Short-Selling Constraints and Supply Effects

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Abstract

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JEL classification: G14, G15, G32
Keywords: Differential short-selling constraints, Increased Supply, Downward-sloping Demand Curve, Market Timing.

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Abstract

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Introduction:

Several major tenets of modern finance theory rest on the assumption that the demand curve for common stocks is horizontal. It is not surprising, therefore, that over the years numerous studies have revisited the question and have modeled or empirically analyzed factors potentially associated with downward sloping demand curves for common stocks. The question has been examined in settings ranging from inclusion/deletions of stocks to/from popular stock indices, stock splits, block trades and equity issuances. However, while many studies support the presence of a supply effect, several others offer evidence and alternate explanations that are not consistent with downward sloping demand curves.[1] Thus, this body of evidence leaves the question of downward sloping demand curves unresolved. Notably, a key feature in the foregoing debate is whether the event examined is devoid of any informational issues. Accordingly, we posit that the ideal environment to examine a possible supply effect is to observe an event where no new information is revealed, a demand shock occurs or there is an infusion of new shares and the supply of shares actually changes, both for stocks with and without trading constraints.

In the context of equity issuances, the regulatory structure of Japanese seasoned equity offers (SEOs) provide just such a preferred setting for several reasons. First and the most important attribute of the Japanese process is that the SEOs' issue date is separated from their pricing date by at least five trading days.[2] Consequently, on a Japanese SEO's Issue Day there is an infusion

[1] Scholes (1972) is the first study to assess the likelihood of a downward sloping demand curve, by examining the supply effect of secondary share issuance. Asquith and Mullins (1986) revisit the question and reach different conclusions. In the case of a demand shock induced by the inclusion of scrips in popular stock indices, Shleifer (1986), Kaul, Mehrotra and Morck (2000), Wurgler and Zhuravskaya (2002), among others, present evidence consistent with a downward sloping demand curve. However, another group of related studies, including Dhillon and Johnson (1991), Denis, McConnell, Ovtchinnikov and Yu (2003), Chen, Noronha and Singal (2004) offer alternate evidence and explanations that are not consistent with a supply effect.

[2] Rule 280 (3-2) of the Japanese Commercial Law indicates that issuers must issue the new shares at least five business days after the pricing date. A detailed discussion of the institutional details of the Japanese SEOs and other information-related characteristics of the issuance process for U.S. and Japan follow in Section 2 of the paper.

of new shares and the supply of shares actually changes but no new information is revealed on that date. The other key attribute that has an important bearing on our study is the very dissimilar set of rules governing short sales across the two types of common stock that trade in the Japanese stock market. In Japan only certain stocks are eligible for short selling on the centralized market; the rest of the stocks face short-sales constraints. We refer to the stocks with restricted short-selling as *Constrained* stocks, and the eligible stocks as the *Unconstrained* stocks.[3] Finally, unlike in the U.S., there were no laws prohibiting manipulative short sales around SEOs in Japan, until December 2011.

Our results, discussed later in greater detail, provide fresh evidence supporting the presence of a supply effect; primarily supporting the case for a downward sloping demand curve for stocks with short-selling restrictions. Specifically, the key finding is that on the Issue-Day of Japanese SEOs, stock prices decline significantly *only* for the short-selling *Constrained* sample. The difference in the Issue-Day price reaction between the *Constrained* and the *Unconstrained* stock SEOs is both economically and statistically significant.

We next juxtapose our findings against prior research. Scholes (1972) examines the impact of secondary share issuance to study whether the increased supply of shares adversely impact the firm's stock price. Scholes labels it the price-pressure effect and rejects its presence arguing that "…the shares a firm sells are not unique works of art but abstract rights…for which close counterparts exist" (p. 179). However, there are a few points to bear in mind as we examine Scholes' (1972) conclusion.

First, Scholes examines the price reaction only around the issuance date for secondary offers,

[3] Since stocks eligible for short sales in the centralized market are selected by liquidity, firm size and ease of borrowing shares, short-sales constraints for these stocks are less binding than they are for their non-eligible counterparts.

and not at their announcement. It should be expected that most of the price-pressure related stock price reaction occur at the announcement of the offerings. However, detecting price-pressure effects at announcements is problematic because events involving issuance of new shares are also closely tied with adverse-information effects (Myers and Majluf 1984).[4] The question is further complicated because Diamond and Verrecchia (1987) suggest that negative information is incorporated into prices slowly when stocks are short-sales constrained. Diamond and Verrecchia (1987) argue that "…Prohibiting traders from shorting reduces the adjustment speed of prices to private information, especially to bad news" (p. 277). Therefore, it should be expected that most of the price-pressure and the adverse-information related stock price reaction occurs at the announcement of the offerings, unless there are trading restrictions that inhibit price discovery at that juncture.

Second, it is difficult to get a clean resolution using U.S. based observations.[5] For instance, Asquith and Mullins (1986) examine a U.S. based sample of seasoned equity offerings (SEOs) and conclude that their "… findings are consistent both with the hypothesis that equity issues are viewed by investors as negative signals and with the hypothesis that there is a downward sloping demand for a firm's shares."(p. 61). These findings do not provide an unequivocal conclusion. Further, the difficulty in using U.S. based observations also lies in the fact that the Issue-Day price reaction is confounded by information effects related to the pricing of the SEO, and effects related

[4] Myers and Majluf (1984) attribute the average negative return at seasoned equity offer (SEO) announcements to an information asymmetry between corporate insiders and outside investors. Outside investors face an adverse selection problem and suspect that the better informed managers are more likely to issue equity when their stock is overvalued.

[5] The examination is further complicated around the issuance of new shares in the U.S. because of information-related features, including manipulative short selling. On the other hand, short selling regulations prohibiting manipulative short-sales, such as U.S. Securities and Exchange Commission's Rule 10b-21 or Rule 105, did not exist in Japan until December 2011. A detailed discussion of the rules governing manipulative short selling and a brief review of the related literature follows in Sections 2 of the paper.

to offer-size amendments. [6] Finally, U.S. based studies can only employ indirect measures of short-selling constraints.

On the other hand, the unique institutional attributes of Japanese SEOs, permit an examination of a potential supply effect, on the Issue Day (1) for stocks with and without trading restrictions, (2) free of the effects of manipulative short sales, and also (3) free of information effects related to the pricing of the SEO, and to offer-size amendments, that are commonly found for U.S. based observations.

Under the conditions discussed above, we propose the *Trading Restrictions Hypothesis* and posit that an increase in the supply of shares affects the price of short-selling constrained stocks adversely on the SEOs' Issue Day, even though it may be unrelated to any new information about the firm. The argument is that when trading restrictions are binding, the participation of less optimistic investors is curbed in the price discovery process. Specifically, pessimistic investors are kept at abeyance and prevented from short selling the stock. Thus, short-selling constrained stocks are likely to be overpriced and the influx of additional shares on the SEO's Issue Day causes their price to decline. This is the outcome of pessimistic investors getting engaged in the trade; and they trade at prices that reflect their less sanguine stock valuation. The argument presupposes that the number of optimistic investors is limited and that the existing stockholders do not choose to increase their current holdings.

A temporary price effect on the SEOs' issue date followed by a quick price recovery would be consistent with alternate explanations (as in Barclay and Litzenberger 1988, Gerard and Nanda 1993, and Meidan 2005). On the other hand, if the share price is affected by the supply effect from

[6] See Altınkılıç and Hansen (2003) and Chan, Nayar, Singh and Yu (2018)

the issuance of the new shares, a larger offering size will be associated with a corresponding greater price decline on the SEO's Issue Day, the price effect will not be temporary, and the stock price will not recover in the days after the offering. In this setting, the temporary or permanent price pressure effects due to the increased supply of shares, if any, should be observed on the Issue Day. Specifically, the *Trading Restrictions Hypothesis* is supported if on SEOs' issue date a supply effect, permanent rather than temporary, is observed only for short-sales constrained stocks. No corresponding Issue-Day price effect is predicted for stocks without any trading restrictions.

Our primary findings can be summarized as follows. Consistent with Myers and Majluf's (1984) adverse selection explanation, we document a significant price drop on the SEOs' Announcement Day for both types of stocks, namely those that are eligible for centralized margin short sales, and those that are not. However, we find that the Announcement Day stock price reaction is significantly more negative for the *Unconstrained* sample, relative to that for *Constrained* stocks, which face greater short-selling restrictions.[7]

More importantly, on the Japanese SEOs' issue day, where there is an infusion of additional shares but no new information is released, we find that stock prices decline significantly *only* for the short-selling restricted stock sample; and the price decline is not followed by a price recovery. Essentially for each of the two types of stocks, the size and significance of the price reactions *reverse* themselves on the Issue Day, from the respective pattern observed on their Announcement Day. In robustness tests, we find similar results even after addressing potential endogeneity concerns. In light of the strong and consistent results that the Issue Day returns are significantly negative only for the short-selling constrained stocks, we argue that our results are supportive of

[7] The result is consistent with Nagel (2005) who argues that constrained stocks under-react to bad news because trading restrictions "hold negative opinions off the market" (p. 278). However, the Announcement Day stock price reaction is not the focus of this study because, on that event date, the market's response is affected by the SEOs' attendant adverse information effects.

the *Trading Restriction Hypothesis.*

Our findings are consistent with Greenwood (2009). Greenwood examines the restrictions placed on investors to sell their shares in the context of Japanese stock splits and notes that the greater the restrictions imposed on potential sellers, more pronounced are the price effects. Further, Greenwood (2009) finds that these effects are reversed when the restrictions are relaxed and investors are allowed to sell again. The key difference between our two studies is that Greenwood (2009) examines the effects of placing temporary trading restrictions on stocks, in general. We, on the other hand, directly examine the differential price effects of additional share infusion on stocks that are with and without short-sales constraints.

The remainder of the paper is organized as follows. Section 2 provides an overview of regulations related to manipulative short sales in the U.S. and Japan, and a brief review of the related literature. Section 2 also provides institutional details regarding Japanese SEO procedures, and trading restrictions. The alternate hypotheses are discussed in Section 3. Section 4 describes the data and empirical methods. In Section 5, we report and discuss the empirical results. Section 6 presents supporting evidence and analyses. Section 7 concludes the paper.

2. **The institutional framework**

2.1. **The market for short sales in Japan**

As described in Hirose, Kato, and Bremer (2009), investors can sell stock short using either "negotiated" or "standardized" margin transactions. Negotiated margin transactions are usually between financial institutions; the terms and fees of negotiated margin transactions are determined by the respective parties. Any stock can be sold short using negotiated margin transactions. On the other hand, not all stocks under the standardized margin transactions are eligible for short sales.

Only certain stocks, called "*taishaku*" stocks, selected by the stock exchange based on liquidity, firm size, and shares outstanding, are eligible for short sales under the standardized margin transactions. [8] It must be noted that across the spectrum of *taishaku*-stocks, a subset of *taishaku* firms acquire attributes (such as firm size and liquidity) that closely match those of stocks classified as *non-taishaku*. The most likely cause is that such a subset of *taishaku* firms experience adverse performance and their characteristics become close to those of matching non-*taishaku* stocks. In robustness tests to control for potential endogeneity concerns, discussed in Section 6.2.2 of the paper, we exploit this factor to identify matched pairs of *Unconstrained* and *Constrained* stocks based on firm size and liquidity.

Short sale transactions using standardized margin transactions must follow the rules determined by the exchange. Although detailed information is not available, search and borrowing costs are usually lower for *taishaku* stocks than for *non-taishaku* stocks. Consistent with these lower costs, Hirose et al. (2009) show that about 90% of *taishaku* stocks had positive short interest during the 2003-2009 period. In comparison, only 20% *non-taishaku* stocks, had positive short interest during this period; and even for the few *non-taishaku* stocks with non-zero short interest, the size of their short interest was relatively small compared to that of *taishaku* stocks.

In summary, negotiated trading is used between financial institutions. However, within standardized margin transactions, short-sales constraints are less restrictive for *taishaku* stocks than for *non-taishaku* stocks. Throughout the paper, *taishaku* stocks are termed "*Unconstrained*

[8] Most of the stocks listed on the First Section of the Tokyo Stock Exchange are included in *taishaku* stocks. The process of standardized margin transactions is presented in Figure 2. Securities companies, accepting orders from investors for standardized margin transactions, check their stock inventory. They match the order with other orders for the same stock by other investors. If the amount of stock ordered by an investor cannot be met with the inventory on hand at the securities company and those made available by the matching process, then the securities firm goes to securities finance companies to fill the gap. Standardized margin transactions have mainly been used by individual investors whose credit base is weak; such transactions are quite convenient for them in that various conditions such as interest rates are fixed by the system regardless of the investor's creditworthiness. The *non-taishaku* stocks can be used for margin buying only and are not eligible for short sales using the standardized margin transactions.

stocks" and the rest of the stocks are designated as "*Constrained* stocks." *Constrained* stocks include both *non-taishaku* stocks and non-marginable stocks under the standardized margin transactions.

2.2. **Manipulative Short Sales Regulations and Related Literature**

In 1988, the U.S. *Securities and Exchange Commission* (SEC) adopted the Rule 10b-21 which applied to any short sale established between an SEO's initial filing and its Issue Day. Rule 10b-21 made it illegal for investors to cover a short position with stock purchased in a new offering if the short position was established between the SEO's filing date and the distribution date.

In 1997, the SEC replaced Rule 10b-21 with Rule 105, which did not prohibit short sales during the SEO period. Instead, Rule 105 prohibited traders from covering their short sales, made within five days of the SEO, with shares obtained in the offering.

In 2007, amendments were made to strengthen Rule 105. Previously, the S.E.C.'s Rule 105 allowed short sellers to purchase shares in the offering, but prohibited the use of those shares to cover short positions taken within five days. Under the amended Rule 105 (of Regulation M adopted in October 2007), anyone who executes a short sale during a restricted period, generally five business days before a public offering, is prohibited from even purchasing shares in the offering. Thus, it prohibits the short sale of an equity security and the purchase of that same security through the offering.[9] The 2007 amendment may be consistent with the idea that short sales, other than manipulative sales, help prevent under-reaction to the SEO information.

In Japan, the *Financial Services Agency* amended the Order for Enforcement of the Financial Instruments and Exchange Act (FIEA, Syouwa 40 cabinet order 321) in December 2011. The new

[9] Pursuant to the 2007 amendments to Rule 105, enforcement activity has increased markedly. Recently, the number of Rule 105 settlements have increased sharply. From January 2010 to September 2013, the SEC collected over $42 million from disgorgement, civil penalties and pre-judgment interest based on violations of Rule 105.

regulation (FIEA 26-6) closely resemble the *Securities and Exchange Commission's* Rule 10b-21 in the U.S. It prohibits the use of the allocated new shares to cover short positions created between SEO announcement and price determination date.

2.2.1 **Related literature**

A set of empirical studies suggest that short sellers are investors with superior information capabilities, and that their trading helps correct overvaluation.[10] Bris, Goetzmann and Zhu (2007) note that "…short selling facilitates efficient price discovery" (p. 1032) and find evidence that prices incorporate negative information more quickly when short sales are permitted. Asquith and Meulbroek (1995), Aitken, Frino, McCorry and Swan (1998), and Danielsen and Sorescu (2001) all find that the introduction of, and/or changes in, regulations restricting short sales, short interest, or options, is associated with negative future returns. Consistent with Diamond and Verrecchia (1987) "…Prohibiting traders from shorting reduces the adjustment speed of prices to private information, especially to bad news" (p. 277), these findings suggest that negative information is incorporated into prices slowly when stocks are short-sales constrained.

Prior literature and policy makers have argued that short sales preceding the SEOs' Issue Day are manipulative.[11,12] However, using U.S. data, it is difficult to examine the role short-sales constraints play in the absorption of information into stock prices in the context of SEOs, because U.S. securities regulations, such as the *Securities and Exchange Commission's* Rule 10b-21 or

[10] See Beneish, Lee and Nichols (2015) for a comprehensive study of short sales and improved informational efficiency. Beneish, Lee and Nichols note that the vast prior literature has consistently shown that short sellers have value-relevant information and suggest that their trading helps correct overvaluation. Further, short-sales constraints can lead to informational inefficiency and that even temporary short-selling bans impact pricing in the banned stocks.

[11] Henry and Koski (2010) examine the relation of the size of short sales prior to announcement on the announcement return but do not examine whether the short sales help to incorporate the public information into stock return on announcement day.

[12] Previous SEO literature has mainly examined the relation of the regulation with the issue costs and stock return around the Issue Day (e.g. Corwin, 2003; Gerard and Nanda, 1993; Henry and Koski, 2010; Kim and Shin, 2004; Safieddine and Wilhelm 1996).

Rule 105, restrict short-selling around SEOs. On the other hand, employing Japanese data, we are able to examine whether short-sales constraints affect the market's ability to incorporate public information. Specifically, we examine the effect associated with the offering's announcement, on the stock price at the SEO's Announcement and on its Issue Day. Further, prior studies have not examined the effect of short-sales constraints on the issuers' ability to "time" their SEO. Given that the Japanese SEO's offer price is determined *prior* to its Issue Day, we explore that question as well.

3. Timing of the Announcement, Pricing, and Issue Days of the Japanese SEO

In Japan, firms conduct an official board meeting to approve the SEO and publish the preliminary prospectus/"red herring" on the same day as the board meeting. Figure 1 summarizes the timeline for Japanese SEOs.

We use the publication date of the red herring as the SEO's announcement day (AD). Book-building occurs in three-to-five business days following the release of the preliminary prospectus. The offer-price determination day (PD) occurs immediately after the book-building period ends. The firm and their lead underwriter set the offer price based on the stock's closing price on PD and the expected demand as determined in the book-building process. A final prospectus is published on the offer-price determination day PD. Rule 280 (3-2) of the Japanese Commercial Law indicates that issuers must issue the new shares at least five business days after PD. As noted before, the extended period from the offer-price determination day to the Issue Day is a key difference between U.S. and Japanese SEOs. The new shares are allocated to investors on the Issue Day. However, investors receive notice of their allocation two to three days before the Issue Day.

Another important distinction between SEOs in Japan and the U.S. is that in the U.S. issuing

firms frequently change the offer size, through amendments, during the registration process. Chan, Nayar, Singh and Yu (2017) present evidence that the amended offer size, from the amount filed initially to the final offer size on the Issue Day, signals the quality of the SEO. In sharp contrast for Japanese SEOs, the number of shares to be offered, announced initially, is never revised upwards (or downwards).

Finally, after the offer price is determined at the end of trading on PD in a Japanese SEO, the investment banker is exposed to significant price risk for the next two to three days. This is the subscription period during which investors submit their bids for the new shares. If the issuer's stock price were to fall below the offer price (between PD+1 and the end of the subscription period), the entire offer would devolve on the underwriter.

4. **Hypotheses and previous evidence**

Stock price reactions to equity issues have been used to examine the slope of the demand curve. However, short sellers' trades impact stock prices during the SEO, confounding any inferences. In addition, the stock price reactions associated with these events are also consistent with a temporary price pressure and information effects. We will briefly explore each related strand of literature and frame our hypotheses. A summary of our hypotheses and related predictions is given in Table 1.

4.1. **Trading Restrictions**

Some of the earlier research (Shleifer, 1986; Lynch and Mendenhall, 1997) indicates that the disclosure of increased supply of shares (a supply effect) impacts the Announcement-Day return.[13] On the other hand, IPO lock-up expirations and the collapse of the internet bubble literature

[13] Studies that examine the supply-effect at stocks inclusion in major indices analyze the Announcement period stock returns because firms that compose a major index do not face severe short-sales constraints.

indicate that the supply effect is evidenced on the effective day (expiration day), when the supply of shares actually changes.[14] Greenwood (2009) examines the restrictions placed on investors to sell their shares in the context of Japanese stock splits. Investors are restricted from trading their new shares between the ex-date and the pay-date.[15] Greenwood (2009) finds that the greater the restrictions imposed on potential sellers, more pronounced are the price effects. Further, Greenwood finds that these effects are reversed when the restrictions are relaxed and investors are allowed to sell again. In view of the significant effect of supply constraints observed in the context of stock splits, it an interesting empirical issue to determine, if and when, such a supply effect is evidenced for SEOs.

The adverse selection model proposed by Myers and Majluf (1984) predicts that firms' stock prices react negatively to their SEO announcements. Consistent with Myers and Majluf (1984) we posit that, in Japan, the adverse impact of the SEO announcement will be evidenced in the Announcement-Day price reaction. However, as argued by Nagel (2005) and Berkman, Dimitrov, Jain, Koch and Tice (2009) the short-sales constrained stocks may under-react at announcement because investors are kept at abeyance, and restricted from trading. The mispricing is removed only gradually. Accordingly, we hypothesize that the Announcement-Day price reaction will be less pronounced for the trading restricted stocks.

Miller (1977) argues that, "…A sufficient amount of short selling could increase the volume of the security outstanding until its price was forced down to the average valuation of all investors" (p. 1162). When the stock price is overpriced and new negative information such as SEO

[14] See Field and Hanka (2001), Hong, Scheinkman and Xiong (2006), Ofek and Richardson (2003), Schultz (2008).
[15] In the Greenwood (2009) sample of Japanese stock splits, on average the announcement is 26 days before the ex-date. The pay-date follows the ex-date in another 39 days. It is important to note that investors can short sell shares at the announcement of the stock splits. However, Greenwood notes: "…importantly, even investors who want to short must find a counterparty to borrow the shares from, which becomes exceedingly difficult once the split is announced" (p. 511).

announcement is released, a sufficient volume of short sales of the *Unconstrained* stocks could increase the volume of the security outstanding until its price is forced down to the average valuation of all investors. If short-sales constraints curb the market's ability to incorporate the SEO information into its stock price, the abnormal trading volume of the *Constrained* stocks will be relatively smaller than the corresponding trading volume for *Unconstrained* stocks from the announcement of the SEO until the day preceding the SEO's Issue Day (ID – 1 in event time, where ID is the Issue Day). Therefore, we hypothesize that the supply effect will be most pronounced on the SEO's Issue Day (ID), when the supply of shares actually changes.

We posit that, if other than the effect of the increased supply, negative information such as the Myers and Majluf (1984) adverse selection effect, is not incorporated into the price of the *Constrained stocks* on the announcement day, there is no reason to expect that information to get incorporated into the price of the *Constrained stocks* precisely on the issue day. It would be reasonable, per Diamond and Verrecchia (1987), to expect that such information should get incorporated into the price of the trading-restricted stocks over a period of time, after it becomes public on the SEO's announcement day. On the other hand, it is reasonable to expect that the supply effect is incorporated into the *Constrained stocks* price precisely on the issue date, because that is when the increased supply hits the market.

It must be noted that on the Issue Day for Japanese SEOs, although the supply of shares changes, no new information is released. Given that the trading in *Unconstrained* stocks is not restricted, our prediction is that the SEO's Issue Day supply effect should be most pronounced for the trading-restricted *Constrained* stocks. On and after the Issue Day, given the inflow of the additional SEO shares, new investors of *Constrained* stocks will only pay a lower price that fully incorporates the SEO information effects. Therefore, we hypothesize that on Issue Day, an

increased supply of new shares should affect the trading volume and stock prices significantly, for the restricted stocks.

Our hypothesis is in keeping with Greenwood (2009). Prior literature related to lock-up expirations and the collapse of the internet bubble, also finds a price effect when restrictions on the supply of a stock's shares are lifted. However, the expiration of IPO lock-up and stock-split related literature does not consider under-reaction on the announcement day of an event. We use the intuition as the reason for the market-timing of SEOs by trading restricted firms.

4.2 **Trading Restrictions** & **Market Timing**

Short-sales constraints imply that investors are restricted from trading and their opinion is not reflected in the price until the actual issuance day. Thus, there is a relatively greater likelihood that firms with short-sales constraints "time" the market and issue the SEO shares when their stock is overvalued. Accordingly, we can examine the implications of market timing in equity issuance, and we posit that firms with restricted-trading stocks are more likely to issue equity opportunistically.[16]

4.3. **Temporary price pressure**

Manipulative short sellers establish short positions prior to seasoned equity offerings for the sole purpose of producing an artificial discount in the price of the to-be-issued new shares in the SEO. Later, short sellers cover their positions with shares purchased in the SEO at a discount. Manipulative short selling is expected to occur more often in Japanese offerings because no regulations restricting short sales around SEOs existed in Japan prior to December 2011.

In Japan, the SEO's offer price is determined a minimum of five days before the Issue Day. The separation of the SEO's price-determination day (PD) from its Issue Day (ID) implies that the

[16] Baker and Wurgler (2002) argue that "managers think investors are irrational and raise equity when the cost of equity is unusually low" (p. 4).

effects of manipulative short selling, if any, should be isolated to PD. On the other hand, temporary price pressure effects due to the increased supply of shares, if there are any, should be observed on ID.

Gerard and Nanda (1993) argue that temporary price pressure is exerted by manipulative short selling before the offer-price determination day (PD). Their model indicates that when traders are confident in their ability to cover their short positions with new discounted shares from the SEO, they sell in the secondary market even if they do not have negative information about the stock. If a large number of manipulative trades occur before the offer-price determination day, secondary market prices drop temporarily on PD and recover in the post-pricing period market.[17]

Alternately, if the share price is affected by the supply effect from the issuance of the new shares, a larger offering size will be associated with a corresponding greater price decline on the SEO's Issue Day. However, the effect will not be temporary and stock prices will not recover in the days after the offering. Thus a longer lasting or a permanent price decline will be consistent with a supply effect, as predicted by the *Trading Restrictions Hypothesis.*

Prior research, based on U.S. samples, has not been in a position to disentangle these issues. In the offering process for U.S. based SEOs, the offer-price determination day is typically the Issue Day (or ID-1, the day before the Issue Day). Accordingly, it is difficult to isolate the effect of the increased supply of shares on the Issue Day from the information effects related to the offer-size revision and/or the offer-price discount. For example, Fig.2 of Corwin (2003) shows that, for U.S. based SEOs, the stock price before the offer date is about 1% lower than the stock price after the

[17] Several other studies find evidence of a temporary price pressure around SEOs' Issue Day. Using daily and intra-day stock return data, Barclay and Litzenberger (1988) find a significant price recovery on the Issue Day. They argue that the price recovery after the SEO's Issue Day is a sweetener to compensate investors for the portfolio re-balancing cost incurred from including the new shares in their portfolio. Meidan (2005) finds that the offer size (relative to the size of the issuing firm) is associated with negative abnormal returns before the Issue Day and positive abnormal returns after the Issue Day. Meidan (2005) argues that these results are consistent with a temporary price pressure effect.

offer date. This is especially true for stocks listed on the Nasdaq. The price drop before, and the related price rebound following the offer date, indicate that the information-related and the temporary price pressure effects cannot be readily disentangled around the offer date in U.S.

5. Description of sample and variables

5.1. Data

The data used in this study cover seasoned equity issues of Japanese stocks listed on all Japanese markets (JASDAQ, OSE, NSE, and TSE) between January 1, 1998, and December 31, 2011. The book building method was introduced in Japan in January 1994. The first book built offer was for "Nihon Jumbo," on March 20, 1994. Since then, all SEOs in Japan have used the book building procedure.

We use the Nikkei NEEDS Financial Quest (FQ) and the eolESPer databases to obtain information on the SEO announcement, the price-determination and the issue dates, the offer price, and proceeds for our sample of Japanese SEOs. Financial data, including the classification of *Unconstrained/Constrained* stocks, are obtained from the FQ database. Data on stock prices, stock returns and the three-factor portfolio returns is from the Nikkei Media Marketing database. The total number of offerings during the 1998-2011 sample period is 967. In conformance with previous studies, we exclude financial institutions and securities firms. In addition, we exclude firms with SEOs that occur within 250 days of their IPO. These screens reduce the sample to 755 observations.

5.2. Description of variables

5.2.1. Abnormal returns

This paper examines the three competing hypotheses by computing abnormal returns around

the SEO. Abnormal returns are computed as follows.[18]

$$AR_{i,t} = Return_{i,t} - Return\ on\ the\ Value\ Weighted\ Index \quad (1)$$

$$CAR_i[d,T] = \sum_{t=d}^{T} AR_{i,t} \quad (2)$$

Where, $AR_{i,t}$ is the abnormal return for firm *i* on day *t* calculated as the difference between the stock return on day *t* for firm *i* , and the value-weighted return on an index of all listed Japanese firms. CAR_i[d,T] is the cumulative abnormal return for firm *i* from day *d* to day *T*.[19]

5.2.2. **Other variables**

RelOffSize is defined as the number of new shares issued divided by the number of shares outstanding on the day prior to the Issue Day. The *Trading Restrictions Hypothesis* posits that the abnormal returns on both the Announcement and the Issue Day are related to *RelOffSize*. However, in accordance with Krasker (1986), the *Information Hypothesis* also argues that *RelOffSize* is a proxy for the degree of negative information. The degree of short-sales constraints is measured by whether the issuer's stock type is *Constrained* or *Unconstrained*. *Constrained* is an indicator variable that is equal to one if the SEO is that of a *Constrained* stock.

The degree of information asymmetry is represented by the firm size. We use ln(*Asset*), measured as the natural logarithm of the market value of equity on the last day preceding the SEO announcement plus book debts as of the end of the previous fiscal year. [20] We adjust for inflation using purchasing power as of the year 2005. We use the book-to-market ratio, *BTM*, as a proxy for the opportunity to invest.

[18] We also conduct the same analyses using the market model to compute abnormal returns. The results remain qualitatively unchanged.

[19] Alternative specifications of CAR based on the market model or the Fama-French three factor model give essentially the same results.

[20] Ln(Asset)= ln(Capitalization + Book Debt)

6. Empirical results

6.1. Summary statistics

Table 1 provides summary statistics for our SEO sample. Column one shows the summary statistics for all SEOs; summary statistics for the *Unconstrained* and *Constrained* samples are separately documented in columns two and three, respectively. 34% of the 755 observations in our sample are *Unconstrained* offerings. *Constrained* stock offerings are more frequent.

Comparing *Asset* size, we find that *Unconstrained* issuers tend to be much larger than *Constrained* issuers. Further, although issue size (*Proceeds*) is also significantly larger for the *Unconstrained* sample, the difference in the relative issue size (*RelOffSize*) between the two sub-samples is marginal. The mean *RelOffSize* of the total sample is nearly 14%, which is smaller than the typical SEO in the U.S. For example, Corwin (2003) finds a mean relative issue size of 23.8% in his U.S. sample covering the period from 1980 through 1998.

The book-to-market ratio, *BTM,* is lower for *Constrained* stocks, which is consistent with Miller (1977) and overpricing of the stock when short-sales constraints are more binding. In keeping with Corwin (2003), *Issue discount* is defined as negative one times the return from the previous day's closing transaction price to the offer price. The average *Issue discount* is 3.5%, which is similar to discounts in the U.S. The *Issue discount* is significantly smaller for the *Unconstrained* sample, relative to the corresponding measure for the *Constrained* stocks.

The average short-sales volume (*Average SSVOL*) for the *Unconstrained* stocks is defined as the average number of shares sold short divided by the stock's total volume of trade in the event-time period [PD-1, PD], where PD is the SEO's price determination date. We find that the mean *Average SSVOL* is over 20%, indicating a fairly significant amount of short sale activity on and just before PD for the *Unconstrained* stocks. We do not find a significant difference between the

underwriters' reputation (*Major UW*) managing the offerings of either group.

6.2. **Hypotheses testing**

6.2.1. S**tock Price Behavior around the SEO Announcement (AD) and Issue Day (ID)**

To examine and evaluate the competing hypotheses, we compute abnormal returns around important event dates in the SEO process. Table 3 shows the stock price reactions around the SEO Announcement and Issue dates. The Announcement-Day (AD) abnormal return is significantly negative. Significantly negative abnormal returns are also observed surrounding the Issue Day (ID). No price recovery is observed after the Issue Day. Permanent negative returns on and after the Issue Day are consistent with the *Trading Restrictions Hypothesis*. The issuing firm's shareholders lose, on average, 7.5% in excess returns during the SEO period.

Panels B and C of Table 3, provide an analysis of the stock price reactions, split along dimensions of individual variables. First, the effect of trading restrictions is examined by splitting the sample based on whether stocks are eligible for short selling, or not. Panel B of Table 3 documents the price drop on the Announcement Day (AD) for *Unconstrained* stocks and shows that it is significantly more negative than that for *Constrained* stocks. This result is consistent with Nagel (2005) and our hypothesis that *Constrained* stocks under-react to bad news. Stock price revision in response to the new information for the *Constrained* sample may be upwardly biased because of trading restrictions.

Consistent with the *Trading Restrictions Hypothesis*, the pattern reverses itself on the Issue Day (ID). Panel B of Table 3 shows that, on ID, there is a significantly negative price reaction *only* for *Constrained* stocks. The price drop on ID for *Unconstrained* stocks is insignificant. The difference between the ID price reactions for the two sub-samples is both economically and statistically significant. The negative price reaction observed on the Issue Day is consistent with a

supply effect and our hypothesis that it should be observed for stocks with trading restrictions.

These findings indicate that, at the SEO announcement, information about new issues is not fully reflected in the stock prices of the *Constrained* sample; that is, given short-sales constraints, stock prices do not reflect new information in a timely manner. Further, since no price recovery is observed for *Constrained* stocks following the Issue Day (ID), the results do not support the *Temporary Price Pressure Hypothesis*. Instead, we consider the results to be consistent with the *Trading Restrictions Hypothesis*.

Panel C of Table 3 examines the effect of *RelOffSize* on stock prices during the SEO period. We find that relatively larger the number of new shares issued, the more the stock price declines on both the Announcement and the Issue Day. The implication of this result is discussed in the following section in a multivariate setting.

6.2.2. Multivariate Analyses

6.2.2.1. Regression Analysis of SEO Announcement Day (AD) and Issue Day (ID) Returns

We next conduct multivariate regression analyses of the Announcement Day (AD) and the Issue Day (ID) returns. The results are presented in Table 4. Models 1 and 2 of Table 4 analyze the AD returns. The ID returns are analyzed in Models 3 and 4. We use the indicator variable *Constrained* to classify the *Constrained/Unconstrained* firms' stock offerings. *Constrained* is the proxy for short sales constraint.

In Table 4, in both models 1 and 2, the coefficient for *Constrained* is consistently positive and statistically significant. As hypothesized, the higher the short-sales constraint, the more positive the AD returns. In other words, stocks with higher trading restrictions (*Unconstrained* stocks) evoke a significantly more positive AD price reaction.

The coefficient for *RelOffSize* is consistently negative; relatively larger the number of new

shares issued, more negative the AD returns. In model 2, the interaction term between *Constrained* and *RelOffSize* is insignificant, indicating that there is no difference in the relative price response to the offer size between the *Unconstrained* and the *Constrained* stocks. It must be noted that the larger *RelOffSize* is also consistent with a more negative information effect (Krasker, 1986). The impact of a potential information effect associated with the announcement of the SEO cannot be parsed out and separated from that of a possible supply-effect by examining the Announcement Date stock price reactions. Therefore, we focus on the offerings' Issue Date to more cleanly identify the supply effect, if any.

The Issue-Day returns analyzed in Models 3 and 4 of Table 4, present a sharp contrast with the Announcement-Day results of Models 1 and 2. In line with the results noted earlier in Table 3, the coefficient for *Constrained* is consistently negative and statistically significant; the ID price reaction for stocks with trading restrictions (*Constrained* stocks) is significantly negative, relative to the price reaction for their unrestricted *Unconstrained* counterparts. Further, in model 4, coefficient for *RelOffSize* is negative and significant (-15.94, with a t-statistic=-2.53), and the coefficient for the interaction term between *Constrained* and *RelOffSize* is negative and statistically significant (15.94, with a t-statistic= 2.32). The interpretation is simply that for *Unconstrained* firm's the price response to the relative offer size is statistically insignificant and not different from zero. The finding is consistent with Greenwood (2009) and is supportive of our contention that, on the actual issue day, when there is an influx of additional shares, only the short-sales constrained stock prices react negatively. Further, the results indicate that the ID returns are negatively related to the relative offer size *only* for stocks with trading restrictions.

6.2.2.2. Robustness check:

It is conceivable that our results discussed in the preceding section are driven by the difference in liquidity between the eligible and the short-sales constrained firms. To ensure that our results are robust to this endogeneity concern, we conduct a detailed analyses controlling for liquidity differences between the two sub-samples. The non-tabulated results are available as an Internet Appendix.

We adopt the following process to find matched pairs from the two sub-samples. The treatment group is the *Constrained* stocks. We first select observations from the *Unconstrained* stocks sub-sample that are listed on the same stock exchange as each specific *Constrained* stock. We then select the *Unconstrained* sample observations with the market value of equity that is within +/- 30% of the treatment firm. Next, using Amihud's (2002) illiquidity measure ILLQ, we identify the control firm with the nearest liquidity to the treatment and define *Min Abs* |Non_E_{ILLQ} – E_{ILLQ}|.[21]Finally, we exclude firms where the *Min Abs* |Non_E_{ILLQ} – E_{ILLQ}| is greater than 0.3. In all, of the 498 treatment sample, 38 observations are excluded for which do not find a suitable match. Thus, our robustness check employs 460 treatment observations and as many matched control observations.

In the Internet Appendix table IA.1, it can be observed that the difference between the treatment and control observations in their firm size, ILLQ (the liquidity measure), and the key variable *RelOffSize* is statistically insignificant. Thus, the control sample observations (still listed as

[21] We follow Amihud (2002) and use ILLQ, the relative price impact variable as a measure of illiquidity from AD-46 to AD-165 (120 days), where:

$$ILLQ_i = 1/D_i \sum_{t=1}^{Di} \frac{|R_{id}|}{VOKD_{id}} * 1{,}000{,}000$$

R_{id} and $VOKD_{id}$ are the daily stock return and the daily volume respectively of firm *i* on day *d*. The unit of the daily volume is yen. *D* is the number of days for which we have available data. We limit the sample at least 60 days of data.

Unconstrained by the stock exchanges and which are by definition, not short-sales constrained) have similar characteristics as the short-sales constrained sample observations. However, the book-to-market ratio (BTM) is not the same for the two groups.

The parallel set of tests run for the matched samples, around the critical event dates, produce results that are consistent with our main analyses (Internet Appendix table IA.2). The pre-event stock price run-up is significantly higher for the treatment group. Consistent with our main results, the stock price reaction at announcement is significantly less negative for the treatment group. The control sample, matched on firm size and ILLQ (liquidity) with the treatment observations, experiences a significantly more negative price reaction at announcement.

The examination of the issue date ID returns present an interesting finding. It is to be noted that the stock price reaction on the issue date ID is significantly more negative for the treatment group. However, the control sample also experiences a statistically significant negative price reaction on the issue date. This result implies that there is a supply effect even if the firms are not subject to regulatory short-sales constraint. The control sample is, by construction, made up of less liquid *taishaku*-stocks. Our findings indicate that lower liquidity itself acts as a trading constraint. The trading restriction caused by their low liquidity suggests that the information possessed by many investors who don't own the shares will not be reflected in stock prices early on. Consequently, there will be a supply effect manifested on the issue date when the SEO shares are added to the trading pool.

Finally, the returns following the issue date ID, are similar for treatment and control samples and their difference is statistically insignificant. These results are consistent with the *Trading Restrictions hypothesis.* As noted before for the main results, the stock returns following ID are insignificant and do not support the *Temporary Price Pressure hypothesis.*

In the Internet Appendix table IA.3, we conduct OLS regression of the abnormal returns on the announcement date AD and the issue date ID using the 920 observations (460 treatment observations with the same number of matching, control observations). The results are generally consistent with our main findings reported in the corresponding Table 4. In the Internet Appendix table IA.3 we again see that the *Unconstrained* stocks, although matched in terms of firm size and ILLQ (liquidity) by construction, experience a significantly more negative price reaction on the Announcement Date AD. On the other hand, the treatment firms experience a significantly more negative price reaction on the Issue Date ID. These results are supportive of the *Trading Restrictions hypothesis.*

6.3. Factors related to the incidence of downward sloping demand curves:

A discussion of downward sloping demand curves is incomplete without Miller (1977). Miller argues that stocks with a wide divergence of opinion regarding their intrinsic value are likely to be overpriced if they are short-sales constrained, since the participation of less optimistic investors is restricted in the price discovery process. Chen, Hong and Stein (2002), formally develop a model in which the slope of the demand curve becomes steeper as divergence of opinion among investors widens. Boehme, Danielsen and Sorescu (2006) argue that both conditions, namely short-sales constraints and the divergence of opinion, must apply to get a downward sloping demand curve.

Accordingly, the above discussion predicts that in the presence of trading restrictions, the greater the divergence of opinion regarding a stock's prospects, the greater the change in supply of shares affects stock prices. Specifically, the above discussion predicts the relation to be significant for seasoned offers of stocks with more restrictive short-sales constraints, and especially those within them that experience relatively greater divergence of opinion. Further, the effect is predicted to be most pronounced specifically for trading restricted stocks on their SEO

issue date where no new information is released and the supply of shares actually changes.

Is the divergence of opinion a key factor without which the demand curve for stocks is unaffected? We have already demonstrated that stocks with trading restrictions exhibit a supply effect on the Issue Date for Japanese SEOs. The above discussion motivates the need to examine the effect of the change in the supply of shares for both types of stocks, namely those that are short-sales constrained and those without such trading restrictions, while controlling for the divergence of opinion. Accordingly, we now discuss the proxies employed to measure the divergence of opinion and to control for its effect in our analyses.

Consistent with Boehme et al. (2006), we use the mean square error, *MSE*, as a proxy for the divergence of opinion among investors. The mean square error is computed as the deviation from the value predicted by the Fama-French three-factor model for the period from -70 days to -11 trading days before the Announcement Day.[22] The descriptive statistics in Table 2 show that *MSE* is significantly higher for *Constrained* stocks, which indicates a greater divergence of opinions among investors.

To capture divergence of opinion we use *D_Breadth* as an alternate measure for the divergence of opinion, which is defined as the change in *Breadth*, a variable introduced by Chen et al. (2002). If t_0 is the event year, then *Breadth* is defined as the ratio of the number of mutual funds that own the stock in the year prior to the equity offerings (t_{-1}) divided by the total number of mutual funds in the year t_{-1}. However, Chen et al. (2002) note that *Breadth* is highly correlated with firm size, indicating that more funds hold large stocks. To purge their measure from firm fixed effects, we follow the Chen et al. (2002) suggestion and develop *D_Breadth*. If t_0 is the event year, then *D_Breadth* is defined as the change in *Breadth* from event year t_{-2} to event year t_{-1}. It measures the

[22] We also use dispersion of analysts' earnings forecasts as a proxy for the divergence of opinion. The sample size for which analysts' forecasts are available is significantly smaller but the results are qualitatively the same.

relative change in the level of mutual fund interest in the stock. The descriptive statistics in Table 2 show that *D_Breadth* is significantly larger for the *Constrained* sub-sample. Consistent with *MSE, D_Breadth* also indicates a greater divergence of opinion for the short-sales constrained stocks.

Table 7 presents the multivariate analyses of the divergence of opinion (*MSE, D_Breadth*) effect on stock prices around SEOs. *MSE* and *D_Breadth* are as defined earlier. The layout of the Table 7 follows that adopted in Table 4. Models 1 through 5 of Table 7 pertain to the announcement date (AD) and models 6 through 10 analyze the issue date (ID) returns. Model 1 is reproduced from Table 4 for ready reference and ease of comparison. In models 2 through 5 of Table 7 we use different proxies for the divergence of opinion. In models 2 and 4 we employ *MSE* and D*_Breadth*, respectively. We introduce an indicator variable in each of models 3 and 5. In Model 3, *High MSE* is a dummy variable which takes the value of one if *MSE* is higher than the median for the total sample. Likewise, in model 5, *High D_Breadth* is an indicator variable that takes the value of one if D*_Breadth* is higher than the median for the total sample.

In models 2 and 3, the short-sales constraint variables *MSE* and *High MSE,* are significantly positive. However, the results are less clear in Models 4 and 5. In Models 4 and 5, where we employ D*_Breadth* and *High D_Breadth*, we find that the divergence of opinion proxies are, at best, only marginally significant. These results do not offer a robust support for the argument that divergence of opinion is as critical a factor in the incidence of a downward sloping demand curve. The AD results noted earlier in Table 4 are unaffected by the introduction of the divergence of opinion proxies.

Models 6 through 10 of Table 7 focus on the effect of divergence of investor opinion and the impact of the supply shock from the newly issued shares at the SEOs' Issue Date (ID). The layout

of the last five models of Table 7 mirror the analyses in the corresponding models 1 through 5 which analyze the announcement date (AD) returns. Model 6, of Table 7 is identical to Model 3 of Table 4, reproduced for ready reference and ease of comparison.

The coefficient of *RelOffSize* is negative and significant in each of the models (7 through 10) for the short sales constrained sample. On the other hand, the *RelOffSize* coefficient is statistically insignificant and not different from zero in any of the four models 7 through 10. These findings indicate that, regardless of the level of the divergence of opinion, the offer size is not related to the Issue Day returns for the stocks which do not face trading restrictions. On the other hand, the results for the trading restricted stocks exhibit a supply effect. These findings are consistent with the results documented in Table 4. As with the AD results, the ID results noted earlier in Table 4 are also unaffected by the introduction of the divergence of opinion proxies.

In three of the four models (7, 8 and 10) the divergence of opinion proxy is insignificant. These results again do not provide robust support for the divergence of opinion as a critical factor in the incidence of a supply effect or a downward sloping demand curves.

It must be noted that no new information is revealed on the Issue Day. However, this is the day when new shares from the SEO are actually released into the market. The supply effect is noted only for the short-sales constrained sample. On the other hand, the demand curve is close to horizontal for low volatility stocks, so the supply shock impact on *Unconstrained* stock returns is negligible. These results are robust to the introduction of different proxies for the divergence of opinion. Our results are supportive of the proposition that trading restrictions play a more important role in the incidence of downward sloping demand curves for stocks. We consider these findings to be supportive of our *Trading Restrictions hypothesis.*

7. Supporting Evidence and Analyses

7. 1. Abnormal Trading Volume

As discussed earlier, Miller (1977) argues that when the stock price is overpriced (i.e. when new negative information such as SEO announcement is released), a sufficient volume of short sales of the *Unconstrained* stocks could increase the volume of the security outstanding until its price is forced down to the average valuation of all investors. We conduct our analyses with an examination of this logic using abnormal trading volume (ABVOL) where:

$$\text{ABVOL}_{i,t} = \frac{Turnover_{i,t}}{AveTurnover_i} - \frac{Turnover_{market,t}}{AveTurnover_{market}}$$

$Turnover_{i,t}$: Volume/outstanding share before issue of firm *i* on date *t*
$Turnover_{market,t}$: Value weighted average market turnover of all public companies on date *t*
AveTurnover: Average daily turnover (daily volume/daily outstanding share) from AD-46 to AD-95. (50 days)

The findings are reported in Table 5. We find that ABVOL of *Unconstrained* stocks is higher *only* in the period from the SEO's announcement to the day before the Issue Day (AD to ID-1) relative to the ABVOL of short-sales constrained stocks. *On* the Issue Day ID, the abnormal trading volume for the two sub-samples is not different. Further, in periods before AD and after ID-1, the ABVOL for the *Unconstrained* stocks is not different from that of the short-sales constrained stocks sample.

If trading volume is a proxy for information content, the ABVOL of *Unconstrained* stocks on the SEO's announcement (AD) should be larger than the corresponding ABVOL on ID-1, the day preceding the Issue Date. However, our results are not consistent with that idea. On the other hand, ABVOL for the *Constrained* stocks gradually decreases from AD to ID-1.

These results indicate that the SEO announcements of *Unconstrained* stock are associated with increased trading volume of the security until the price falls to its average value across all investors.

On the other hand, although SEO announcement of the trading restricted stocks also conveys negative information, the attendant price reaction and the corresponding trading volume is lower (relative to that of the *Unconstrained* stock sample).

7.2. The Probability of SEO Announcements

The information of the stock issuance is revealed on the SEO's announcement day. If the market is semi-strong efficient, the markets modify their valuation of the stock immediately. This would be consistent with Myers and Majluf (1984). Therefore, firms are less likely to be overvalued by their Issue Day (that is, firms are less likely to be able to issue overpriced shares in an efficient market). We posit that such is the case for *Unconstrained* stocks. Accordingly, consistent with the pecking-order theory that predicts equity issues to be relatively rare, we posit that *Unconstrained* stocks are likely to issue equity less frequently.

On the other hand, if short-sales constraints render the markets inefficient, the SEO's announcement effect cannot be fully incorporated into the stock price before the offer's price determination day because markets are not able to modify their valuation of the stock immediately. The implication is that issuers will be able to sell overpriced equity. If indeed that is the case, external equity is not necessarily more expensive than external debt, and a firm might want to take advantage of a temporary overvaluation of its stock by raising external capital through SEOs when its equity is overvalued. As a result, firms with short-sales constraints will issue equity more frequently. We posit that such is the case for trading restricted stocks.

In Table 6, we employ *Previous Return* (Panel A) and *BTM* (Panel B) as proxies for market timing (issuance of overvalued stock), respectively. In Panel A, Table 6 it can be seen that both the *Constrained* and the *Unconstrained* issuers are likely to time their SEO when the stock is overvalued, i.e. at their SEO announcement, the probability of *high-previous return* is larger than

the probability of *low-previous return*. These results are consistent with both the pecking order and the market timing theories. However, when we examine the *high-previous return* sub-sample (overvalued stock), the probability of the short-sales constrained firms' offer is larger than the probability of *Unconstrained* stock issuance. For the *low-previous return* sub-sample (undervalued stock), the probability of the *Constrained* firms' stock issuance is lower than the probability of the *Unconstrained* stock offer. These results are consistent with the idea that stocks with trading restrictions are more likely to market-time their equity issuance.

Finally, we obtain consistent results in Panel B, Table 6, where we use *BTM* as the proxy for overvaluation. As in Panel A, Table 6, the short-sales constrained stocks are more likely to issue stock when they are relatively overvalued and less likely to issue equity when they are relatively undervalued.

8. Conclusions

In the context of seasoned equity offerings (SEOs), Japan provides an ideal setting to examine the possibility of a supply effect, the proposition that increased supply of shares adversely impacts the associated stock's price. The use of Japanese SEO data offers several advantages. First, the Japanese underwriting process separates the offer-price determination date from the Issue Day by a minimum of five days. Second, there are groups of stocks in Japan with and without short-selling constraints.[23] Thus, we are able to directly examine and compare the impact of an influx of new SEO shares, from issuers with and without short-sales restrictions on their stocks, while circumventing several confounding effects associated with the offer-date in U.S. based SEOs.[24]

[23] We refer to the short-sales restricted stocks as *Constrained* and the unrestricted stocks are termed *Unconstrained*.
[24] U.S.-based studies are not in a position to disentangle the confounding effects surrounding the offer's Issue Day. In the US, the offer-price determination date coincides with the offer's Issue Day. Hence, the effects related to manipulative short-sales, the information content of the offer price discount, the offer-size amendment and the possible temporary price effects related to the size of the offer, all potentially impact the offer-date price reaction.

Our main findings are as follows. On the SEO's Issue Day, the price reaction is significantly negative only for the *Constrained* issuer's stock. The difference in the price reaction between the two types of issuers is economically and statistically significant. Consistent with Diamond and Verrecchia (1987), we posit that short-sales constraints restrict the price discovery process and the market under-reacts to the information initially.[25] However, on the Issue Day, when there is an increased supply of new shares, the stocks with short-sales constraints experience a significant price decline. Importantly, the price drop on the Issue Day, is exclusively for the short-sales restricted stock SEOs and it is not followed by a price recovery. The lack of a post-issue price recovery is inconsistent with a temporary price pressure. Further, we find that the relative size of the new issue is associated with a significant permanent price drop on the Issue Day *only* for the short-sales constrained sample. These findings support the *Trading Restrictions Hypothesis*. We conduct further tests to allay potential endogeneity concerns that the results could be driven by liquidity differences between the two sub-samples. The robustness analyses, employing a sample of *Unconstrained* and *Constrained* observations matched on firm-size and liquidity, provides results consistent with our main findings.

Our results are robust, controlling for the level of the divergence of opinion. The analyses does not rule out the divergence of opinion as a factor affecting the demand curve for stocks. However, the results indicate that short-sales restriction is a relatively more robust factor in the incidence of downward sloping demand curves. We also examine and find trading volume changes consistent with the idea that short-sales constraints curb the market's ability to incorporate the SEO information into its stock price. The abnormal trading volume of the *Constrained* stocks is

[25] At the SEOs' announcement, the abnormal return of the Constrained sample is significantly less negative than that of the Unconstrained sample. We argue that this effect, consistent with Nagel (2005), is driven by the fact that investors are restricted from participating in the stock's price discovery process due to short-selling constraints.

relatively smaller than the corresponding trading volume for *Unconstrained* stocks from the announcement of the SEO until the day preceding the SEO's Issue Day (ID – 1 in event time, where ID is the Issue Day). On and after ID, the Issue Day, the increased supply of new shares affects the trading volume and stock prices significantly only for the short-sales constrained sample.

Our results indicate that firms with *Unconstrained* stocks issue their shares at prices that more accurately incorporate the information of the SEO announcement, and also the effect of short-sales preceding the pricing of the offer. Therefore, we argue that firms with *Unconstrained* stocks are less likely to time their offerings. On the other hand, firms with *Constrained* stock are opportunistic and time their offerings when their stock prices are mispriced higher. These findings contribute to the SEOs market-timing literature and are consistent with the *Trading Restriction Hypothesis.*

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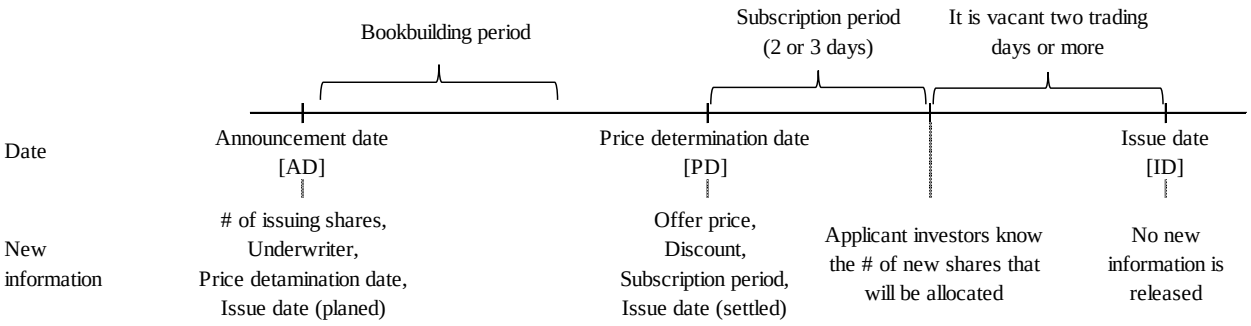

Figure 1: The schedule of events for Japanese SEOs from announcement (AD) to the Issue Day (ID)

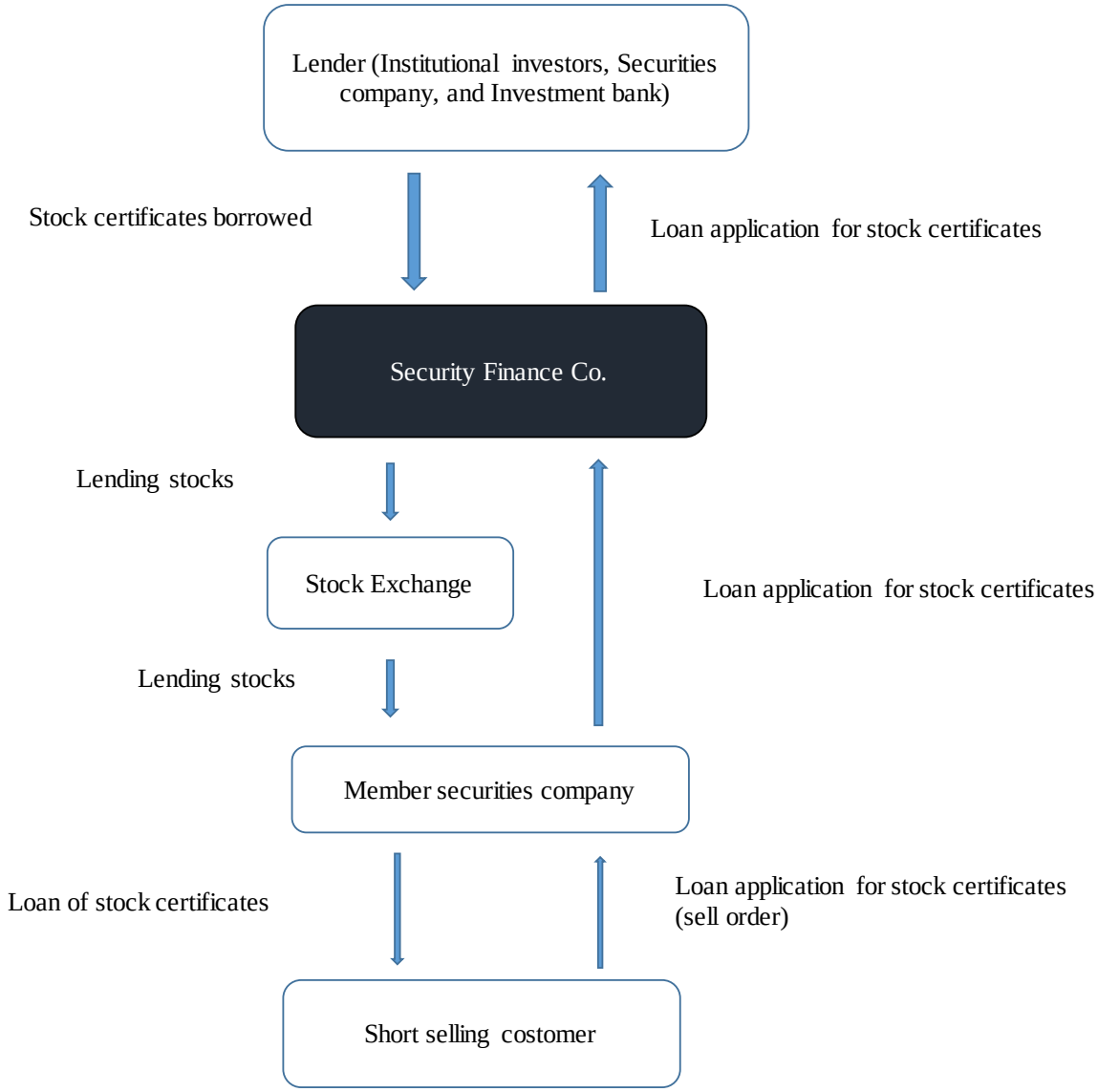

Figure 2: Outline of Short Selling Transactions (margin trading) in Japan

Table 1
Summary of hypotheses

Hypotheses	Short-sales constraints	Prediction			
		Announcement day return	Issue day return	Volume change	Timing
Trading restriction	Short-sales constrained (Non-eligible stock)	Under-reaction; Less negative than unconstrained stocks (Negatively associated with issue size)	Negative and Permanent effect; not a Temporary effect (The price reaction should be negatively associated with issue size)	Positive (Low)	Frequent offers; SEOs "time" overpriced stock
	No short-sales constraints (Eligible stock)	Negative (Negatively associated with issue size)	No effect	Positive (High)	Less frequent; Less able to "time" sale of overpriced equity
Temporary price pressure			Temporary effect; that is, Negative before/on Issue Date and Positive after Issue Date (Associated with issue size)		

Table 2
Summary statistics

This table provides summary statistics for the SEO sample. The sample consists of 755 SEOs of Japanese listed firms from 1998-2011. The first column shows summary statistics for the total sample. The second and third columns provide summary statistics for the *Constrained* and the *Unconstrained* samples. *Constrained* is the dummy variable that takes a value equal to one if the issuer is a *constrained* stock and a value of zero otherwise. *MSE* is defined as the mean square error, is computed as the deviation from the value predicted by the Fama-French three factor model for the period from -70 days to -11 trading days before the announcement date. *Breadth* is defined as the ratio of the number of mutual funds that own the stock in the year prior to the equity offerings (t_{-1}) divided by the total number of mutual funds in the year t_{-1}, where t_0 is the event year. *D_Breadth* is defined as the change in *Breadth* from event year t_{-2} to event year t_{-1}. *Asset* is the sum of the market value of the firm's equity at the last day of the month preceding the SEO announcement and the book-value of assets, as of the previous fiscal year end. *Proceeds* are the total proceeds of the offering. *Asset* and *Proceeds* are adjusted for 2005 purchasing power. *RelOffSize* is defined as the total number of new offering shares divided by the outstanding shares prior to the offering. *BTM* is the book-to-market ratio. *Issue discount* is defined as negative one times the return from the previous day's closing transaction price to the offer price. *Major UW* is the dummy variable that takes a value equal to one if the underwriter is one of the Top three underwriters (Daiwa, Nikko, and Nomura) in Japanese SEO market and a value of zero otherwise.

		Total (N = 755)	*Constrained* (N = 498)	*Unconstrained* (N = 257)	Diff	t-stat	
Constrained	Mean	0.660					
MSE	Mean	2.991	3.322	2.348	0.974	9.87	***
	Median	2.736	3.161	2.180			
	Std.dev	1.365	1.381	1.078			
D_Breadth	Mean	0.0009	0.0011	0.0005	0.001	2.22	**
	Median	0.0004	0.0005	0.0004			
	Std.dev	0.0032	0.0023	0.0044			
	N	714	461	253			
Asset	Mean	315.07	82.85	765.04	-682.19	-5.57	***
(billion yen)	Median	44.74	32.35	127.09			
	Std.dev	1626.80	367.85	2687.71			
Proceeds	Mean	11.500	3.950	26.200	-22.25	-7.42	***
(billion yen)	Median	2.280	1.730	5.080			
	Std.dev	40.500	9.430	65.700			
RelOffSize	Mean	0.138	0.135	0.144	-0.008	-1.69	*
	Median	0.127	0.128	0.126			
	Std.dev	0.065	0.056	0.078			
BTM	Mean	0.506	0.454	0.606	-0.153	-5.07	***
	Median	0.409	0.344	0.510			
	Std.dev	0.399	0.378	0.420			
Issue discount	Mean	3.476	3.673	3.095	0.577	8.48	***
	Median	3.060	3.500	3.030			
	Std.dev	0.928	0.898	0.866			
Average SSVOL	Mean			0.203			
	Median			0.157			
	Std.dev			0.173			
Major UW	Mean	0.738	0.719	0.774	-0.055	-1.64	
	Median	1.000	1.000	1.000			
	Std.dev	0.440	0.450	0.419			

Table 3
Abnormal returns and cumulative abnormal returns around the SEO

This table shows the average abnormal returns (*AR*) and cumulative abnormal returns (*CAR*) around the announcement day and the issue date for the total sample. Panel A shows the *AR* and *CAR* for total sample. Panels B to D present the *AR* and *CAR* for the sample divided by the short-sales constraint, the issue size, and the divergence of opinion (*Constrained* vs. *Unconstrained*, *Low RelOffSize* vs. *High RelOffSize*). *Constrained* is the dummy variable that takes a value equal to one if the issuer is a *constrained* stock and a value of zero otherwise. *RelOffSize* is defined as the total number of new offering shares divided by the outstanding shares prior to the offering. Statistical significance levels of the average *AR* and *CAR* are based on a cross-sectional t-statistic. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in two-tailed tests.

Panel A: Total

(N=755)	Mean	t-statistics	# of negative sample	% of negative sample
CAR[AD-45, AD-2]	8.45	10.41 ***	281	37.22%
AR[AD]	-2.55	-11.19 ***	558	73.91%
CAR[AD-1, AD]	-2.48	-9.39 ***	545	72.19%
CAR[AD+1, ID-1]	-2.46	-5.17 ***	474	62.78%
CAR[AD-1, ID-1]	-4.93	-8.87 ***	518	68.61%
CAR[AD-1, ID]	-6.76	-12.14 ***	566	74.97%
AR[ID]	-1.83	-11.17 ***	522	69.14%
CAR[AD-1, PD]	-4.26	-9.64 ***	543	71.92%
CAR[PD+1, ID]	-2.50	-7.66 ***	505	66.89%
CAR[ID+1, ID+10]	-0.71	-1.87 *	441	58.41%
CAR[ID+1, ID+20]	-0.80	-1.55	424	56.16%

Panel B: Constrained vs. Unconstrained

	Constrained (a)		*Unconstrained (b)*		(a) - (b)	t-statistics
	Mean	t-statistics	Mean	t-statistics		
CAR[AD-45, AD-2]	10.95 ***	9.86	3.61 ***	3.75	7.34	4.33 ***
AR[AD]	-1.57 ***	-5.52	-4.44 ***	-12.68	2.87	6.12 ***
CAR[AD-1, AD]	-1.28 ***	-3.84	-4.80 ***	-12.23	3.52	6.50 ***
CAR[AD+1, ID-1]	-1.61 **	-2.54	-4.10 ***	-6.25	2.49	2.49 **
CAR[AD-1, ID-1]	-2.88 ***	-3.97	-8.90 ***	-11.56	6.02	5.22 ***
CAR[AD-1, ID]	-5.55 ***	-7.60	-9.09 ***	-11.36	3.53	3.02 ***
AR[ID]	-2.67 ***	-12.13	-0.19	-1.03	-2.48	-7.46 ***
CAR[AD-1, PD]	-2.24 ***	-4.13	-8.17 ***	-11.66	5.93	6.54 ***
CAR[PD+1, ID]	-3.31 ***	-7.44	-0.91 **	-2.29	-2.40	-3.52 ***
CAR[ID+1, ID+10]	-0.81	-1.51	-0.52	-1.27	-0.29	-0.36
CAR[ID+1, ID+20]	-1.49 **	-2.08	0.53	0.89	-2.02	-1.86 *
N	498		257			

Panel C: Low RelOffSize vs. High RelOffSize

	Low RelOffSize (a)		*High RelOffSize (b)*		(a) - (b)	t-statistics
	Mean	t-statistics	Mean	t-statistics		
CAR[AD-45, AD-2]	7.19 ***	6.88	9.71 ***	7.83	-2.52	-1.56
AR[AD]	-1.85 ***	-6.36	-3.25 ***	-9.36	1.40	3.10 ***
CAR[AD-1, AD]	-1.62 ***	-4.58	-3.34 ***	-8.61	1.72	3.28 ***
CAR[AD+1, ID-1]	-1.64 **	-2.53	-3.27 ***	-4.72	1.62	1.71 *
CAR[AD-1, ID-1]	-3.26 ***	-4.49	-6.60 ***	-7.93	3.34	3.02 ***
CAR[AD-1, ID]	-4.53 ***	-6.08	-8.99 ***	-11.07	4.47	4.05 ***
AR[ID]	-1.26 ***	-5.81	-2.39 ***	-9.93	1.12	3.46 ***
CAR[AD-1, PD]	-2.90 ***	-4.83	-5.62 ***	-8.77	2.72	3.09 ***
CAR[PD+1, ID]	-1.62	-3.57	-3.37 ***	-7.27	1.75	2.69 ***
CAR[ID+1, ID+10]	-0.57	-1.25	-0.85	-1.40	0.28	0.38
CAR[ID+1, ID+20]	-0.46	-0.64	-1.14	-1.55	0.68	0.66
N	377		378			

Table 4
Ordinary least square regressions of the abnormal announcement-day return and the abnormal issue day return

This table shows ordinary least square regressions of the abnormal return on the announcement day and the issue day. *Constrained* is the dummy variable that takes a value equal to one if the issuer is a *constrained* stock and a value of zero otherwise. We use *Constrained* as measure of the short sales constraint. *RelOffSize* is defined as the total number of new offering shares divided by the outstanding shares prior to the offering. *ln(Asset)* is the natural logarithm of the sum of the market value of the firm's equity at the last day of the month preceding the SEO announcement and the book-value of assets, as of previous fiscal year end. *Assets* are adjusted for 2005 purchasing power. *BTM* is the book-to-market ratio. Heteroscedasticity-adjusted t-statistics are presented in parentheses below the regression coefficients. *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

	Announcement return		Issue day return	
VARIABLES	Model 1	Model 2	Model 3	Model 4
Constrained	2.56***	37.53***	-2.17***	-15.06***
	(-5.29)	(-4.13)	(6.44)	(-2.68)
RelOffSize (a)	-15.04***	-19.67***	-9.13**	-15.94**
	(-3.37)	(-3.35)	(-2.44)	(-2.53)
Constrained x RelOffSize (b)		-5.76		-15.94**
		(-0.65)		(-2.32)
ln(Asset) (c)	-0.17	-0.97***	0.35***	0.61***
	(-0.96)	(-3.16)	(3.24)	(3.13)
Constrained x ln(Asset) (d)		-1.38***		0.60***
		(-3.80)		(2.74)
BTM	0.43	0.03	-0.81*	-1.01**
	(0.71)	(0.05)	(-1.85)	(-2.36)
Constant	4.37	24.74***	-9.60***	-14.93***
	(0.98)	(3.19)	(-3.65)	(-2.99)
Observations	755	755	755	755
Adjusted R-squared	0.067	0.084	0.101	0.118

Table 5
Abnormal volume around announcement date and issue date

This table shows the abnormal trading volume (*ABVOL*) around the announcement date and the issue date. ABVOL is defined as follow,

$$ABVOL_{i,t} = \frac{\text{Turnover}_{i,t}}{\text{AveTurnover}_i} - \frac{\text{Turnover}_{m,t}}{\text{AveTurnover}_m}$$

$\text{Turnover}_{i,t}$ is defined as daily volume/outstanding share before issue of firm i on date t. $\text{Turnover}_{m,t}$ is defined as value weighted average market turnover of all public companies on date t. AveTurnover is defined as average daily turnover (daily volume/daily outstanding share) from AD-95 to AD-46. ABVOL is winsorized at the 99th percentile & 1st percentile. First column shows results for the total sample. The other columns present results for the sub groups divided by the short-sales constraints (*Constrained* and *Unconstrained*). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in two-tailed tests.

	Total	*Constrained*	*Unconstrained*	Diff	
AD-10	0.09	0.03	0.21	-0.19	
AD-9	0.11	0.04	0.26	-0.22	**
AD-8	0.16	0.17	0.13	0.04	
AD-7	0.16	0.20	0.07	0.13	
AD-6	0.19	0.22	0.13	0.09	
AD-5	0.13	0.16	0.06	0.11	
AD-4	0.10	0.10	0.10	-0.01	
AD-3	0.18	0.18	0.19	-0.01	
AD-2	0.27	0.31	0.20	0.11	
AD-1	0.42	0.44	0.38	0.06	
AD	1.85	1.67	2.21	-0.54	**
AD+1	1.49	1.02	2.39	-1.37	***
AD+2	0.71	0.43	1.25	-0.82	***
AD+3	0.52	0.25	1.04	-0.79	***
AD+4	0.71	0.39	1.33	-0.94	***
ID-4	1.45	0.91	2.49	-1.58	***
ID-3	1.23	0.81	2.04	-1.23	***
ID-2	1.06	0.70	1.75	-1.05	***
ID-1	1.39	0.77	2.60	-1.83	***
ID	10.39	10.39	10.40	-0.02	
ID+1	3.28	3.43	2.98	0.45	
ID+2	2.61	2.77	2.29	0.48	
ID+3	2.35	2.47	2.11	0.36	
ID+4	1.94	1.98	1.86	0.12	
ID+5	1.84	1.97	1.59	0.38	
ID+6	1.90	1.94	1.84	0.10	
ID+7	1.91	2.10	1.53	0.57	
ID+8	1.86	2.09	1.41	0.68	
ID+9	1.69	1.90	1.29	0.61	
ID+10	1.49	1.54	1.38	0.16	

Table 6
Probability of SEO announcements.

The table shows yearly SEO announcement probabilities as functions of the market timing and the variables of short-sales constraints and the divergence of opinion. We use the market timing variable as the previous one year's index-adjusted stock return (*Previous return*) and book-to-market ratio (*BTM*) on previous fiscal year end. At the beginning of each fiscal year, firms are independently sorted into three groups based on the market timing variables (*Previous return* and *BTM*) and the variable of short-sales constraints (*Constrained* and *Unconstrained*). Our sample of potential SEO announcers consists of 49,594 firm-year observations from 1998 to 2011. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in two-tailed tests.

Panel A: Previous return

	Previous return	SEO probability					
		Total	*Previous return*			(A) - (B)	t-stat
			Low (A)	Middle	High (B)		
Total	-0.81%	1.51%	0.60%	0.98%	2.93%	-2.33%	-16.13 ***
Constrained (a)	-1.76%	1.84%	0.52%	1.15%	3.97%	-3.45%	-16.47 ***
Unconstrained (b)	0.39%	1.08%	0.73%	0.79%	1.68%	-0.95%	-5.09 ***
(a) minus (b)	-2.15%	0.76%	-0.21%	0.36%	2.29%		
t-statistics	-6.98***	6.90***	-1.72*	2.34**	8.69***		

Panel B: BTM

	BTM	SEO probability					
		Total	*BTM*			(a) - (b)	t-stat
			Low (a)	Middle	High (b)		
Total	1.26	1.51%	3.03%	1.10%	0.39%	2.64%	18.63 ***
Constrained (a)	1.36	1.84%	4.15%	1.36%	0.30%	3.85%	19.02 ***
Unconstrained (b)	1.14	1.08%	1.75%	0.84%	0.54%	1.21%	6.37 ***
(a) minus (b)	0.212	0.008	0.024	0.005	-0.002		
t-statistics	26.24***	6.90***	8.99***	3.18***	-2.38***		

Table 7
Ordinary least square regressions of the abnormal announcement-day return and the abnormal issue-day return

This table shows ordinary least square regressions of the abnormal return on the announcement day and the issue day. *Constrained* is the dummy variable that takes a value equal to one if the issuer is a *constrained* stock and a value of zero otherwise. We use *Constrained* as measure of the short sales constraint, and MSE and *D_Breadth* as measures of the divergence of opinion. *MSE* is defined as the mean square error, is computed as the deviation from the value predicted by the Fama-French three factor model for the period from -70 days to -11 trading days before the announcement date. *High MSE* is a dummy variable which take a value equal one if the *MSE* is higher than the median of total sample. *Breadth* is defined as the ratio of the number of mutual funds that own the stock in the year prior to the equity offerings (t_{-1}) divided by the total number of mutual funds in the year t_{-1}, where t_0 is the event year. *D_Breadth* is defined as the change in *Breadth* from event year t_{-2} to event year t_{-1}. *High D_Breadth* is a dummy variable which take a value equal one if the *D_Breadth* is higher than the median of total sample. *RelOffSize* is defined as the total number of new offering shares divided by the outstanding shares prior to the offering. *ln(Asset)* is the natural logarithm of the sum of the market value of the firm's equity at the last day of the month preceding the SEO announcement and the book-value of assets, as of previous fiscal year end. Assets are adjusted for 2005 purchasing power. *BTM* is the book-to-market ratio. Heteroscedasticity-adjusted t-statistics are presented in parentheses below the regression coefficients. *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

	Announcement return					Issue day return				
DOO proxy		*MSE*	*High MSE*	*D_Breadth*	*High D_Breadth*		*MSE*	*High MSE*	*D_Breadth*	*High D_Breadth*
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Constrained	2.56***	39.81***	39.75***	37.02***	35.21***	-2.17***	-15.62***	-15.46***	-15.21**	-14.66**
	(5.29)	(4.35)	(4.35)	(3.92)	(3.73)	(-6.44)	(-2.76)	(-2.73)	(-2.57)	(-2.46)
DOO proxy		0.58***	1.80***	-25.11	-0.82*		-0.14	-0.33	79.81**	0.37
		(2.61)	(3.58)	(-0.42)	(-1.83)		(-1.03)	(-0.89)	(2.21)	(1.19)
RelOffSize	-15.04***	-21.27***	-21.37***	-20.95***	-21.11***	-9.13**	-15.54**	-15.63**	-16.64**	-16.59**
	(-3.37)	(-3.64)	(-3.68)	(-3.48)	(-3.52)	(-2.44)	(-2.43)	(-2.47)	(-2.58)	(-2.58)
Constrained x RelOffSize		-4.62	-4.21	-6.96	-7.04		-16.23**	-16.23**	-17.62**	-16.91**
		(-0.53)	(-0.48)	(-0.77)	(-0.78)		(-2.36)	(-2.36)	(-2.51)	(-2.40)
ln(Asset)	-0.17	-1.00***	-1.02***	-0.96***	-0.89***	0.35***	0.62***	0.62***	0.60***	0.59***
	(-0.96)	(-3.24)	(-3.33)	(-2.94)	(-2.75)	(3.24)	(3.16)	(3.16)	(2.88)	(2.83)
Constrained x ln(Asset)		-1.49***	-1.50***	-1.35***	-1.27***		0.63***	0.62***	0.61***	0.59**
		(-4.09)	(-4.10)	(-3.57)	(-3.38)		(2.85)	(2.80)	(2.63)	(2.50)
BTM	0.43	0.69	0.84	-0.10	-0.20	-0.81*	-1.17**	-1.16**	-0.94**	-0.98**
	(0.71)	(1.05)	(1.29)	(-0.16)	(-0.32)	(-1.85)	(-2.57)	(-2.36)	(-2.09)	(-2.21)
Constant	4.37	23.35***	22.88***	24.60***	24.28***	-9.60***	-14.59***	-14.59***	-14.72***	-15.03***
	(0.98)	(3.00)	(2.97)	(3.03)	(3.00)	(-3.65)	(-2.93)	(-2.94)	(-2.80)	(-2.84)
Observations	755	755	755	714	714	755	755	755	714	714
Adjusted R-squared	0.067	0.094	0.098	0.087	0.091	0.101	0.118	0.118	0.128	0.126

Table 8
Ordinary least square regressions of issue discounts

This table shows ordinary least square regressions of *Issue discounts*, defined as negative one times the return from the previous day's closing transaction price to the SEO's offer price. Columns 1 to 3 show the regression results for total sample. Columns 4 and 5 present the regression results for *Constrained* and *Unconstrained* sample, respectively. *Constrained* is the dummy variable that takes a value equal to one if the issuer is a *constrained* stock and a value of zero otherwise. *Average SSVOL* is defined as the average the number of short selling divided by the number of total volume from PD-1 to PD. *Days from PD to ID* is the number of days from pricing day to issue day. *RelOffSize* is defined as the total number of new offering shares divided by the outstanding shares prior to the offering. *ln(Asset)* is the natural logarithm of the sum of the market value of the firm's equity at the last day of the month preceding the SEO announcement and the book-value of assets, as of previous fiscal year end. Assets are adjusted for 2005 purchasing power. *BTM* is the book-to-market ratio. *Major UW* is the dummy variable that takes a value equal to one if the underwriter is one of the Top three underwriters (Daiwa, Nikko, and Nomura) in Japanese SEO market and a value of zero otherwise. Heteroscedasticity-adjusted t-statistics are presented in parentheses below the regression coefficients. *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

	Total			*Constrained*	*Unconstrained*
	Model 1	Model 2	Model 3	Model 4	Model 5
Constrained		0.21***			
		(3.03)			
Average SSVOL			-0.76***		
			(-4.77)		
Days from PD to ID	0.07***	0.07***	0.07***	0.07***	0.05
	(7.75)	(6.67)	(7.06)	(6.77)	(1.55)
RelOffSize	2.21***	2.18***	2.11***	1.56**	2.67***
	(3.64)	(3.58)	(3.54)	(2.29)	(2.64)
ln(Asset)	-0.21***	-0.18***	-0.20***	-0.22***	-0.16***
	(-10.52)	(-8.58)	(-9.55)	(-5.62)	(-6.86)
BTM	0.57***	0.57***	0.59***	0.59***	0.50***
	(6.17)	(6.09)	(6.30)	(5.05)	(3.39)
Major UW	0.13	0.13*	0.11	0.19**	0.02
	(1.64)	(1.71)	(1.46)	(1.99)	(0.17)
Constant	4.33***	4.15***	4.27***	4.53***	3.92***
	(18.14)	(17.45)	(17.96)	(11.45)	(10.68)
Observations	755	755	755	498	257
Adjusted R-squared	0.228	0.235	0.238	0.157	0.174

Table IA.1

The difference between the treatment and control observations in their firm size, liquidity and the offer size

Asset is the sum of the market value of the firm's equity at the last day of the month preceding the SEO announcement and the book-value of assets, as of the previous fiscal year end. *Proceeds* are the total proceeds of the offering. *Asset* and *Proceeds* are adjusted for 2005 purchasing power. *RelOffSize* is defined as the total number of new offering shares divided by the outstanding shares prior to the offering. *ILLQ* is Amihud's (2002) illiquidity measure, and is defined in footnote#18 of the main text.

		Total (N = 920)	*Constrained (A)* (N = 460)	*Control Unconstrained (B)* (N = 460)	Diff *(A) - (B)*	t-stat	*Unconstrained (C)* (N = 257)	Diff *(A) - (C)*	t-stat
Asset	Mean	315.07	86.914	73.324	13.590	0.68	765.04	-678.13	-5.33 ***
(billion yen)	Median	44.74	34.325	33.942			127.09		
	Std.dev	1626.80	382.041	191.387			2687.71		
ILLQ	Mean	0.272	0.273	0.270	0.003	0.13	0.076	0.20	9.43 ***
	Median	0.157	0.156	0.158			0.013		
	Std.dev	0.309	0.311	0.307			0.162		
Proceeds	Mean	11.500	4.104	3.394	0.710	1.20	26.200	-22.10	-7.10 ***
(billion yen)	Median	2.280	1.815	1.343			5.080		
	Std.dev	40.500	9.622	8.343			65.700		
RelOffSize	Mean	0.138	0.135	0.138	-0.003	-0.83	0.144	-0.01	-1.44
	Median	0.127	0.127	0.140			0.126		
	Std.dev	0.065	0.056	0.052			0.078		

Table IA.2
Abnormal returns and cumulative abnormal returns around the SEO

	Treatment Constrained (a) (N = 460)		*Control Unconstrained (b) (N = 460)*		(a) - (b)	t-statistics
	Mean	t-statistics	Mean	t-statistics		
CAR[AD-45, AD-2]	11.02 ***	9.46	2.94 ***	4.13	8.08	5.92 ***
AR[AD]	-1.69 ***	-5.94	-3.94 ***	-19.10	2.25	6.42 ***
CAR[AD-1, AD]	-1.41 ***	-4.20	-4.29 ***	-22.59	2.88	7.45 ***
CAR[AD+1, ID-1]	-1.58 **	-2.39	-4.23 ***	-8.09	2.65	3.14 ***
CAR[AD-1, ID-1]	-2.99 ***	-3.95	-8.52 ***	-14.97	5.52	5.83 ***
CAR[AD-1, ID]	-5.62 ***	-7.40	-9.56 ***	-15.67	3.94	4.04 ***
AR[ID]	-2.67 ***	-11.58	-0.97 ***	-5.24	-1.70	-5.75 ***
CAR[ID+1, ID+10]	-0.70	-1.23	0.38	1.08	-1.08	-1.62
CAR[ID+1, ID+20]	-1.26 *	-1.67	-0.48	-0.97	-0.79	-0.87

Table IA.3
Ordinary least square regressions of the abnormal announcement-day return and the abnormal issue day return

	Announcement return		Issue day return	
	Model 1	Model 2	Model 3	Model 4
Constrained	2.06***	2.36	-1.76***	-19.64***
	(5.86)	(0.26)	(-5.53)	(-2.79)
RelOffSize	-21.32***	-18.20***	-12.16***	-16.97**
	(-5.57)	(-2.94)	(-2.75)	(-2.56)
Constrained x RelOffSize		6.79		-10.31
		(0.93)		(-1.24)
ln(Asset)	-0.62***	-0.64**	0.33**	0.68***
	(-3.24)	(-2.32)	(2.43)	(3.15)
Constrained x ln(Asset)		-0.05		0.79***
		(-0.14)		(2.88)
BTM	-0.62	-0.55	-0.12	-0.24
	(-1.23)	(-1.08)	(-0.29)	(-0.63)
Constant	16.61***	16.59**	-9.13***	-16.92***
	(3.46)	(2.40)	(-2.58)	(-3.08)
Observations	920	920	920	920
Adjusted R-squared	0.090	0.089	0.060	0.071