11.56 ***		
		(2.96)				(2.73)		
MiddleSCR*ABSSVOL[PD]		3.44				4.57		
		(1.26)				(1.21)		
ABSSVOL[PD-3 to PD]			0.48	-1.80			-0.10	-3.30
			(0.28)	(-1.17)			(-0.03)	(-0.83)
HighSCR*ABSSVOL[PD-3 to PD]				9.03 **				11.74 *
				(2.93)				(1.67)
MiddleSCR*ABSSVOL[PD-3 to PD]				3.64				4.49
				(1.29)				(0.81)
HighSCR dummy	2.52 ***	0.72	2.53 ***	0.78	2.90 **	0.68	2.88 **	1.28
	(2.96)	(0.60)	(2.99)	(0.65)	(2.37)	(0.44)	(2.35)	(0.77)
MiddleSCR	0.85	0.14	0.86	0.10	1.40	0.47	1.38	0.77
	(1.13)	(0.14)	(1.15)	(0.10)	(1.16)	(0.30)	(1.14)	(0.50)
ln(Capitalization)	0.04	0.21	0.05	0.17	0.19	0.39	0.20	0.30
	(0.23)	(1.00)	(0.25)	(0.83)	(0.60)	(1.13)	(0.60)	(0.90)
RelOffSize	-10.48 **	-10.14 **	-10.54 **	-10.07 **	-23.14 ***	-22.70 ***	-23.06 ***	-22.74 ***
	(-2.22)	(-2.17)	(-2.23)	(-2.15)	(-2.68)	(-2.66)	(-2.67)	(-2.63)
Major UW	-0.08	0.26	-0.12	0.25	-0.53	-0.59	-0.94	-0.68
	(-0.10)	(0.31)	(-0.14)	(0.30)	(-0.56)	(-0.48)	(-0.78)	(-0.55)
STDR	0.74	0.82 *	0.73	0.81 *	-0.16	-0.07	-0.15	-0.08
	(1.65)	(1.79)	(1.63)	(1.77)	(-0.43)	(-0.18)	(-0.39)	(-0.21)
Days[PD to ID]	0.08	0.03	0.08	0.04	-0.07	-0.13	-0.07	-0.10
	(0.64)	(0.19)	(0.46)	(0.21)	(-0.36)	(-0.70)	(-0.35)	(-0.51)
Exchange dummy	yes	yes	yes	yes	yes	yes	yes	yes
Intercept	0.62	-3.16	0.58	-2.08	-0.59	-5.22	-1.00	-3.75
	(0.12)	(-0.55)	(0.10)	(-0.36)	(-0.07)	(-0.61)	(-0.11)	(-0.43)
R^2	0.11	0.15	0.11	0.15	0.09	0.10	0.08	0.09
Observations	218	218	218	218	218	218	218	218

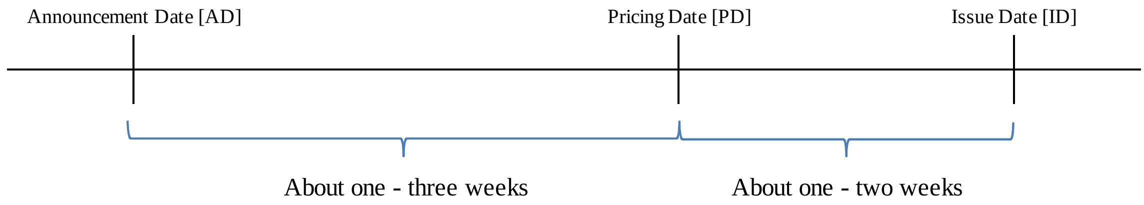

Fig. 1 The timing of announcement date (AD), pricing date(PD), and issue date(ID)

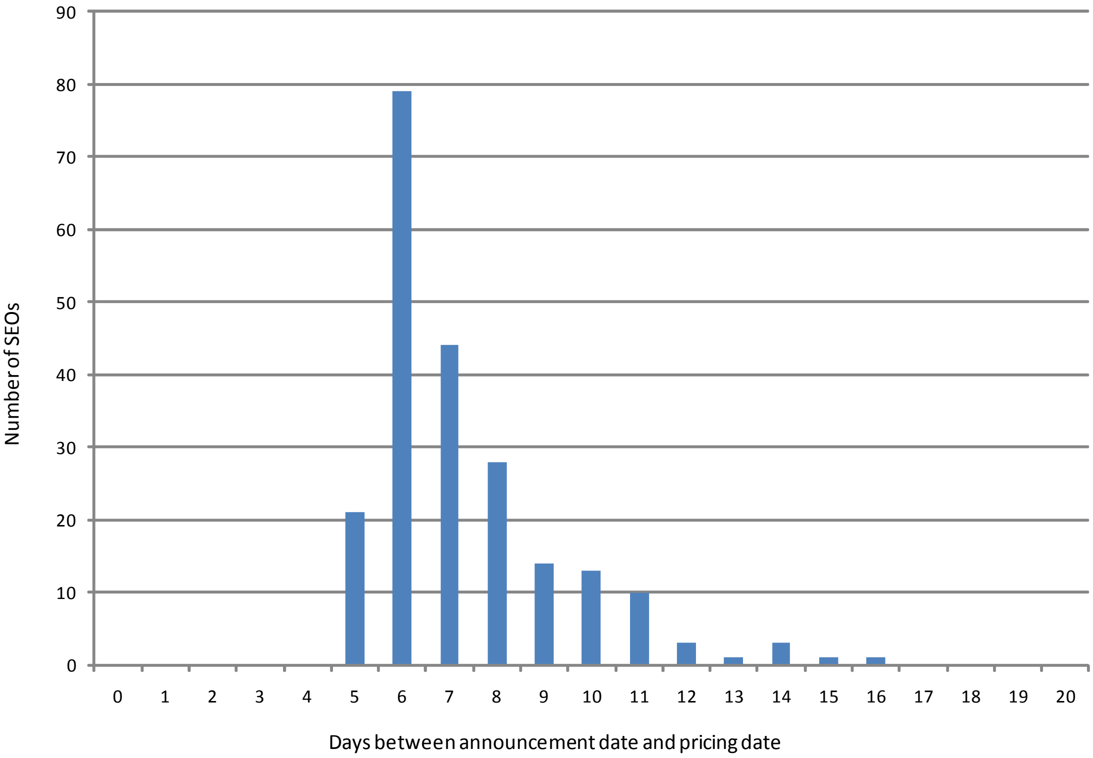

Fig. 2. Frequency distribution of the number of trading days between from announcement date (AD) to the pricing date (PD)

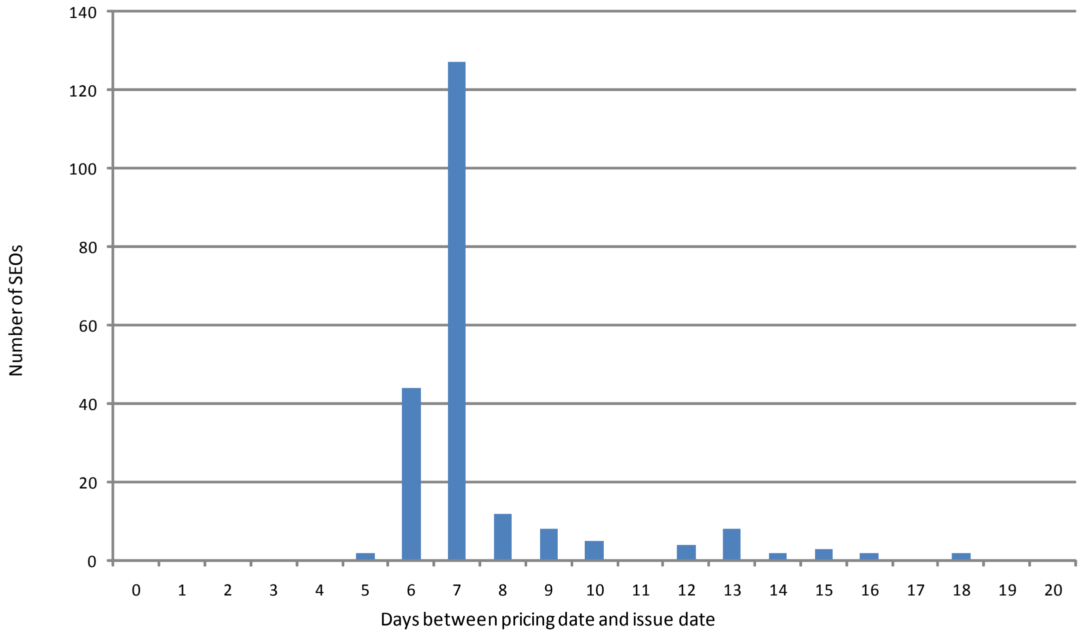

Fig. 3. Frequency distribution of the number of trading days between from the pricing date (PD) to the issue date (ID)

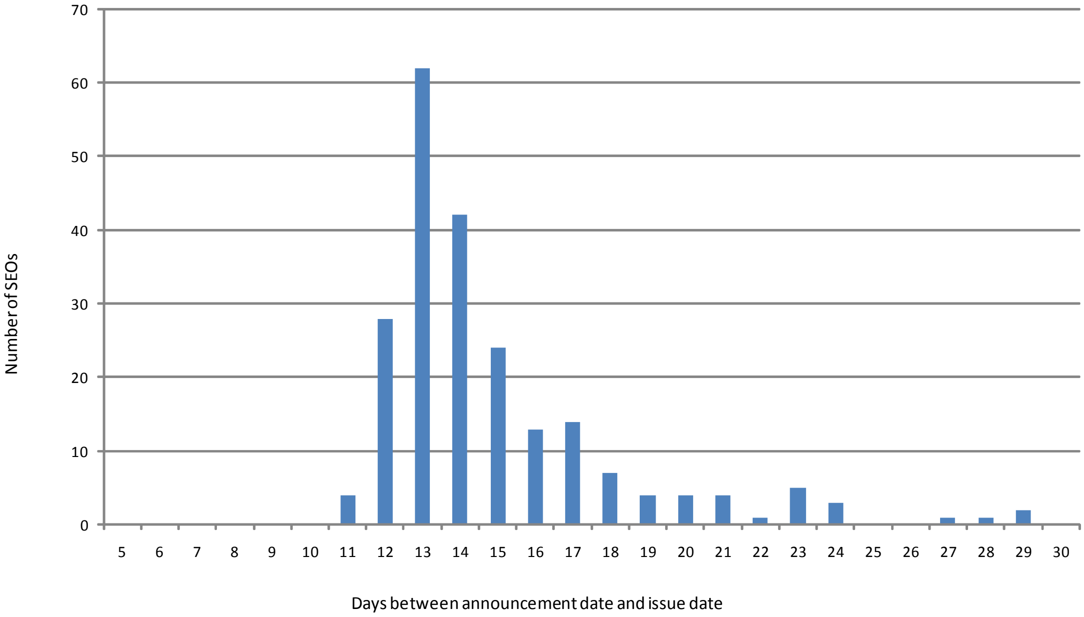

Fig. 4. Frequency distribution of the number of trading days between from the announcement date (AD) to the issue date (ID)

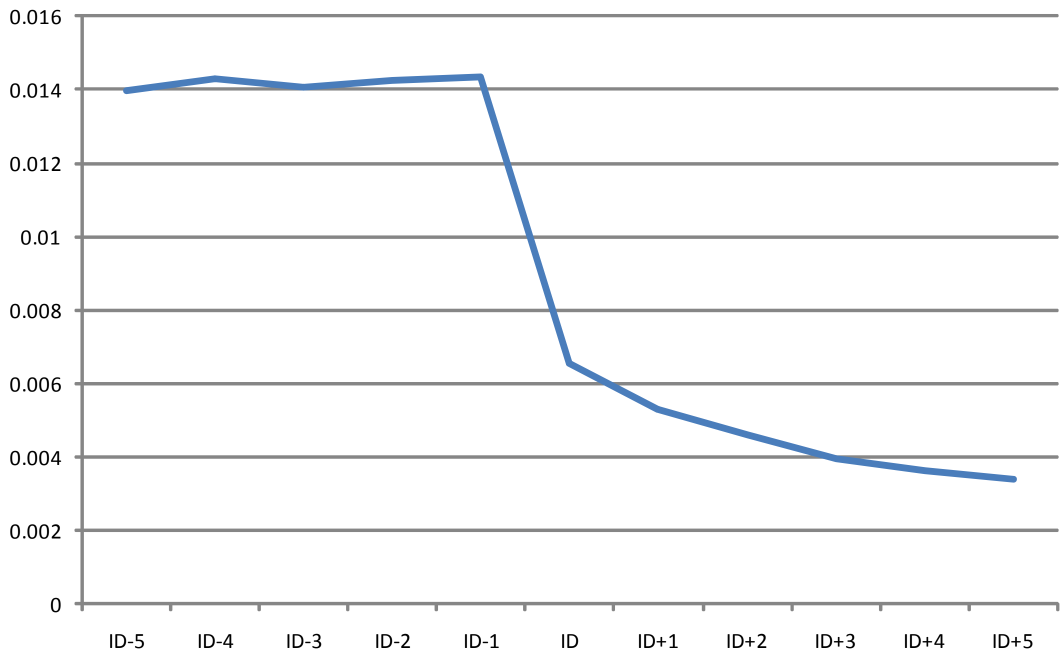

Fig. 5. The total number of short selling stocks without covered which is divided by total shares around the issue date (ID)