# The Impact of Reference Point Prices on Seasoned Equity Offerings

Armen Hovakimian*

Huajing Hu**

January 14, 2016

## Abstract

We document that firms' financing decisions are affected by historical high prices. The ratio of the offering price to the 12-month high price clusters around one with the probability of issuing exactly at the historical high price much higher than that at prices slightly below or above. Furthermore, the likelihood of equity issuance increases with the ratio of the current price to the 12-month high and is significantly higher following the months in which the stock hits the high watermark. Overall, the evidence is consistent with the hypothesis that historical high prices serve as reference points in managers' financing decisions.

* Zicklin School of Business, Box B10-225, Baruch College, New York, NY 10010. Tel: (646) 312-3490; fax: (646) 312-3451; e-mail: armen.hovakimian@baruch.cuny.edu.
** Robert B. Willumstad School of Business, Adelphi University, Garden City, New York, NY 11530. Tel: (516) 833-8162; fax: (516)877-4607; e-mail: hhu@adelphi.edu.

## I. Introduction

Prior evidence suggests that seasoned equity offerings (SEO) tend to be preceded by periods of relatively high stock returns and tend to be followed by periods of relatively low returns. One interpretation of this evidence is that managers take advantage of temporary overpricing by selling shares to overly optimistic investors (Loughran and Ritter, 1995, 1997, Spiess and Affleck-Graves, 1995, Baker and Wurgler, 2002). The underlying assumption of this market-timing hypothesis is that managers are informed and sophisticated enough to identify mispricing. Although it is possible that insiders' access to private information may allow them to identify the instances when their shares are potentially mispriced (Lucas and McDonald, 1990), managers may, as we discuss below, also utilize publicly available information to determine the best timing opportunities for SEOs.

In this paper, we test and find empirical support for the hypothesis that mangers use historical high prices as their reference points when they make decisions on new equity issuance. The idea of a reference point was first explored in Kahneman and Tversky (1974). They find that individuals typically make estimates by starting with an easily available starting value, or anchor, which is then adjusted to yield the final answer. The adjustment is not complete in the sense that different starting values lead to different estimates.

There are a number of reasons why historical high prices could play a reference point role in corporate financing decisions. First, Kahneman and Tversky (1974) suggest that individuals use heuristics to cope with complex and uncertain situations. To identify when the firm's shares are overvalued is a complex task with substantial uncertainty.

Hence, it would not be surprising if managers used heuristics and looked for public information to help them time new equity issues.

Second, prior empirical literature provides evidence of anchoring among market professionals. For example, Campbell and Sharpe (2009) show that professional forecasters anchor their predictions of macroeconomic data, such as the consumer price index on previous values. Similarly, Cen, Hilary and Wei (2013) find that financial analysts anchor their earnings forecasts on the industry medians. In a related study, Baker, Pan and Wurgler (2012) find that, in mergers and acquisitions, mangers use historical high prices as reference points for valuing the targets. In another related paper, Baker and Xuan (2011) find that the CEO-specific share price performance affects corporate financing decisions. The probability of equity issuance increases discontinuously when the share price exceeds the inherited price and the impact of recent stock returns is stronger when the return occurs during the current CEO's tenure.

Third, Huang and Ritter (2009) refer to anecdotal evidence that whether a client's stock price is near a 12-month high is one of the most important factors when investment bankers advise on the choice between debt and external equity financing. Similarly, Rosenbaum and Pearl (2009) state that a company's current share price as a percentage of its 12-month high is a widely used metric that provides perspective on valuation and calibrates current market sentiment and outlook.

Finally, it is important to note that managers of publicly traded corporations do not make decisions in isolation. To the extent their boards, shareholders, and market participants in general use historical high prices as reference points, the managers may not be able to ignore such anchors.

We start our analysis by examining the relation between seasoned equity offering prices and historical high prices, as measured by 12-, 24-, 36-, 48-, and 60-month high prices. For each horizon, the distribution of the ratios of the offering price to the historical high price shows that the probability of offering exactly at the historical high is substantially higher than at prices slightly below and above the historical high.

Furthermore, a comparison of the empirical distributions of the ratios of the most recent monthly closing stock prices to the historical high prices of issuers and non-issuers shows that the two distributions are significantly different from each other. Specifically, at values of about one or higher, the density of the ratio of the price to the historical high price is higher for issuers, whereas, at values below one, the density is higher for non-issuers. These results suggest that historical high prices may influence seasoned equity offering decisions.

An equity issuer has little flexibility in terms of the offering price because the shares have to be offered at a discount to the market price at the time of the offering. In fact, it is primarily by choosing the timing of the offering that the firm can affect the offering price. Furthermore, our univariate results are likely to be affected by other firm characteristics that are known to affect equity issuance, in particular, by pre-issue stock returns and market-to-book ratios. Therefore, we next use regression analyses to test whether historical high prices play an important and separate role in equity financing decisions, while controlling for a variety of other variables. The results show that, after accounting for past stock returns, market-to-book ratios, and other firm characteristics, the impact of the ratio of the recent stock price to its historical high on the likelihood of equity issuance remains significantly positive.

In a series of alternative tests, we find that the likelihood of equity issuance is significantly higher in the month and the year immediately following the month in which the stock hits a new high. Furthermore, we find that the positive sensitivity of the probability of equity issuance to the stock price increases sharply when the ratio of the current to historical high price exceeds one. This positive sensitivity entirely disappears when this ratio reaches about 1.2. Thus, the positive impact of the ratio of the current to historical high price is mostly limited to a narrow region above the value of one, consistent with the idea that this value plays a special psychological role.

This study contributes to the SEO literature by providing evidence that widely available stock price information, the historical high price, serves as a reference point that influences managers' financing decisions. The study also contributes to the recent literature that recognizes the importance of managerial cognitive biases in corporate finance.

The paper is organized as follows. Section II describes the sample. Section III documents the effect of historical high prices on equity offering prices. Section IV examines how historical high prices affect equity financing decisions. Section V presents alternative tests that show that the likelihood of equity issuance increases significantly after the stock price reaches a new historical high. Section VI presents complementary evidence on equity repurchases. Section VII summarizes our conclusions.

## II. Sample and Variables

The initial sample consists of all firms that: (1) are present in both Center for Research in Security Prices (CRSP) and Compustat in 1974-2014; (2) are not utilities or financial firms (SIC codes 4900 through 4999 or codes 6000 through 6999); (3) are not firms with values of total assets or sales of less than $1 million. We retain only

observations with non-missing values of variables of interest from Compustat and one year stock returns from CRSP.

The sample of seasoned equity offerings that took place over the period of 1975–2014 is obtained from Thomson Financial SDC database. Following earlier new issue studies, we exclude issues by non-US firms, private placements, pure secondary issues, rights issues, and unit offerings. We retain the issues that have matched stock price data from CRSP and financial statement data from Compustat. Many of our tests use fiscal year data from Compustat. If there is more than one SEO within the same fiscal year we retain only the first offering. These selection criteria generate a sample of 2,871 SEOs. The distribution of SEOs over the sample period is presented in Figure 1.

Using monthly CRSP data, for each firm-month we calculate the historical high prices over the 12-, 24-, 36-, 48- and 60-month periods ending one month prior to the current month. Then, we calculate three related ratios. First, for each of our sample SEOs, we calculate the ratios of the offer price to the historical high prices over the 12, 24, 36, 48, and 60 months prior to the issue month. Second, for each sample month, we calculate the ratios of the end of the month stock price to the historical high prices over the previous 12, 24, 36, 48, and 60 months. Third, for each sample month, we calculate the ratios of the monthly high price to the historical high prices over the previous 12, 24, 36, 48, and 60 months. In fiscal year data based tests we use the ratios calculated for the month corresponding to the fiscal year end.

Table I reports the numbers of annual observations and the means of the end of fiscal year price-to-historical-high ratios, various firm characteristics, and measures of stock performance for the entire sample. Table II provides separate summary statistics for

firm-years with and without equity issues. Panel A reports the mean values of end of the previous year price-to-historical-high ratios for different historical horizons. Panel B reports the mean values of the end of the previous year firm characteristics identified by earlier studies as important determinants of equity issuance decisions.

Consistent with previous literature, firms tend to issue equity when their valuations are high. The average stock return during the preceding fiscal year is significantly higher for issuers (0. 448) than for non-issuers (0.140). Similarly, the mean market-to-book ratio is significantly higher for issuers (1.960) than for non-issuers (1.550). The ratios of the pre-issue year stock price to the historical high prices are also higher for issuers. For example, the mean ratio of the share price at the beginning of the year to the 12-month historical high price is 0.852 for issuers and 0.750 for non-issuers. These patterns are consistent with the hypothesis that managers may be using historical high prices as reference points when they make SEO decisions. However, they are also consistent with other hypotheses, such as that firms issue equity when their prices are high without giving a special consideration to the historical high price.

## III. Equity Offering Price and Historical High Price

According to the reference point hypothesis, historical high prices are used as reference points to determine when to issue equity. If a firm is more likely to issue equity when its stock price is close to the historical high price, such a behavior should be reflected in the distribution of the offering prices. More specifically, offering prices should be positively correlated with historical high prices and cluster around the historical high prices.

### A. Distribution of the ratios of the offering price to the historical high price

Figure 2 displays histograms of the ratios of the offering price to the 12-, 24-, 36-, 48- and 60-month historical high prices. In all five histograms, the frequency of issuing exactly at the historical high price is substantially higher than that at prices slightly below or above. These patterns suggest that historical high prices play a special role in equity issuance decisions, consistent with the reference point hypothesis.

B. Regression analysis

While the likelihood of issuing at exactly historical high price is unusually high, the vast majority of offerings are not at historical high prices. In this section, we examine whether the offering prices are influenced by historical high prices by estimating the following regression of offering prices on historical high prices:

$$Offer_{it} = a + \beta_1 Hi_{it-1} + \varepsilon_{it}. \qquad (1)$$

In (1), *Offer* is the SEO offering price and *Hi* is the historical high stock price. Cross-sectional variation in average price levels may induce a positive correlation between offering prices and historical high prices. To avoid this and reduce heteroscedasticity, both the dependent and the independent variables in (1) are scaled by the average stock price over the last 12 months. The inverse of the average stock price is also included in the specification. The coefficient estimates and robust t-statistics with standard errors clustered by month are reported in Table III.

The results in Table III show that the coefficient estimates of the historical high prices are statistically significantly positive. The economic magnitudes of the effect are also significant. A ten percentage point increase in the 12-month high price relative to the average stock price leads to a 5.48 percentage point increase in the offering price relative to the average stock price. Historical high prices at longer horizons are also significant,

but both the magnitude of the effect and the explanatory power of the historical high price decline with time. These results suggest that historical high prices may play an important role in timing of seasoned equity offerings.

## IV. Equity Issue Decisions and Historical High prices

An issuer can choose when to issue but has little flexibility in terms of the offering price once the timing is determined because the shares have to be offered at a discount to the market price at the time of the offering. Indeed, it is by choosing the timing of the offering that the firm can issue new shares at or close to historical high prices. In this section, we directly examine how historical high prices affect the timing of equity offerings.

### A. Univariate Analysis

We first examine the evolution of the issuers' stock prices relative to historical high prices around the year of the issue. If historical high prices play a reference point role in a firm's financing decision, we expect to find that the ratios of the stock price to the historical high prices are at their highest right before equity issuance.

In Table IV, we report the time series profiles of the ratios of the closing stock prices to the historical high prices over 12, 24, 36, 48, and 60 months. Year 0 reflects the average ratio of the last pre-issue month's closing price to the historical high. Years -1 through -3 reflect the ratios calculated at, respectively, 12-, 24-, and 36-month lags. Years +1 through +3 reflect the ratios calculated 12, 24, and 36 months after the issue. The results show that, for all historical horizons, the average price-to-historical-high ratios are indeed the highest right before the issue. The differences between Year 0 ratios and the ratios in all other years are statistically significant at five percent level. This time-series pattern is

consistent with the hypothesis that firms use historical high prices as reference points in equity financing decisions.

While Table IV provides the time-series of mean price-to-historical-high ratios, Figure 3 provides a snapshot of the whole distribution of these ratios for both issuers (at the end of the month preceding the filing month) and non-issuers (at the end of the fiscal year preceding the year when there is no equity issue). Panels A through D present the distributions using respectively 12-, 24-, 36-, 48- and 60-month high prices. In all panels, the issuers' distributions show higher likelihoods of ratios greater than 0.8-0.9 than the distributions of non-issuers. For example, for the ratio of the stock price to the past 12-month high price, 67% of the issuers have values higher than 1, while only 25% of the non-issuers have value higher than 1. Using two-sample Kolmogorov–Smirnov test, which is a nonparametric test for the equality of continuous, one-dimensional probability distributions of two samples, for each of the panels A-D, we reject the hypothesis that the sample distributions of issuers and non-issuers are the same at 1% level.

B. Probit analysis of equity issuance decisions

Prior literature shows that many firm characteristics affect the probability of equity issuance. It is possible that the univariate relation between historical high prices and equity offering decisions is driven by such firm characteristics, in particular, by market-to-book ratios and past stock returns, which are likely to be correlated with historical high prices. In this section, we estimate traditional equity issuance regressions with the ratios of recent to historical high prices as additional explanatory variables. Our goal is to test the hypothesis that historical high price reference points play an incremental role in corporate

equity financing decisions in addition to stock returns, market-to-book ratios, and other firm characteristics.

To test the impact of the historical high prices on firms' equity financing decisions while controlling for other factors that likely affect such decisions, we estimate a probit regression modeling the likelihood of seasoned equity offerings as a function of a set of firm characteristics used in prior studies, but include the ratio of the pre-issue stock price to the historical high price on the right hand side.

$$SEO_{it=}\beta_{0j+}\beta_1 LEV_{it-1} + \beta_2 RD_{it-1} + \beta_3 NOLC_{it-1} + \beta_4 Prof_{it-1} +$$
$$\beta_5 Tng_{it-1} + \beta_6 SZ_{it-1} + \beta_7 Ret_{it-1} + \beta_8 MB_{it-1}$$
$$+ \beta_9 \mathrm{Prc_{it\text{-}1}/Highprice} + \varepsilon_{it} \qquad (2)$$

In equation (2), the dependent variable, SEO is a binary variable set to one if firm *i* issues equity in fiscal year *t* and set to zero otherwise. The set of independent variables consists of variables such as lagged leverage *(LEV)*, research and development (*R&D*) expenses, net operating loss carryforwards (*NOLC)*, profitability (*Prof*), asset tangibility (*Tng*), size (*SZ*), return (*Ret*) and market-to-book ratio (*MB)*. These variables have been used as proxies for factors affecting target leverage (Titman and Wessels, 1988; Hovakimian, Opler and Titman, 2001). The market-to-book ratios and stock return have also been used as measures of mispricing.

The independent variables are measured as follows. Leverage (*LEV*) is measured as the sum of long-term debt and short-term debt over total assets. *R&D* is defined as research and development expense over sales. *NOLC* is defined as net operating loss carryforwards over total assets. Profitability (*Prof)* is measured as operating income over total assets. Tangible assets ratio (*Tng*) is defined as net property, plant, and equipment

over total assets. Size (*SZ*) is the natural logarithm of sales. Return (*Ret*) is the stock return measured over the fiscal year. Market-to-book (*MB*) is defined as total assets minus book equity plus market equity over total assets.[1] Year indicators are included to control for macroeconomic factors.

The coefficient estimates for the independent variables in regression (3) are presented in Table V. The reported t-statistics reflect robust standard errors adjusted for heteroskedasticity and firm-level clustering. The sample consists of firms that have at least one SEO during the sample period. The non-issuer subsample consists of observations with no equity issue in the current year. Thus, the regression models why a firm issues equity at time t but not at other times.[2] The table reports the estimation results for five different specifications of regression (3), with the historical high price measured over five different horizons: 12, 24, 36, 48, and 60 months.

Consistent with the findings of earlier studies, probability of equity issuance increases with past returns and the market-to-book ratio. One interpretation of these results in prior empirical literature is that firms time equity issues to periods when their shares are likely to be overvalued. In all specifications, the effect of the ratio of the pre-issue stock price to historical high price is positive and statistically significant. This implies that, holding past stock returns, market-to-book ratios, and other important determinants of equity issuance constant, the probability of issuing equity rises with the ratio of the stock

[1] Market value of assets is (total assets – book equity + market equity). Book equity is the book value of stockholders' equity, plus balance sheet deferred taxes and investment tax credit, if available (TXDITC), minus the book value of preferred stock. Depending on availability, we use the redemption (PSTKRV), liquidation (PSTKL), or par value (PSTK) to estimate the book value of preferred stock. Stockholders' equity is (SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (CEQ) plus the par value of preferred stock, or the book value of assets minus total liabilities (LT).

[2] The results are similar when firms that never conduct an equity offering are included.

price to the historical high. In other words, historical high prices play an important and separate role in firms' equity financing decisions in addition to other firm characteristics and stock valuation variables.

C. Robustness Tests

In the prior section, the sample seasoned equity issues is obtained from SDC. The advantage of using SDC is that we can pin down the announcement date, the issue date, and the offering price. However, it is well known that public seasoned equity offerings are relatively rare. In addition to SEOs, firms could issue equity in mergers or through other channels, such as private placements. Therefore, many prior studies (e.g., Hovakimian, Opler, and Titman, 2001) also use an alternative, Compustat based, definition of equity issuance. As a robustness check, we reestimate regression (3) with equity issues defined as cases when net equity issued exceeds 5% of pre-issue total assets. Net equity issued is measured as the sale of common stock and preferred stock minus the purchase of common stock and preferred stock. The coefficient estimates are presented in Table VI. The effects of historical high prices continues to be statistically significant.

## V. Is a Firm More Likely to Issue Equity After the Stock Hits High?

The regression results presented in the previous section imply that historical high prices play a significant role in firms' financing decisions after controlling for other firm characteristics. However, the positive relation between the ratio of the stock price to the historical high price and the likelihood of equity issuance only suggests that firms prefer to issue equity at high share prices but says little specifically about the reference point role of historical high prices. In this section, we further examine if historical high prices play a reference point role in firms' financing decisions. We test whether firms are more likely

to issue equity following the months in which the stocks hit the 12-, 24-, 36-, 48- or 60-month high.

A. Univariate tests

We begin by examining the association between whether the stock hits high and the likelihood of SEOs. We split our firm-month observations into two subsamples based on whether the stock price reaches a new high during that month. For each firm-month, we also track whether the firm issues equity over the following 12 months.[3]

Table VI presents the fractions of firms that issue equity in the 12 months following the months when their stock price hits a new high and, separately, for the months in which the stock does not hit a new high. The results in the first two columns of Table VI show that 5.1% of the months in which the stock hits a new 12-month high are followed by an equity offering during the following 12 months. In contrast, only 2.3% of the months in which the stock does not hit a 12-month high are followed by an equity offering. The difference is statistically significant at one percent. The results for 24-, 36-, 48, and 60-months highs show that, as the new high becomes more exceptional, the likelihood of equity issuance becomes higher and the difference between the firms that hit new highs and those that do not becomes larger.

It is possible that the differences in the likelihood of equity issuance observed in Table VI are driven by the fact that firms simply prefer to issue stocks at higher prices. In addition, it is possible that the differences are driven by a relatively few observations with extreme prices. To address such concerns, we limit the sample to situations where the current month high is greater than the 80% of the historical high price but is less than the

[3] We also check different time horizons, such as 6 months and 3 months. The results are similar.

120% of the historical high price. If the historical high prices do not play a special reference point role and the differences in probability of issuance are driven exclusively by a price effect, we expect that the probability of equity issue to be similar regardless of whether the stocks hit high or not because overall the share prices in this subsample are relatively high. These results are presented in the last two columns of Table VI. The results show that 4.8% of the firm-months in which the stock hits a 12-month high are followed by an equity offering. By comparison, only 2.8% of the firm-months in which the stock doesn't hit a 12-month high are followed by an issue. The difference is statistically significant at one percent. These results are consistent with the reference point hypothesis.

B. Multivariate regressions: Predicting SEOs

As discussed earlier in the paper, the relation between whether the stock hits high and the probability of equity issuance could be indirectly driven by other firm characteristics known to affect equity issuance. In this section, we use probit regressions to predict the likelihood of SEO issuance over the next 12 months while controlling for a host of other firm characteristics.

$$Issue_{it+12=}\beta_{0j+}\beta_1 LEV_{it-1} + \beta_2 RD_{it-1} + \beta_3 NOLC_{it-1} + \beta_4 Prof_{it-1} +$$
$$\beta_5 Tng_{it-1} + \beta_6 SZ_{it-1} + \beta_7 Ret_{it-1} + \beta_8 MB_{it-1}$$
$$+ \beta_9 \mathrm{DHi_t} + \varepsilon_{it} \qquad (3)$$

Regression (3) is similar to regression (2), except regression (2) was estimated on unbalanced panel of firms with the time dimension represented by fiscal years. Regression (3) is estimated on an unbalanced panel with monthly observations. The dependent variable, *Issue*, is a binary variable set to one if there is an equity issue over the following 12 months. *DHi* is an indicator variable set to one if the stock hits a historical high in

month *t* and zero otherwise. *Ret* is the stock return over the previous 12 months. Other firm characteristics, such as lagged leverage (*LEV*), research and development (*R&D*) expenses, Net operating Loss carry forward (*NOLC*), profitability (*Prof*), asset tangibility (*Tng*), size (*SZ*) and market-to-book (*MB*) are based on the most recent fiscal year-end financial statement data and proxy for important determinants of leverage as identified by earlier literature. Year indicators are included to control for macroeconomic factors. The standard errors are clustered on firm level to account for the time-series correlation among observations from the same firm.

Panel A of Table VII provides the estimation results for probit regression (3). The coefficient estimates show that, for all horizons, *DHi* positively predicts equity issuance. Consistent with the reference point hypothesis, the estimates are highly significant. The results for other variables are consistent with prior studies.

The regressions reported in Panel A, are estimated on monthly data. However, all right hand side variables, except *DHi*, are annual. Furthermore, the dependent variable, *Issue*, represents equity issuance over the following 12 months and, hence, overlaps with preceding and subsequent monthly observations for the same firm. Firm-level clustering used in Panel A is helpful but may not resolve all potential concerns. As an alternative, Panel B displays the estimation results for probit regressions using only one randomly chosen month from each fiscal year. The coefficient estimates and their significance remain qualitatively the same.

C. Discontinuity analysis

In this section, we sort the all sample firm-months into 14 groups based on the ratio of the current-month high to the historical high price. The highest bin consists of the firm-months in which the ratio is higher than 1.5. The lowest group consists of the firm-months in which the ratio is lower than 0.2. The remaining observations are sorted into 13 groups with equal bandwidth of 0.1. Within each group, the average percent of firm-months that are followed by equity issues in 12 months is obtained. Figure 4 shows that as the current month's high price increases and approaches the historical high, the percent of firms that issue equity in the next 12 months increases.

Figure 4 further reveals that the likelihood of equity issuance increases slowly as the price approaches the historical high from below, it rises dramatically as the price passes the historical high, and it levels off and even declines slightly after the price exceeds the historical high by about 20 percent. This pattern is consistent with the reference point hypothesis that the historical high price plays a special role in triggering equity issuance decisions.

With the non-linearity in Figure 4 in mind, we estimate the following probit regression model for different subsamples.

$$Issue_{it+12=}\beta_{0j+}\beta_1 LEV_{it-1} + \beta_2 RD_{it-1} + \beta_3 NOLC_{it-1} + \beta_4 Prof_{it-1} +$$
$$\beta_5 Tng_{it-1} + \beta_6 SZ_{it-1} + \beta_7 Ret_{it-1} + \beta_8 MB_{it-1}$$
$$+ \beta_9 \mathrm{HiPrice_{it}/Hi12} + \varepsilon_{it} \qquad (4)$$

In equation (4), the dependent variable, $Issue_{it+12}$ is a binary variable set to one if there is an equity issue over the following 12 months. $HiPrc_{it}/Hi12$ is the ratio of current month high price to the 12-month historical high price. *Ret* is the stock return over the

previous 12 months. Other firm characteristics, such as lagged leverage (*LEV*), research and development (*R&D*) expenses, Net operating Loss carry forward (*NOLC*), profitability (*Prof*), asset tangibility (*Tng*), size (*SZ*) and market-to-book (*MB*) are based on annual data and proxy for important determinants of the leverage. Year indicators are included to control for macroeconomic factors. We cluster the standard errors at firm level to account for the within firm time-series correlation.

The first set of results in Table VIII is for the entire sample.[4] The second set of results is for observations with the current month's high price lower than the historical high price. The third set of results is for observations with the current month's high price higher but less than 20% higher than the historical high. The fourth set of results is for observations with the current month's high price more than 20% higher than the historical high. The results show that while the likelihood of equity issuance increases with the ratio of the current month's high price to the historical high price, the sensitivity is especially high when the ratios are between 1 and 1.2. For the subsample with the ratios of the current month's high price to the historical high below 1, the coefficient estimate for HiPrice/Hi12 is a statistically insignificant -0.070, while for the subsample with the ratios between 1 and 1.2 the coefficient is 0.979 and is highly significant. Beyond the 1.2 level, the estimated incremental effect of the historical high price becomes significantly negative.

To summarize, the results presented in Figure 4 and Table VIII are consistent with the reference point hypothesis that managers use historical high prices as a reference point to determine the timing of their equity financing decisions.

[4] Table VIII shows results for 12-month high prices. The results are similar for longer time horizons.

## VI. Equity Repurchasing and Historical Low Prices

If the reference point plays a special role in firms' equity offering decisions, it may also affect firms' share repurchase decisions. The traditional timing argument suggests that while firms may attempt to sell new shares when their share price is too high, they may repurchase shares when the price is too low. Hence, the reference point used in stock repurchase decisions would be the historical low price and we hypothesize that a firm is more likely to repurchase shares if the stock price is close to or lower than the historical low price.

We use Compustat data to define repurchases as cases when net equity issued is lower than -5% of pre-repurchase assets, where net equity issued is measured as the sale of common stock and preferred stock minus the purchase of common stock and preferred stock.. We obtain the historical low prices over 12-, 24-, 36-, 48- and 60-month ending one month prior to the fiscal year end and then calculate the ratios of the fiscal year end stock price to the historical low price defined over different time horizons.

To examine the impact of historical low prices on repurchasing decisions, we estimate the following probit regression.

$$Repurchase(ER)_{it=}\beta_{0j+}\beta_1 LEV_{it-1} + \beta_2 RD_{it-1} + \beta_3 NOLC_{it-1} + \beta_4 Prof_{it-1} + \beta_5 Tng_{it-1} + \beta_6 SZ_{it-1} + \beta_7 Ret_{it-1} + \beta_8 MB_{it-1} + \beta_9 \text{Lo12/Price} Price_{it-1} + \varepsilon_{it} \quad (5)$$

In equation (5), the dependent variable, *Repurchase* (ER) is a binary variable set to one if the firm repurchases shares and zero otherwise. Lo12/Price is the ratio of the 12-month historical low price to the closing stock price at the end of the previous fiscal year. Other firm characteristics, such as lagged leverage (*LEV*), research and development

(*R&D*) expenses, net operating loss carryforward (*NOLC*), profitability (*Prof*), asset tangibility (*Tng*), size (*SZ*), return (*Ret*) and market-to-book (*MB*) are as defined earlier and proxy for important determinants of corporate financing decisions. Year indicators are included to control for macroeconomic factors. The reported *t*-statistics reflect robust standard errors adjusted for heteroskedasticity and firm-level clustering.

Table IX provides the regression results of corporate repurchasing decisions on historical low prices. In addition to the regression with the 12-month historical low price, the table also presents the results for specifications of equation (5) with 24-, 36-, 48-, and 60-month lows on the right hand side. As conjectured, the coefficient estimate for *Lo12/Price* is significantly positive, implying that the likelihood of a share repurchase increases as the current price declines and gets closer to the historical low price. The coefficient estimates for longer horizons are also all significantly positive, although the magnitude of the estimate declines with the length of the horizon.

## VII. Conclusion

In this paper, we hypothesize that historical high prices play a special role as reference points that affect the timing of firms' seasoned equity offerings.

We find evidence that historical high prices affect the probability of seasoned equity offerings. The ratios of the offering price to the historical high prices cluster around one with the probability of issuing exactly at the historical high price much higher than that at prices slightly below or above. Furthermore, the effects of the historical high prices are separate from the effects of the traditional stock performance measures, such as stock returns and market-to-book ratios. Controlling for traditional determinants of equity issuance, the probability of equity issuance increases significantly with the ratio of the

current stock price to the historical high prices. In addition, the likelihood of equity issuance is significantly higher following the months in which the stock price hits a new high.

Our findings suggest that managers use historical high prices as reference points to simplify the timing of equity financing decisions.

**References**


Baker, Malcolm, and Yuhai, Xuan. 2009. "Under new management: Equity issues and the attribution of past returns". Working paper.

Baker, Malcolm, Xin Pan, and Jeffrey Wurgler. 2012. "The Effect of Reference Point Prices on Mergers and Acquisitions." *Journal of Financial Economics* 106 (1): 49–71.

Baker, Malcolm, and Jeffrey Wurgler. 2002. "Market Timing and Capital Structure." The Journal of Finance 57 (1): 1–32.

Campbell, Sean D., and Steven A. Sharpe. 2009. "Anchoring Bias in Consensus Forecasts and Its Effect on Market Prices." *Journal of Financial and Quantitative Analysis* 44 (02): 369–90.

Cen, Ling, Gilles Hilary, and Kuo-Chiang Wei. 2013. "The role of anchoring bias in the equity market: Evidence from analysts' earnings forecasts and stock returns." Journal of Financial and Quantitative Analysis, 48(01), 47-76.

Hovakimian, Armen, Tim Opler, and Sheridan Titman. 2001. "The Debt-Equity Choice." *Journal of Financial and Quantitative Analysis* 36 (01): 1–24.

Huang, Rongbing, and Jay R. Ritter. 2009. "Testing Theories of Capital Structure and Estimating the Speed of Adjustment." *Journal of Financial and Quantitative Analysis* 44 (02): 237–71.

Kahneman, Daniel, and Amos Tversky. 1974. "Judgment under Uncertainty: Heuristics and Biases", *Science* 185, 1124-1131.

Loughran, Tim, and Jay R. Ritter. 1995. "The New Issues Puzzle." *The Journal of Finance* 50 (1): 23–51.

Loughran, Tim, and Jay R. Ritter. 1997. “The Operating Performance of Firms Conducting Seasoned Equity Offerings.” *The Journal of Finance* 52 (5): 1823–50.

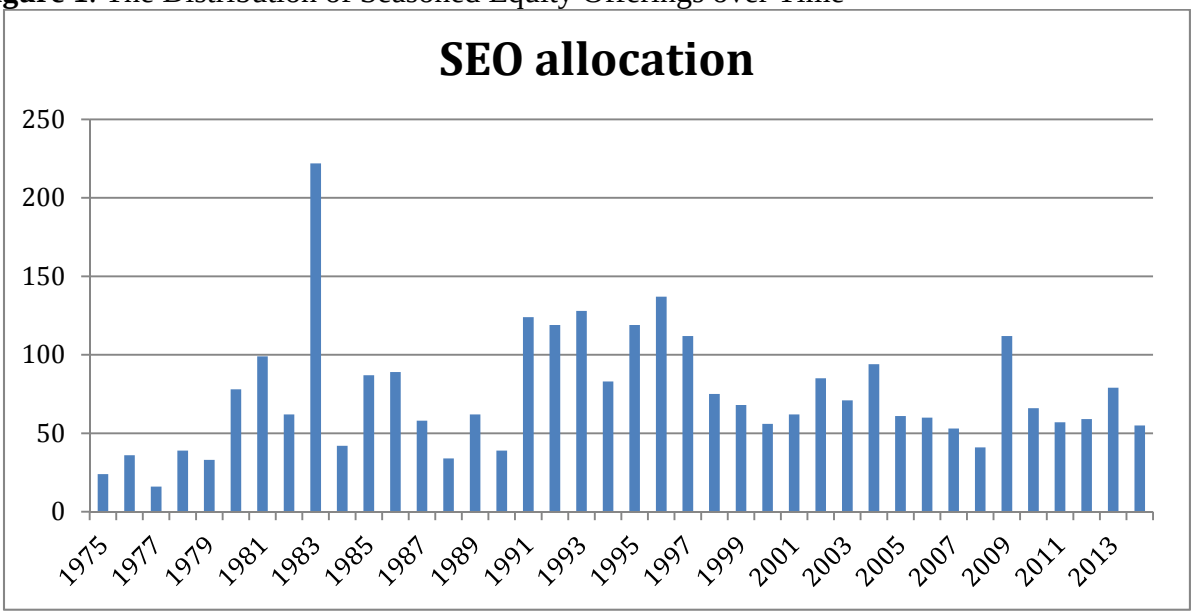
Lucas, Deborah J., and Robert L. McDonald. 1990. “Equity Issues and Stock Price Dynamics.” *The Journal of Finance* 45 (4): 1019–43.

Rosenbaum, Joshua, and Joshua Pearl. 2009. “Investment Banking: Valuation, Leveraged Buyouts, and Mergers and Acquisitions.” Wiley.

Spiess, D. Katherine, and John Affleck-Graves. 1995. “Underperformance in Long-Run Stock Returns Following Seasoned Equity Offerings.” *Journal of Financial Economics* 38 (3): 243–67.

Titman, Sheridan, and Roberto Wessels. 1988. “The Determinants of Capital Structure Choice.” *The Journal of Finance* 43 (1): 1–19.

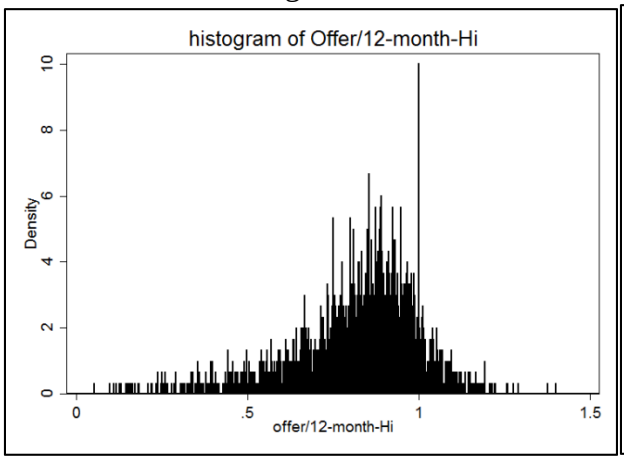
**Figure 1**. The Distribution of Seasoned Equity Offerings over Time



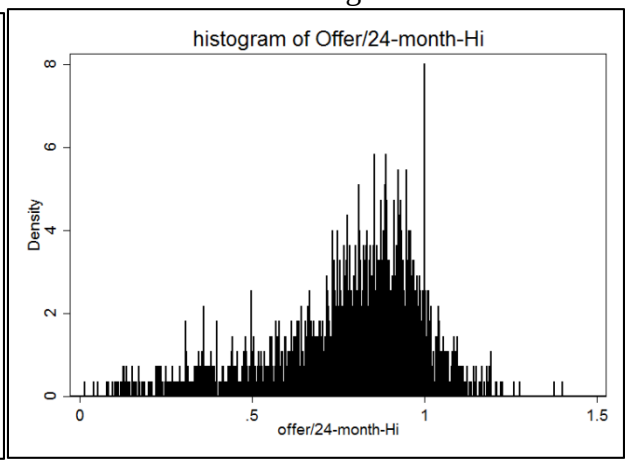
Figures 2. Offering Price Density.

The following figures display histogram of the ratio of the offering price to the high stock price over the 12-, 24-, 36-, 48- and 60-month ending 1 month prior to the filing month.

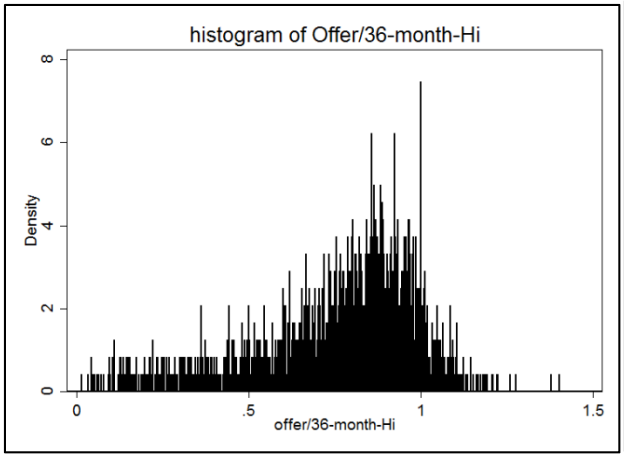
Panel A. 52_week_ high



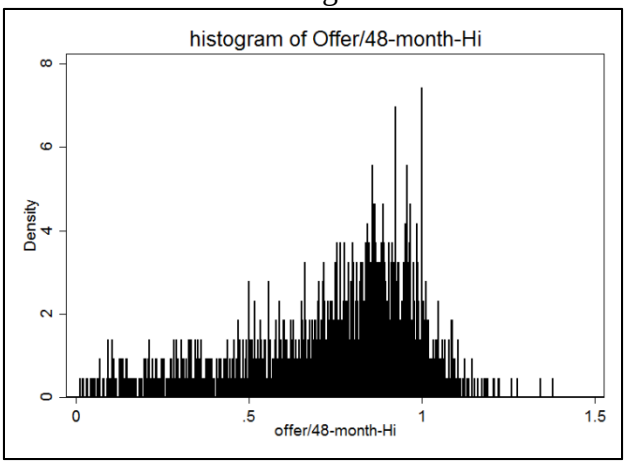

Panel B. 24-month high



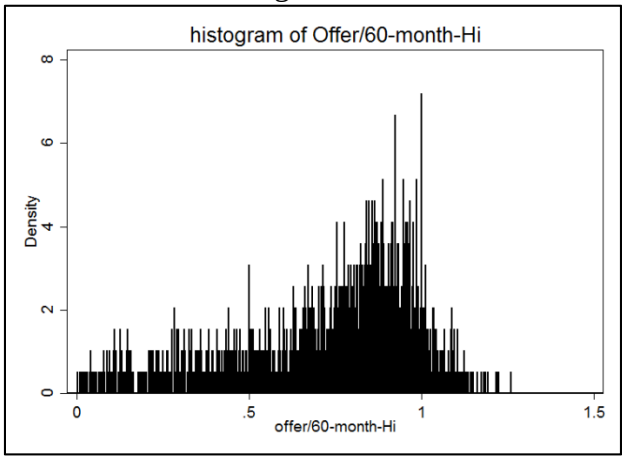

Panel C. 36-month high




Panel D. 48-month high

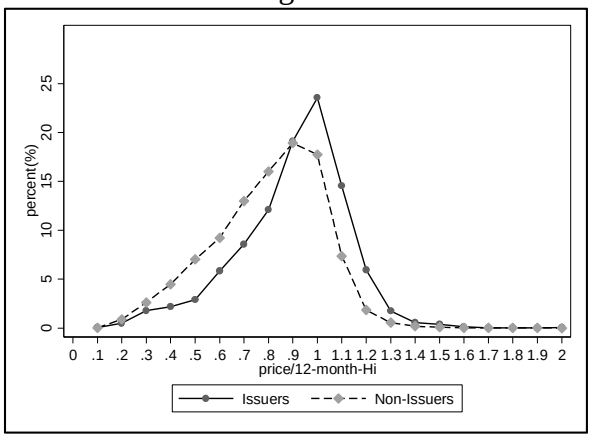



Panel E. 60-month high

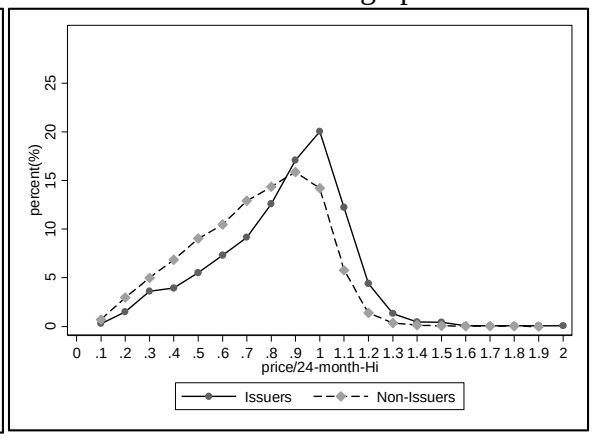


**Figures 3**. Distribution of the ratio of the stock price to the historical high price.
For issuers, the ratios are defined as the ratio of the last monthly pre-filing closing stock price to historical high prices over 12-, 24-, 36-, 48- and 60-month ending two months prior to the filing month. For non-issuers, the ratios are calculated using fiscal year-end price over historical high prices over 12-, 24-, 36-, 48- and 60-month ending one month prior to the end of the fiscal year.

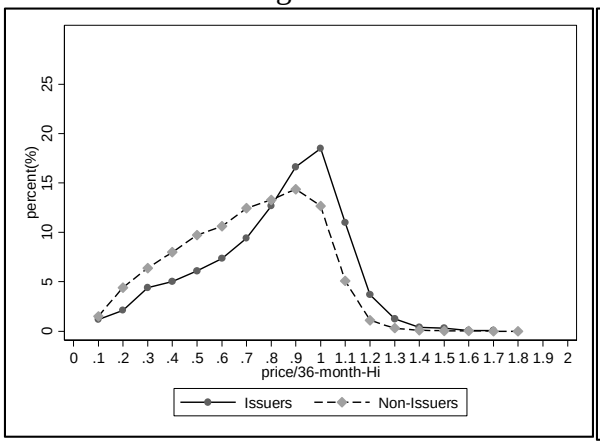
Panel A. 12-month high



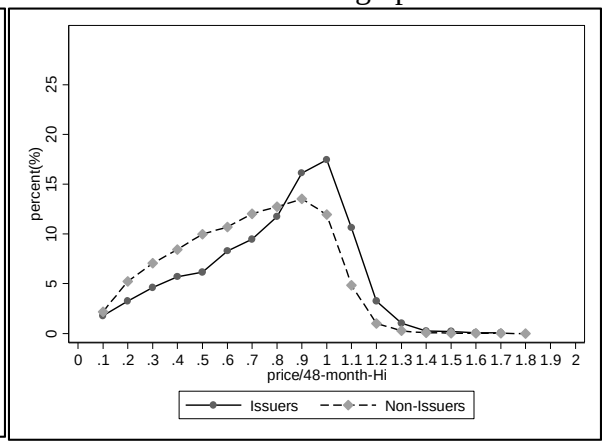

Panel B. 24-month high price




Panel C. 36-month high




Panel D. 48-month high price




Panel E. 60-month high

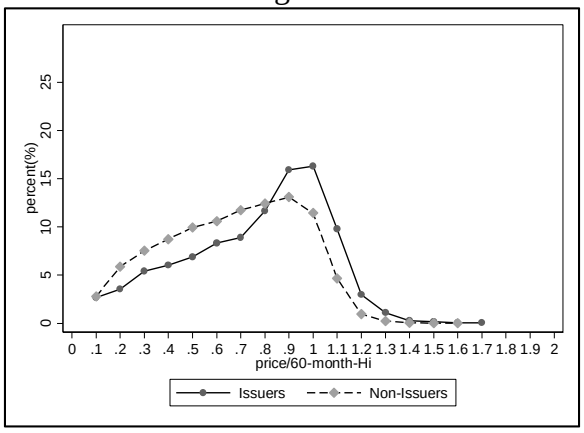


**Figure 4.** This figure provides the average percent of firms issuing equity for different groups. The entire firm-months are split into 15 groups according to the ratio of the current-month high to the historical High. The highest bin includes firm-months in which the ratio is higher than 1.5 and lower than 1.6. The lowest group includes the firm-months in which the ratio is lower than 0.2. The rest of the months are sorted into 12 groups with equal bandwidth of 0.1. For each group, the average fraction of firm-months that are followed by equity issues in 12 months is obtained.

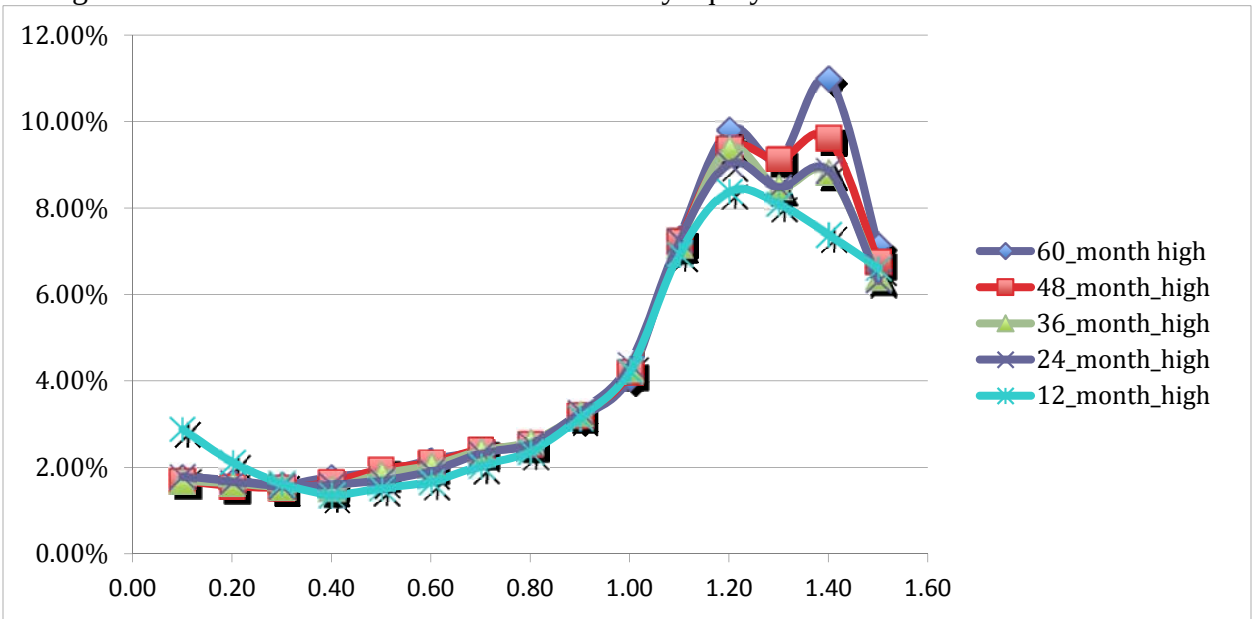


**Table I**. Summary Statistics
The sample consists of issuers and non-issuers from 1975 to 2012.
Price/Hi12 is the stock price at the end of the previous fiscal year scaled by the 12-month historical high price. Price/Hi24, Price/Hi36, Price/Hi48, and Price/Hi60 follow analogous definitions. Leverage is long-term debt plus short-term debt over total assets. Tangibility net property, plant, and equipment over total assets. R&D is research and development expenses over sales. NOLC is net operating loss carry forwards over total assets. Profitability is operating income before depreciation over total assets. Size is the natural logarithm of sales. Return is the stock return measured over the fiscal year. Market-to-book is total assets minus book equity plus market equity over total assets.

| Panel A: Historical high price ratios | Mean | N |
|---|---|---|
| Price/Hi12 | 0.754 | 96,867 |
| Price/Hi24 | 0.688 | 89,554 |
| Price/Hi36 | 0.651 | 82,481 |
| Price/Hi48 | 0.632 | 74,838 |
| Price/Hi60 | 0.618 | 67,787 |
| Panel B: Firm Characteristics | | |
| Leverage | 0.228 | 96,867 |
| R&D | 0.036 | 96,867 |
| NOLC | 0.105 | 96,867 |
| Profitability | 0.140 | 96,867 |
| Tangibility | 0.303 | 96,867 |
| Size | 4.910 | 96,867 |
| Return | 0.149 | 96,867 |
| Market-to-book | 1.560 | 96,867 |

**Table II**. Summary Statistics for issuers and non-issuers
The sample consists of issuers and non-issuers from 1975 to 2012.
Price/Hi12 is the stock price scaled by the 12-month historical high price. The stock price is either the SEO offer price or the previous fiscal year end price, as indicated in the table. Price/Hi24, Price/Hi36, Price/Hi48, and Price/Hi60 follow analogous definitions. Leverage is long-term debt plus short-term debt over total assets. Tangibility net property, plant, and equipment over total assets. R&D is research and development expenses over sales. NOLC is net operating loss carry forwards over total assets. Profitability is operating income before depreciation over total assets. Size is the natural logarithm of sales. Return is the stock return measured over the fiscal year. Market-to-book is total assets minus book equity plus market equity over total assets. Non-Issuer values significantly different from Issuer values at 5% and 1% levels are marked * and ** respectively.

| Panel A: Price-to-historical-high ratios | Issuers | Non-Issuers |
|---|---|---|
| Price/Hi12 | 0.852 | 0.750** |
| Price/Hi24 | 0.790 | 0.685** |
| Price/Hi36 | 0.758 | 0.648** |
| Price/Hi48 | 0.733 | 0.629** |
| Price/Hi60 | 0.712 | 0.616** |

| Panel B: Firm Characteristics | Issuers | Non- Issuers |
|---|---|---|
| Leverage | 0.283 | 0.226** |
| R&D | 0.052 | 0.035** |
| NOLC | 0.144 | 0.104** |
| Profitability | 0.162 | 0.139** |
| Tangibility | 0.344 | 0.302* |
| Size | 4.990 | 4.910** |
| Return | 0.448 | 0.140** |
| Market-to-book | 1.960 | 1.550** |
| Observations | 2,871 | 93,996 |

**Table III.** Regression of offering prices on historical high prices

The dependent and the independent variables are scaled by the average stock price over the last 12-month period ending prior to the announcement month. Values significantly different from zero at 5% and 1% levels are marked * and ** respectively. *t*-statistics reflect standard errors clustered by firm.

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Offer | t-stat | Offer | t-stat | Offer | t-stat | Offer | t-stat | Offer | t-stat |
| Constant | 0.406** | 5.3 | 0.672** | 10.3 | 0.722** | 12.6 | 0.802** | 15.4 | 0.847** | 15.4 |
| 1/Average Price | 0.004 | 0.3 | 0.025 | 1.6 | 0.042* | 2.0 | 0.047* | 2.0 | 0.049 | 1.9 |
| Hi12/Average Price | 0.548** | 9.8 | | | | | | | | |
| Hi24/Average Price | | | 0.363** | 7.8 | | | | | | |
| Hi36/Average Price | | | | | 0.327** | 8.0 | | | | |
| Hi48/Average Price | | | | | | | 0.273** | 7.2 | | |
| Hi60/Average Price | | | | | | | | | 0.246 | 6.2 |
| Observations | 3,042 | | 2,675 | | 2,272 | | 1,978 | | 1,744 | |
| $R^2$ | 0.221 | | 0.121 | | 0.115 | | 0.091 | | 0.077 | |

**Table IV.** Time series profile of the ratios of current stock prices to historical high prices for issuers and non-issuers.
For issuers, the current stock price is the stock price one month prior to the issue month. For non-issuers, the current price is the fiscal-year-end stock price. Values significantly different from the values in year 0 at 5% and 1% levels are marked * and ** respectively.

| | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| Issuers | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| Price/Hi12 | 0.774** | 0.784** | 0.774** | 0.852 | 0.790** | 0.743** | 0.762** |
| Price/Hi24 | 0.710** | 0.723** | 0.719** | 0.790 | 0.761** | 0.679** | 0.677** |
| Price/Hi36 | 0.669** | 0.688** | 0.684** | 0.758 | 0.738** | 0.663** | 0.639** |
| Price/Hi48 | 0.644** | 0.664** | 0.660** | 0.733 | 0.723** | 0.654** | 0.628** |
| Price/Hi60 | 0.633** | 0.648** | 0.644** | 0.712 | 0.708** | 0.649** | 0.624** |

**Table V.** Probability of SEO: Probit regressions

Leverage is long-term debt plus short-term debt over total assets. Tangibility net property, plant, and equipment over total assets. R&D is research and development expenses over sales. NOLC is net operating loss carry forwards over total assets. Profitability is operating income before depreciation over total assets. Size is the natural logarithm of sales. Return is the stock return measured over the fiscal year. Market-to-book is total assets minus book equity plus market equity over total assets. Price/Hi12 is the stock price at the end of the previous fiscal year over the 12-months historical high price. Price/Hi24, Price/Hi36, Price/Hi48, and Price/Hi60 follow analogous definitions. Marginal effects are reported. Regressions include year dummies. Values significantly different from zero at 5% and 1% levels are marked * and ** respectively. *t*-statistics reflect standard errors clustered by firm.

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SEO | t-stat | SEO | t-stat | SEO | t-stat | SEO | t-stat | SEO | t-stat |
| Leverage | 0.940** | 18.2 | 0.985** | 17.9 | 1.022** | 17.3 | 1.061** | 16.9 | 1.105** | 16.6 |
| R&D | 0.964** | 10.8 | 0.985** | 10.4 | 0.992** | 9.8 | 0.939** | 8.4 | 0.945** | 7.9 |
| NOLC | 0.097** | 3.4 | 0.109** | 3.7 | 0.110** | 3.5 | 0.125** | 3.9 | 0.131** | 3.8 |
| Profitability | 0.403** | 4.2 | 0.159 | 1.5 | 0.049 | 0.4 | -0.124 | -1.0 | -0.191 | -1.4 |
| Tangibility | 0.331** | 6.0 | 0.361** | 6.1 | 0.360** | 5.8 | 0.379** | 5.7 | 0.392** | 5.5 |
| Size | 0.003 | 0.5 | 0.009 | 1.3 | 0.007 | 1.0 | 0.009 | 1.3 | 0.011 | 1.5 |
| Return | 0.293** | 15.7 | 0.305** | 15.3 | 0.302** | 14.8 | 0.320** | 15.2 | 0.345** | 16.0 |
| Market-to-book | 0.087** | 10.0 | 0.066** | 6.8 | 0.054** | 5.0 | 0.045** | 3.8 | 0.040** | 3.1 |
| Price/Hi12 | 0.517** | 9.1 | | | | | | | | |
| Price/Hi24 | | | 0.487** | 8.6 | | | | | | |
| Price/Hi36 | | | | | 0.535** | 9.6 | | | | |
| Price/Hi48 | | | | | | | 0.513** | 9.1 | | |
| Price/Hi60 | | | | | | | | | 0.441** | 7.7 |
| Pseudo $R^2$ | 0.091 | | 0.089 | | 0.088 | | 0.089 | | 0.091 | |
| Observations | 98,867 | | 89,554 | | 82,481 | | 74,838 | | 67,787 | |

**Table VI.** Likelihood of equity issuance after the stock price reaches a new historical high.
The table the fraction of firms that issue equity over the next 12 months for firms that hit new historical highs in the current month and those that do not. "New high" values that are significantly different from "No New High" values at 1% level are marked **. In the first two columns the entire sample is used. In the last two columns, only observations with the ratio of the current month's high price to the historical high greater than 0.8 and less than 1.2 are used.

| | Full sample | | Monthly high/Hi'N' between 0.8 and 1.2 | |
|---|---|---|---|---|
| | No New High (%) | New High (%) | No New High (%) | New High (%) |
| 12-months high | 2.3 | 5.1** | 2.8 | 4.8** |
| 24-months high | 2.3 | 5.3** | 2.9 | 5.0** |
| 36-months high | 2.3 | 5.2** | 2.9 | 4.9** |
| 48-months high | 2.2 | 5.1** | 2.9 | 4.8** |
| 60-months high | 2.2 | 5.0** | 2.8 | 4.7** |

**Table VII.** Probability of Equity issuance over the next 12 months: Probit regressions

Leverage is long-term debt plus short-term debt over total assets. Tangibility net property, plant, and equipment over total assets. R&D is research and development expenses over sales. NOLC is net operating loss carry forwards over total assets. Profitability is operating income before depreciation over total assets. Size is the natural logarithm of sales. Return is the stock return measured over the fiscal year. Market-to-book is total assets minus book equity plus market equity over total assets. DHi12 is a dummy set to one if the stock price reaches a new 12-months historical high in the current month. DHi24, DHi36, DHi48, and DHi60 follow analogous definitions. Marginal effects are reported. Regressions include year dummies. Values significantly different from zero at 5% and 1% levels are marked * and ** respectively. *t*-statistics reflect standard errors clustered by firm.

Panel A. Monthly regressions

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SEO | t-stat | SEO | t-stat | SEO | t-stat | SEO | t-stat | SEO | t-stat |
| Leverage | 0.574** | 12.0 | 0.593** | 12.1 | 0.623** | 12.0 | 0.664** | 12.1 | 0.707** | 12.1 |
| R&D | 0.937** | 11.2 | 0.960** | 11.2 | 0.985** | 10.7 | 0.935** | 9.3 | 0.885** | 8.2 |
| NOLC | 0.039 | 1.5 | 0.044 | 1.7 | 0.043 | 1.5 | 0.054 | 1.8 | 0.055 | 1.8 |
| Profitability | 0.452** | 4.8 | 0.388** | 3.9 | 0.297* | 2.7 | 0.184 | 1.6 | 0.072 | 0.6 |
| Tangibility | 0.333** | 6.0 | 0.338** | 5.9 | 0.354** | 5.9 | 0.371** | 5.8 | 0.374** | 5.5 |
| Size | 0.022** | 4.0 | 0.025** | 4.3 | 0.027** | 4.5 | 0.028** | 4.5 | 0.028** | 4.2 |
| Return | 0.257** | 26.9 | 0.258** | 26.5 | 0.269** | 25.8 | 0.275** | 24.6 | 0.283** | 23.4 |
| Market-to-book | 0.098** | 12.3 | 0.093** | 11.2 | 0.087** | 9.7 | 0.081** | 8.2 | 0.078** | 7.4 |
| DHi12 | 0.174** | 20.5 | | | | | | | | |
| DHi24 | | | 0.185** | 17.2 | | | | | | |
| DHi36 | | | | | 0.184** | 14.4 | | | | |
| DHi48 | | | | | | | 0.187** | 13.0 | | |
| DHi60 | | | | | | | | | 0.185** | 11.6 |
| Pseudo $R^2$ | 0.069 | | 0.068 | | 0.067 | | 0.066 | | 0.066 | |
| Observations | 1,161,556 | | 1,122,334 | | 1,035,116 | | 952,163 | | 862,173 | |

Panel B. Yearly regressions

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SEO | t-stat | SEO | t-stat | SEO | t-stat | SEO | t-stat | SEO | t-stat |
| Leverage | 0.911** | 17.9 | 0.945** | 17.7 | 0.961** | 16.8 | 0.989** | 16.3 | 1.052** | 16.3 |
| R&D | 0.952** | 10.7 | 0.978** | 10.4 | 0.967** | 9.6 | 0.936** | 8.4 | 0.959** | 8.1 |
| NOLC | 0.087** | 3.1 | 0.095** | 3.3 | 0.089** | 2.8 | 0.103** | 3.2 | 0.107** | 3.1 |
| Profitability | 0.449** | 4.8 | 0.276* | 2.6 | 0.219 | 1.9 | 0.070 | 0.6 | 0.012 | 0.1 |
| Tangibility | 0.342** | 6.2 | 0.365** | 6.2 | 0.364** | 5.9 | 0.400** | 6.1 | 0.397** | 5.7 |
| Size | 0.011 | 1.9 | 0.018** | 3.0 | 0.020** | 3.1 | 0.024** | 3.5 | 0.025** | 3.5 |
| Return | 0.334** | 20.8 | 0.349** | 20.4 | 0.351** | 19.5 | 0.365** | 19.1 | 0.384** | 19.1 |
| Market-to-book | 0.088** | 10.2 | 0.070** | 7.3 | 0.063** | 6.0 | 0.057** | 4.9 | 0.052** | 4.2 |
| DHi12 | 0.195** | 9.2 | | | | | | | | |
| DHi24 | | | 0.194** | 7.8 | | | | | | |
| DHi36 | | | | | 0.209** | 7.5 | | | | |
| DHi48 | | | | | | | 0.201** | 6.7 | | |
| DHi60 | | | | | | | | | 0.169** | 5.2 |
| Pseudo $R^2$ | 0.090 | | 0.088 | | 0.085 | | 0.086 | | 0.089 | |
| Observations | 96,867 | | 90,397 | | 83,266 | | 76,375 | | 69,158 | |

**Table VIII.** Probability of equity issuance over the next 12 months: Probit regressions

Leverage is long-term debt plus short-term debt over total assets. Tangibility net property, plant, and equipment over total assets. R&D is research and development expenses over sales. NOLC is net operating loss carry forwards over total assets. Profitability is operating income before depreciation over total assets. Size is the natural logarithm of sales. Return is the stock return measured over the fiscal year. Market-to-book is total assets minus book equity plus market equity over total assets. HiPrice/Hi12 is the monthly high stock price over the 12-months historical high price. The first set of results is for full sample. The second set of results is for observations with HiPrice/Hi12 < 1. The third set of results is for observations with 1<HiPrice/Hi12<1.2. The forth sets of results are for observations with HiPrice/Hi12>1.2. Marginal effects are reported. Regressions include year dummies. Values significantly different from zero at 5% and 1% levels are marked * and ** respectively. *t*-statistics reflect standard errors clustered by firm.

| | Full sample | | HiPrice/Hi12<1 | | 1<HiPrice/Hi12<1.2 | | HiPrice/Hi12>1.2 | |
|---|---|---|---|---|---|---|---|---|
| | SEO | t-stat | SEO | t-stat | SEO | t-stat | SEO | t-stat |
| Leverage | 0.596** | 12.3 | 0.398** | 6.5 | 0.741** | 13.5 | 0.094 | 1.0 |
| R&D | 0.943** | 11.2 | 0.704** | 7.0 | 1.096** | 10.8 | 1.083** | 5.8 |
| NOLC | 0.045 | 1.7 | 0.042 | 1.5 | 0.043 | 1.6 | -0.069 | -1.5 |
| Profitability | 0.418** | 4.4 | 0.054 | 0.4 | 0.586** | 6.0 | 0.589** | 4.1 |
| Tangibility | 0.328** | 5.9 | 0.461** | 6.5 | 0.270** | 4.4 | 0.218* | 2.3 |
| Size | 0.019** | 3.4 | 0.080** | 10.2 | -0.008 | -1.3 | 0.094** | 9.1 |
| Return | 0.233** | 21.7 | 0.219** | 10.3 | 0.242** | 21.1 | 0.080** | 5.7 |
| Market-to-book | 0.098** | 12.4 | 0.174** | 18.1 | 0.071 | 8.2 | 0.064** | 4.7 |
| HiPrice/Hi12 | 0.409** | 12.3 | -0.070 | -0.9 | 0.979** | 19.4 | -0.218** | -2.9 |
| Pseudo $R^2$ | 0.069 | | 0.084 | | 0.064 | | 0.055 | |
| Observations | 1,161,146 | | 463,924 | | 675,072 | | 22,136 | |

**Table IX.** Probability of an equity repurchase over the next 12 months: Probit regressions

Equity repurchases are cases when net equity issued is below -5% of assets, where net equity issued is the change in book equity minus the change in retained earnings. Leverage is long-term debt plus short-term debt over total assets. Tangibility net property, plant, and equipment over total assets. R&D is research and development expenses over sales. NOLC is net operating loss carry forwards over total assets. Profitability is operating income before depreciation over total assets. Size is the natural logarithm of sales. Return is the stock return measured over the fiscal year. Market-to-book is total assets minus book equity plus market equity over total assets. Price/Hi12 is the stock price at the end of the previous fiscal year over the 12-months historical high price. Price/Hi24, Price/Hi36, Price/Hi48, and Price/Hi60 follow analogous definitions. Marginal effects are reported. Regressions include year dummies. Values significantly different from zero at 5% and 1% levels are marked * and ** respectively. *t*-statistics reflect standard errors clustered by firm.

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ER | t-stat | ER | t-stat | ER | t-stat | ER | t-stat | ER | t-stat |
| Leverage | -1.000** | -14.7 | -0.996** | -14.1 | -0.985** | -13.5 | -0.986** | -13.1 | -0.973** | -12.4 |
| R&D | 0.143 | 1.2 | 0.091 | 0.7 | 0.100 | 0.8 | 0.137 | 1.0 | 0.202 | 1.4 |
| NOLC | -0.100** | -2.7 | -0.099* | -2.6 | -0.097* | -2.5 | -0.103* | -2.6 | -0.109* | -2.6 |
| Profitability | 1.567** | 19.5 | 1.743** | 19.6 | 1.861** | 19.0 | 1.871** | 17.8 | 1.887** | 16.8 |
| Tangibility | -0.428** | -7.2 | -0.455** | -7.3 | -0.485 | -7.5 | -0.473** | -7.1 | -0.462** | -6.7 |
| Size | 0.111** | 18.8 | 0.107** | 17.7 | 0.106** | 17.1 | 0.106** | 16.5 | 0.106** | 16.0 |
| Return | 0.071** | 3.3 | 0.017 | 0.9 | -0.021 | -1.1 | -0.049* | -2.6 | -0.083** | -4.3 |
| Market-to-book | 0.090** | 8.9 | 0.105** | 9.6 | 0.113** | 9.7 | 0.120** | 9.7 | 0.129** | 9.9 |
| Price/Lo12 | 0.560** | 9.9 | | | | | | | | |
| Price/Lo24 | | | 0.428** | 8.5 | | | | | | |
| Price/Lo36 | | | | | 0.345** | 7.0 | | | | |
| Price/Lo48 | | | | | | | 0.265** | 5.3 | | |
| Price/Lo60 | | | | | | | | | 0.186** | 3.6 |
| Pseudo $R^2$ | 0.138 | | 0.141 | | 0.143 | | 0.141 | | 0.141 | |
| Observations | 96,867 | | 89,554 | | 82,481 | | 74,838 | | 67,787 | |