

**Seasoned Equity Offers:  
The effect of inside ownership and float**

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**Abstract**

SEO underpricing has increased dramatically over the last 10-15 years. This period is also associated with a large number of firms going public. Many of these firms have high inside ownership after the IPO and implement follow-on SEOs soon after. Therefore, it may be that the higher SEO discounts are partially due to price effects resulting from a downward sloping demand curve; this effect would be particularly strong in recent IPO firms with thin public float. We re-examine the underpricing of SEOs after controlling for ownership in these firms and find that the effect of inside ownership is twofold. First, inside ownership reduces public float, thereby increasing the price pressure on SEOs and the level of underpricing. Second, the greater the percentage of secondary shares offered, the lower the underpricing, indicating that insiders may pressure banks to reduce underpricing when their personal wealth is at stake.

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\*We would like to thank Laura Field, Sarah Ferguson, Jean Helwege, Shrikant Jategaonkar, Sandy Klasa, Mark Peterson, David Rakowski, and Jay Ritter for their helpful suggestions and useful feedback. Andrew Koch provided excellent research assistance.

## **I. Introduction**

Numerous empirical studies document significant underpricing in seasoned equity offerings (SEOs).<sup>1</sup> More recently, Corwin (2003) and Mola and Loughran (2004) provide evidence that the level of underpricing has increased dramatically over time. In particular, Corwin (2003) finds that while SEO underpricing averages only 1.15% in the 1980s, it rises to 2.92% in the 1990s. Mola and Loughran (2004) report that the amount of money left on the table in SEOs averaged \$7.1 million in 1999, compared to \$0.5 million in 1986. The magnitude of this increase has resulted in heightened interest in the determinants of underpricing.

The 1990s were characterized by a hot IPO and historically strong bull market. Jegadeesh, Weinstein, and Welch (1993) find that firms with high post-IPO abnormal returns are more likely to return to the seasoned equity market and to return sooner. Consistent with their findings, many firms in the 1990s issued a small number of shares at their IPO, but quickly followed up with a seasoned equity offering at a higher price once the market price was established. According to Ofek and Richardson (2000), the typical firm sells 15-20% of the company in its IPO. The remaining 80-85% is held by pre-IPO shareholders, including officers, directors, and venture capitalists, who are generally subject to a lockup period. Helwege, Pirinsky, and Stulz (2007) also provide evidence that IPO firms start their life with highly concentrated ownership and that ownership remains concentrated for years after the IPO. Furthermore, Zhang (2005) finds that 33% of firms that went public from 1990-1997 issued seasoned equity within three years of their IPO. He also finds that firms are more likely to have follow-on offerings if they issue fewer shares at the time of the IPO and if the managers sell fewer secondary shares in the IPO. Given this evidence, we suggest that the higher SEO

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<sup>1</sup> See Smith (1977), Bhagat and Frost (1986), Loderer, Sheehan, and Kadlec (1991), and Eckbo and Masulis (1992) for early papers on SEO underpricing.

discounts in the 1990s may be partially due to temporary price pressure resulting from downward sloping demand curves. This pressure would be especially strong in SEOs by recently public firms with thin float.<sup>2</sup>

While numerous papers examine SEO underpricing, little evidence exists on the impact of insider ownership or firm float on SEO discounts. We attempt to fill this gap in the literature by examining the effect of several related variables on SEO underpricing: insider ownership prior to the SEO (and its effect on float), the fraction of secondary shares to total shares sold in the SEO, and the time since the IPO.

In spite of the number of recent IPOs with thin float, the literature that examines the effect of firm float on stock prices is sparse.<sup>3</sup> Issuing seasoned equity can result in significant price pressure for firms that have recently gone public via an IPO if the aggregate demand curve for the firm's shares is downward sloping. Most studies on SEO underpricing attempt to test the price pressure hypothesis using a proxy such as relative offer size, defined as the number of shares issued in the SEO divided by the total shares outstanding. However, relative offer size ignores the fact that the number of shares outstanding can be significantly different than the float and therefore may be a poor proxy for price pressure effects, especially in recently public firms with thin float. Consequently, to control for price pressure effects in firms with thin float, we calculate the ratio of shares offered in the SEO to float, where float is measured as total shares outstanding minus shares held by insiders. If price pressure is an important determinant of

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<sup>2</sup> A firm's float is the number of shares outstanding that are available for trading by the public; thus float generally does not include shares held by insiders, 5% owners, or restricted shares. Although the exact calculation of a firm's float is difficult, it is generally estimated by subtracting shares held by insiders from outstanding shares.

<sup>3</sup> For example, Hong, Scheinkman, and Xiong (2006) model the relation between float and stock price bubbles. Using the percent of shares outstanding that get unlocked as a proxy for firm float, Ofek and Richardson (2003) document that the float of firms in the internet sector increased dramatically around the time when internet valuations collapsed due to lockup expirations. Bradley and Jordan (2002) examine share overhang, defined as the ratio of pre-IPO shares retained in a firm relative to the number of shares filed for sale to the public in the IPO, and find that IPOs with greater overhang are more underpriced than issues with less overhang. They also find that overhang appears to have risen in the late 1990s.

underpricing, then underpricing should be greater for firms with higher insider ownership and lower float. Thus, we hypothesize that:

*H1a: Underpricing will be higher when inside ownership prior to the SEO is higher, or alternatively*

*H1b: Underpricing will be higher when the shares offered to float ratio is higher.*

While high insider ownership may result in increased price pressure at the SEO, it is also possible that high inside ownership causes management to be more cognizant of underpricing, especially if underpricing affects their personal wealth. This wealth effect will be particularly large if managers sell their own shares as part of the seasoned offering. In this case, managers with high ownership who are selling their personal shares in the SEO could pressure underwriters to reduce underpricing.<sup>4</sup> To test this, we proxy for managerial participation by examining the ratio of secondary shares sold to total shares sold in the SEO:

*H2a: Underpricing will be lower when managerial participation in the SEO is higher.*

An extensive literature examines the effect of investment bank reputation on underpricing. Consistent with the certification story, Carter, Dark, and Singh (1998) find an inverse relation between underwriter reputation and IPO underpricing. Mola and Loughran (2004) find evidence that SEO underpricing is lower for firms that employ more reputable underwriters; they suggest that more prestigious underwriters are likely to underwrite larger offerings with less information asymmetry. However, Loughran and Ritter (2004) argue that since underwriters receive compensation from both issuers and investors, they have an incentive

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<sup>4</sup> Alternatively, if managers issue relatively few of their own shares in the IPO with the intention of issuing seasoned equity later, after the price increases, then they might not be upset by the level of SEO underpricing; their proceeds from the seasoned offer are still higher than if they had simply issued their shares at the lower IPO price and not completed a follow-on offering. This argument is consistent with Aggarwal, Krigman, and Womack (2002), who suggest that managers of IPO firms do not maximize the offering price at the IPO but rather strategically set low offering prices in order to create information momentum to sell more shares at higher prices in the open market or through follow-on offerings. It is also consistent with Loughran and Ritter's (2002) prospect theory of IPOs.

to underprice issues in order to keep retail clients happy. Consistent with this argument, they find that IPO underpricing in the 1990s was greater when more prestigious underwriters were used. We suggest that the effect of underwriter reputation is twofold. First, as in Mola and Loughran (2004), underpricing should be negatively related to underwriter reputation since more prestigious investment banks tend to underwrite offerings by large NYSE firms. Second, to the extent that prestigious underwriters are better able to withstand pressure from selling managers to greatly reduce underpricing, the relation in hypothesis *H2a* between underpricing and managerial participation in the offering may be mitigated.

*H2b: The negative relation between underpricing and managerial participation in the SEO will be less pronounced when the lead underwriter is more prestigious.*

We also examine whether seasoned offers by recent IPOs exhibit more or less underpricing. To do so, we identify firms whose IPOs occurred within one year prior to issuing an SEO. If an SEO issued within a year of the IPO simply proxies for firms with low float that are more sensitive to price pressure, then we would expect a positive relation between a recent IPO dummy and SEO underpricing. However, Mola and Loughran (2004) find lower underpricing for SEOs that have already issued seasoned equity in the past year. They hypothesize that issuers are willing to leave some money on the table because they want to come back later for additional funding, and the previous underpricing leaves a “good taste” in investors’ mouths. Their result could also be explained if there is less information asymmetry for recent SEOs, or if firms issue two SEOs within a short time period because the demand for the stock is high. If the arguments in Mola and Loughran (2004) hold for recent IPO firms, then after controlling for shares offered to float and other determinants of underpricing, there should be a negative relation between the recent IPO dummy and subsequent SEO underpricing.

*H3: Underpricing will be lower in firms that recently went public.*

Our univariate results indicate that while SEOs by firms that recently went public have higher share overhang and a higher ratio of shares offered to public float, SEO underpricing on average is lower in firms that recently went public. At the same time, firms with the highest shares offered to float ratios have the highest level of underpricing, but are not necessarily the firms that have gone public most recently. In our multivariate analysis, after controlling for other factors known to affect underpricing, we find evidence consistent with our hypotheses. In particular, underpricing is positively related to the fraction of insider ownership in the firm and to the ratio of shares offered to float. It is negatively related to the ratio of secondary shares offered to total shares offered, but the negative relation is mitigated if the firm employs a highly regarded underwriter. Underpricing is also negatively related to the recent IPO dummy. Overall, our results provide evidence that low float causes temporary price pressure that results in an economically and statistically significant increase in SEO underpricing. However, the influence of low float is moderated by the personal incentives of managers who sell their own shares in the offering.

The rest of the paper is organized as follows. In section II, we discuss the related literature. Section III describes the data selection and provides a discussion of both firm and SEO characteristics. Section IV discusses the results of our analysis, and section V concludes.

## **II. Related Literature**

One common explanation for price declines at equity offerings is that a sizeable sale of common stock places temporary and possibly permanent downward pressure on the stock price. When firms issue primary shares, the number of shares outstanding and thus the permanent

supply of shares increases. Even when secondary shares are issued, to the extent that these shares were not previously publicly traded, the float of the firm increases. If the aggregate demand curve for the firm's shares is downward sloping, this increase in supply will result in a permanent decrease in stock price. Even if a seasoned offer is simply a temporary liquidity shock that must be absorbed by the market, then a discounted offer price may be necessary to induce investors to absorb additional shares. Assuming prices return to normal following the offering, investors who purchased shares in the offering receive a positive return or "sweetener" (Scholes (1972)) for participating in the offering.

Numerous papers in financial economics examine whether stock prices are affected by supply or demand shifts in the quantity of shares. Early work by Scholes (1972), Mikkelson and Partch (1985), and Holthausen, Leftwich, and Mayers (1987, 1990) examines shifts in supply due to block trades and find evidence of both temporary and permanent price effects that are related to block size. Other studies examine shifts in demand via S&P index inclusion and find mixed results. For example, Shleifer (1986) and Lynch and Mendenhall (1997) find evidence of both permanent and temporary price effects related to changes in institutional demand, while Dhillon and Johnson (1991) find evidence consistent with an information hypothesis but not with price pressure.

In the case of seasoned equity offerings, there is an unequivocal and permanent increase in the supply of shares available for trading in the open market, either through an increase in shares outstanding or through an increase in public float. However, a permanent stock price decrease may not occur on the offer day, even if the demand curve is downward-sloping. The reason for this is that in an efficient market, any price effects associated with an increase in supply should be absorbed by the market on the announcement day rather than the offer day.

Evidence of price pressure on the announcement day and offer day is mixed. Asquith and Mullins (1986) and Mikkelson and Partch (1985) find a negative relation between announcement day returns and issue size that supports the price pressure explanation, while Mikkelson and Partch (1986) and Barclay and Litzenberger (1988) find no such evidence. Neither Scholes (1972) nor Mikkelson and Partch (1985) find a significant relation between offer size and offer day returns around secondary offerings. More recently, however, Corwin (2003) finds that SEO underpricing is positively related to offer size, consistent with temporary price pressure at the issue.

Although the information on share dilution due to the SEO is already known at the offer date and should be impounded in prices at the time of announcement, there may still be temporary price pressure at the sale of new shares. We contribute to the literature on price pressure by showing that, as in Corwin (2003), positive relation exists between offer size and underpricing that is consistent with temporary price pressure. However, we find that in measuring offer size, it is important to examine publicly tradable shares, or float, as opposed to shares outstanding. Our results also indicate that while underpricing is foreseeable, the price declines are not fully reflected in announcement day stock prices. This result is similar to the finding of significant price decreases at share lock-up expirations, even though the expiration date is well-known. Both Field and Hanka (2001) and Ofek and Richardson (2000) conclude that this finding is at least partly explained by a downward sloping demand curve for shares.<sup>5</sup>

While previous work examines the determinants of SEO underpricing, to the best of our knowledge, no one has examined the effect of insider ownership or float on SEO underpricing.

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<sup>5</sup> Ofek and Richardson (2000) also find that the negative price pressure at the lockup expiration may be caused by factors such as trading costs and the difficulty of shorting new public stocks; this restriction on the ability to short shares is partially measured by float.

However, there are two papers that examine the effect of ownership/float on IPO underpricing. As already mentioned, Bradley and Jordan (2002) examine the effect of share overhang (defined as the ratio of pre-IPO shares retained in a firm, relative to the number of shares filed for sale to the public in the IPO) on IPO underpricing. They suggest that only shares sold to the public, and not shares retained by insiders, are underpriced in the IPO. Therefore, for a given degree of underpricing, the economic cost per share to the firm declines as overhang rises. Consistent with this argument, Bradley and Jordan find that IPOs with greater overhang are more underpriced than issues with lesser overhang.

Habib and Ljungqvist (2001) examine the relation between IPO underpricing and insider sales at the IPO, arguing that the extent to which owners care about IPO underpricing depends on how much they sell at the IPO. Owners who sell very few shares suffer only marginally from underpricing while owners who sell a significant number of shares have a greater incentive to decrease underpricing. This intuition implies that underpricing should decrease in the number of shares sold by insiders. Consequently, Habib and Ljungqvist (2001) model the effect of participation (the number of secondary shares sold relative to pre-IPO shares outstanding) and dilution (the number of primary shares sold relative to pre-IPO shares outstanding) on underpricing and show that initial returns are lower, the more pre-IPO shareholders sell or the greater the increase in shares outstanding as a result of the issuance of primary stock.

We extend the literature on the effect of ownership and float on IPO underpricing to SEO underpricing and simultaneously examine the effect of ownership, float, and secondary share sales on SEO discounts. Consistent with Bradley and Jordan's (2002) results on IPO overhang, we find that firms with higher shares offered to float ratios experience greater underpricing. We also find that underpricing is lower when the ratio of secondary shares offered to total shares

offered is higher, consistent with Habib and Ljungqvist's (2001) argument that owners care about IPO underpricing when they have greater wealth at stake. These results hold even after controlling for other determinants of SEO underpricing, including the time since the IPO.

### **III. Data and Summary Statistics**

#### *A. Sample Selection*

We use Securities Data Company's (SDC) Global New Issues database to obtain our sample of seasoned equity offers. Excluding all unit and rights offerings, we begin with 9,837 seasoned equity offerings that take place between January 1, 1980 and December 31, 2004. We next restrict our sample to include only observations for which returns are available from CRSP for at least 30 days prior to the issue date; this eliminates 540 observations. Removing observations with offer prices less than \$3 or greater than \$400 results in a loss of 88 additional observations. Consistent with previous work, we also remove non-U.S. issues, closed-end funds, and REITs, which drops 511 observations. Deleting offers in which the firm has a stock split during the 11-day window surrounding the offer date and excluding utilities drops 116 and 829 observations, respectively.<sup>6</sup> Lastly, excluding extreme outliers with an absolute value of underpricing greater than 60 percent eliminates an additional 33 observations, leaving us with a total sample of 7,720 seasoned equity offerings.<sup>7</sup>

The final sample of 7,720 seasoned equity offers includes 2,483 offers by NYSE-listed firms and 5,237 offers by Nasdaq- or Amex-listed firms. Further, the sample

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<sup>6</sup> Non-U.S. issues are defined as securities with CRSP share codes between 30 and 39 or share codes ending in 2. Closed-end funds and REITs are identified using SDC classifications and by CRSP share codes of 40 or greater or ending in 3, 4, 5, or 8. Utilities are defined as securities with three-digit SIC codes between 491 and 494. SIC codes are obtained from CRSP or, where missing, from COMPUSTAT.

<sup>7</sup> These outliers are assumed to be potential data errors. However, the results are similar if the outliers are included.

includes offers by 4,841 unique firms. Of these firms, 3,072 made one seasoned offer, 1,118 made two offers, 381 made three offers, 154 made four offers, 69 made five offers, 30 made six offers, 10 made seven offers, 5 made eight offers, and 2 made nine offers during our sample period. The annual number of SEOs ranges from a low of 89 in 1988 to a high of 526 in 1996. Our sample includes pure primary SEOs, pure secondary SEOs, and mixed primary and secondary SEOs. Removing the pure secondary offerings does not change our results, except where noted.

Several previous studies examine the accuracy of stated offer dates for SEOs. Lease, Masulis, and page (1991) and Eckbo and Masulis (1992) find that 20-25% of offers over the period 1963-1981 take place after the close of trading. Saffieddine and Wilhelm (1996) apply a volume-based correction to account for this practice and find that 18.4% of offers from 1980 through 1991 require an offer-date correction. Following Saffieddine and Wilhelm (1996) and Corwin (2003), we apply a volume-based offer date correction. Specifically, if trading volume on the day following the SDC offer date is (1) more than twice the trading volume on the SDC offer date and (2) more than twice the average daily volume over the previous 250 trading days, then the day following the SDC offer date is designated as the offer date. This correction results in an offer-date change for 40.25% of our sample offers, which is similar to the 35.1% found in Corwin.<sup>8</sup>

We also require inside ownership for our study. From 1996 through 2004, we examine registration statements and proxy statements for insider ownership prior to the

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<sup>8</sup> Saffieddine and Wilhelm (1996) apply only part (1) of this correction, while Corwin (2003) applies both corrections. We follow the procedure in Corwin (2003) and apply the more restrictive correction because previous studies have shown that a larger fraction of offers is affected by the offer date correction in the 1990s compared to the 1980s. Corwin's analysis suggests that the volume-based correction accurately identifies offer dates for between 96 percent and 100 percent of SEOs.

SEO.<sup>9</sup> When this data is unavailable, we use (1) insider ownership prior to the SEO as reported by SDC and (2) insider ownership from Compact Disclosure. We are able to obtain insider ownership for 4,139 seasoned equity offers from 1991-2004.<sup>10</sup> Table 1 shows the time series distribution of offerings for both the full sample of SEOs and for the subset with ownership data. Although ownership data is scarce prior to the 1990s, we are able to collect ownership data for a handful of firms in 1991 and for close to half of our SEO sample in 1992. Beginning in 1993, we are able to collect ownership data for the majority of our SEO sample; we obtain ownership data for approximately 85% of our SEOs in 1993, 95% by 1998, and 98% by the end of our sample period (2000-2004). Between 1991 and 2000, approximately 20% of the firms for which we obtain ownership data have gone public within the past year; over 45% have gone public within the past three years. The number of SEO firms going public within the past year (three years) falls to 6.5% (20%) from 2001-2004. During this time, NASDAQ fell from 5000 in March 2000 to 1100 in September 2002, reducing the incentive of many firms to issue equity.

### *B. Variable Definitions*

We define the SEO discount, or underpricing, as negative one times the return from the previous day's closing price to the offer price; thus underpricing is a positive number

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<sup>9</sup> We collect data on ownership by insiders of the firm prior to the SEO. The S.E.C. requires an issuer's prospectus to include the beneficial ownership of common stock by directors, director nominees, and executive officers, as well as each person or entity with an equity stake exceeding 5% of the outstanding stock. The prospectus also reports the aggregate ownership of all directors and executive officers as a group; this is the group we refer to as insiders. However, we also collect the information on principal shareholders who are not officers or directors in the firm, but who own a substantial fraction of shares. Although the results reported in the remainder of the paper are for ownership by insiders, our results are robust to using ownership by officers, directors, and principal shareholders.

<sup>10</sup> As Gompers, Ishii, and Metrick (2008) point out, there is no easy way to identify dual-class firms. If we follow their method and classify as dual-class firms those firms that have multiple CUSIP numbers that differ in their 7<sup>th</sup> and 8<sup>th</sup> digits, then approximately 10% of the SEOs in our sample are by firms with multiple share classes. Removing these observations does not affect our results.

when the offer price is less than the previous day's close. We follow previous literature in defining many of the explanatory variables used in the regressions and add new variables designed to test our hypotheses.

**1) Proxies for uncertainty and asymmetric information.**

The first proxy is *firm size*, defined as total market capitalization on the day prior to the offer, adjusted to 2004 dollars. This measure reflects the fact that small firms are likely to be associated with more uncertainty and higher levels of asymmetric information than large firms, and thus size should be negatively related to underpricing.

The second proxy, *volatility*, is defined as the standard deviation of daily stock returns over the 30 trading days ending 11 days prior to the issue. This variable reflects the ex ante uncertainty associated with the value of the issuing firm. Based on the uncertainty and asymmetric information hypotheses, underpricing should be positively related to volatility.

The third proxy is *max rank*, defined as the maximum underwriter ranking (on the 0 to 9 Carter-Manaster scale) of the lead underwriter(s) in the SEO.<sup>11</sup> As noted in Mola and Loughran (2004), more prestigious underwriters are likely to underwrite larger offerings with less uncertainty. Thus, if underwriter ranking is important and reflects the reputation of the underwriter, then a higher ranking should be correlated with less underpricing.

Finally, we include a dummy equal to one for firms that have gone public in the past year (*recent IPO dummy*). Based on our hypothesis *H3*, we expect a negative relation between underpricing and the recent IPO dummy.

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<sup>11</sup> We thank Jay Ritter for providing this data on his web page.

## 2) *Proxies for price pressure*

The price pressure hypothesis suggests that underpricing should be most pronounced for the largest offers, reflecting the market's ability to absorb the new shares. Corwin (2003) defines *relative offer size* as shares offered divided by shares outstanding prior to the offer. We suggest that insider ownership should matter, since insider ownership reduces the firm's float, and that the ratio of shares offered in the SEO to float is a more appropriate measure of temporary price pressure. Consequently, we include either *inside ownership* or *shares offered to float* in our regressions to test hypotheses *H1a* and *H1b*.

Shares offered to float is defined as  $(\text{total shares issued}) / ((\text{shares outstanding the day prior to the offer} * (1 - \text{percent owned by insiders}))$ . The difference between shares offered to float and relative offer size can be large. For example, in March 1996, Speedway MotorSports issued 3.1 million shares in a seasoned equity offering. At the time, it had 38 million shares outstanding, so its relative offer size equaled 8.2%. Insiders owned 76.9% of the firm prior to the SEO, however, resulting in shares offered to float of 35.3%. In terms of relative offer size, Speedway is at the 12<sup>th</sup> percentile of our sample, whereas in terms of shares offered to float, it is at the 63<sup>rd</sup> percentile.

Price pressure should also be stronger for firms with low liquidity. Consequently, we also include *average daily trading volume* as a measure of liquidity. We calculate the average daily trading volume over the 250 trading days prior to the offer date. Trading volume for firms on NASDAQ is divided by two in order to provide comparable measures of share volume across markets; trades on Nasdaq are often recorded twice, once for the seller to dealer transaction and once for the dealer to buyer transaction, whereas specialist

participation occurs less frequently on the NYSE. Volume as a percentage of shares outstanding is the average daily trading volume scaled by the number of shares outstanding on the day prior to the offer date.

Finally, we include a dummy variable equal to one if the offer price is higher than the original file price (*increase dummy*). An increase in price indicates strong demand for the stock, which should alleviate price pressure. Thus SEO underpricing should be lower for firms in which the original file price was amended to a higher price prior to the offer.<sup>12</sup>

### **3) Proxies for the manipulative trading hypothesis**

Previous studies report significant price declines in the days prior to an SEO. Gerard and Nanda (1993) argue that these pre-offer returns may reflect manipulative trading by investors attempting to depress the stock price.<sup>13</sup> Consequently, we examine market-adjusted returns prior to the offer. The market-adjusted return is defined as the return on the stock minus the return on the CRSP value-weighted index. In our multivariate analysis, we include the CAR from day -5 to day -1 as a proxy for pre-offer price moves. Specifically, we separate *positive CARs* from *negative CARs* to control for Corwin's (2003) finding that underpricing is positively related to both large negative and large positive abnormal returns over the pre-offer period.

### **4) Underwriter pricing practices and offer price rounding**

Recent research argues that underpricing may be related to underwriter preferences on pricing. Lee, Lochhead, Ritter, and Zhao (1996) suggest that SEO underpricing may

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<sup>12</sup> Hanley (1993) finds that IPOs whose final offer price exceeds the limits of the offer range have greater underpricing than all other initial public offerings. However, the partial adjustment phenomenon should be less important in SEOs since they already have an established market price.

<sup>13</sup> The manipulative trading effect should be reduced after SEC Rule 10b-21, which was enacted on August 25, 1988 and which was intended to address the manipulative trading problem by banning short-selling before offers. However, this does not affect our results since the SEO sample for which we are able to obtain ownership data occurs after Rule 10b-21 became effective.

result from the practice of rounding offer prices down to the nearest eighth or integer value. Mola and Loughran (2004) find that seasoned offer prices are clustered at integers and do not tend to fall on odd-eighth fractions. Corwin (2003) also finds that underpricing is related to such pricing conventions. If offer price rounding is important, then underpricing should be negatively related to price level. We define *price* as the closing price on the day prior to the offer. In addition, the effects of offer price rounding should be most evident in cases where the closing price does not fall on an even dollar or \$0.25 price increment. Consequently, we include in the regression a price-increment dummy variable (*tick<25*) which is equal to one if the decimal portion of the closing price falls on an increment smaller than \$0.25 and is equal to zero otherwise. If offer price rounding is a significant determinant of SEO underpricing, we expect a positive coefficient on *tick<25*.

We also include a dummy variable equal to one for stocks that trade on the NYSE (*NYSE dummy*). Lee et al. (1996) suggest that SEO underpricing reflects a tendency for underwriters to price at the closing bid quote rather than the closing transaction price. Corwin (2003) confirms the use of this pricing practice with underwriters and market professionals, who also suggest that pricing at the bid is practiced only on the Nasdaq market.

##### **5) *Managerial wealth***

Finally, in order to test hypotheses *H2a* and *H2b*, we include the ratio of secondary to total shares offered. Habib and Ljungqvist (2001) argue that the extent to which owners care about underpricing depends on how much they sell at the IPO, and show that initial IPO returns are lower, the more pre-IPO shareholders sell. Likewise, if selling their personal shares in the SEO causes management to be more cognizant of underpricing, then managers will have a

greater incentive to pressure underwriters to reduce underpricing when they are selling a significant number of their own shares. Since this effect might be mitigated if the firm uses a reputable underwriter, we also include an interaction term between the ratio of secondary to total shares and a dummy variable equal to one if the lead underwriter is prestigious.

### *C. Summary Issue and Firm Statistics*

Table 2 provides issue characteristics for our SEO sample. Panel A lists results for the entire sample of 7,720 SEOs, while Panel B provides results for the 4,139 offers with available ownership data. For each variable, Table 2 lists mean and median values for the complete sample and for the subsamples of NYSE and non-NYSE offers. Panels A and B also provide p-values from a test of the restriction that means (medians) are equal across NYSE versus non-NYSE and ownership versus non-ownership samples based on an analysis of variance (Wilcoxon rank sum test). Although the discussion focuses on the mean results, conclusions based on medians are similar.

The average seasoned equity offer raised \$95.3 million in proceeds and had underpricing of 2.39 percent. However, offer characteristics differ significantly across markets, with NYSE firms making larger, higher-priced offers with less underpricing. Offer proceeds (underpricing) average \$154.9 million (1.51 percent) for NYSE issues compared to \$67.0 million (2.81 percent) for non-NYSE issues. While NYSE issues are larger, they represent a smaller fraction of the existing firm. Relative offer size, defined as the total shares offered divided by shares outstanding on the day prior to the offer, averages 16.2 percent on the NYSE relative to 25.0 percent on Amex and Nasdaq. Finally, on average, over 30% of the shares offered in an SEO are secondary shares. This number is skewed, however, given that the median is less than 7%.

Panel B of Table 2 provides issue characteristics for the sample of SEOs with

ownership data. The subsample with ownership data has significantly higher underpricing, offer price, offer proceeds, relative offer size, and percent of secondary shares offered than the full sample. The higher underpricing relative to the overall sample isn't surprising since previous studies show that underpricing has increased over time, and our sample with ownership comes from the latter half of our time period. Further, as expected, our shares offered to float measure is significantly higher than the relative offer size measure.<sup>14</sup> This is particularly true for non-NYSE listed firms.

Table 3 shows firm characteristics for our sample of SEO issuing firms. Similar to Table 2, Panel A reports results for the entire sample while Panel B shows results for our sample with ownership data. As expected, NYSE issuers tend to be larger, more actively traded firms. The average pre-issue market capitalization (in 2004 dollars) is \$2.5 billion for NYSE issuers and \$631.7 million for Amex and Nasdaq issuers. Similarly, the mean and median price on the day before the offer date is larger for NYSE issuers than for Nasdaq issuers. The average adjusted daily trading volume over the 250 trading days prior to the issue is 268,741 for NYSE issuers and 96,613 for Nasdaq issuers. In results not shown, we find that NYSE issuers have significantly higher trading volume than Nasdaq firms even if we do not adjust Nasdaq trading volume levels. However, there is no difference between trading volume scaled by shares outstanding across NYSE and Nasdaq firms. NYSE issuers are also associated with lower volatility. The standard deviation of daily returns, measured over the 30 trading days ending 11 days prior to the offer, averages 2.37 percent for NYSE offers compared to 3.58 percent for non-NYSE offers. Finally, sixty-two percent of the sample experiences negative cumulative market-adjusted returns in the five days before the offer; the magnitude of both positive and negative

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<sup>14</sup> We eliminate 13 firms with extremely high ownership, and thus shares offered to float > 5. Keeping these firms in the sample results in an average shares offered to float of 104% but does not change our conclusions.

CARs is lower in NYSE firms, however.

Similar to the SEO characteristics shown in Panel B of Table 2, all firm characteristics differ significantly across the ownership and non-ownership samples, shown in Panel B of Table 3. To better determine where these differences come from, we run a binominal logit model with firm year fixed effects where the dependent variable is equal to 1 if the observation has ownership data and zero otherwise. Independent variables include all Table 2 and 3 characteristics and a dummy equal to one if the firm is listed on the NYSE and zero otherwise.

Regression results show insignificant coefficients on almost all characteristics after controlling the time series effect and NYSE dummy (tables not shown for brevity). The only significant coefficients are proceeds (negative), shares outstanding (negative), average daily trading volume (positive), and underpricing (positive). The coefficient on the NYSE dummy is also negative and significant. These results indicate that much of the difference between samples is due to time series influences and the higher frequency of non-NYSE SEOs issued in the 1990s and 2000s. Therefore, we focus the remainder of our analysis on our sample with ownership data.

#### **IV. Results**

Panel A of Table 4 shows the relation between the time since IPO and select SEO characteristics, including underpricing, the ratio of shares offered to float, and overhang at the time of the IPO. The first column provides characteristics for the entire sample of SEOs while the second column limits the sample to SEOs where at least some primary shares are sold. In general, results from Panel A suggest that SEO underpricing increases and shares offered to float decreases as the time since the IPO increases. Specifically,

mean underpricing for the entire sample (primary shares sold sample) is 2.51% (2.70%) for SEOs implemented within one year of the IPO and 3.28% (3.47%) for SEOs offered five years or greater from the IPO. Not surprisingly, share overhang at the IPO is highest for firms that return more quickly to the market. Shares offered to float is also highest for more recent IPO firms; both the mean and median shares offered to float decrease almost monotonically as the time since the IPO increases, indicating that a greater number of shares are being offered relative to the publicly traded shares in firms that have gone public more recently. In untabulated results, we find that in contrast to shares offered to float, the average relative offer size remains between 23-25%, regardless of the time since the IPO.

Panel B of Table 4 examines the relation between our shares offered to float measure and SEO underpricing. Results show that as the ratio of shares offered to float increases, underpricing also increases almost monotonically. Mean underpricing varies from 2.21% (2.32%) for shares offered to float levels of under 0.10 to 5.53% (5.84%) for shares offered to float levels of 1.0 or greater for the overall sample (primary shares sold sample). Evidence also suggests that there is a negative relation between the time since IPO and the ratio of shares offered to float. The mean time since IPO is 7.87 (8.97) years for shares offered to float levels under 0.10. It decreases to 2.98 (2.71) years for shares offered to float levels between 0.7 and 0.8 for the entire sample (primary shares sold sample) of firms, respectively, before increasing again at higher levels.<sup>15</sup> Overall, the results in Table 4 support the hypothesis that low float (i.e. high shares offered to float) results in temporary price pressure that affects SEO underpricing.

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<sup>15</sup> The increase in time since IPO at higher levels of shares offered to float is consistent with Helwege, Pirinsky, and Stulz (2007), who find that ownership in some firms remains highly concentrated for years after the IPO.

Figure 1 further examines the influence of float on price pressure. Specifically, we separate SEOs into top (high shares offered to float) and bottom (low shares offered to float) quartiles and plot cumulative market-adjusted returns (defined as the return on the stock minus the return on the CRSP value-weighted index) for the 25 trading day period ( $t=-12$  to  $+12$ ) surrounding the offer date for both samples. Figure 1 shows a slight runup in price which dissipates as the firm reaches the SEO offer date for both samples.<sup>16</sup> This price pressure leads to market-adjusted returns by the SEO offer date of -2.29 percent for the high shares offered to float quartile, but only -0.45 percent for the low shares offered to float quartile. However, much of these losses are recovered within 12 trading days after the SEO offer date, indicating that the negative market-adjusted returns leading up to the offer date are the result of temporary price pressures due to the SEO. Overall, these findings provide further support for the hypothesis that low float (high shares offered to float) leads to higher temporary price pressure surrounding the SEO offer date.

Although the results in Table 4 provide preliminary evidence of the effect of shares offered to float and time since IPO on SEO underpricing, these results do not control for other factors known to affect underpricing. Consequently, in Table 5 we provide multivariate regressions of SEO underpricing after controlling for firm and SEO characteristics known to predict underpricing. As expected based on previous research, we find that SEO underpricing is positively related to the standard deviation of firm returns, relative offer size, and the positive CAR variables and negatively related to market capitalization, the natural log of the closing stock price on the day prior to the issue, and underwriter ranking. After controlling for these and other variables known to

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<sup>16</sup> Results are similar if returns are measured relative to the CRSP equal-weighted index. The negative returns in the five days preceding the offer are consistent with Barclay and Litzenberger (1988) and Lease, Masulis, and Page (1991), who find significant negative excess returns in the two days prior to the issue date.

influence SEO underpricing, we find in Model 1 that the coefficient on inside ownership is positive and significant, while the coefficient on secondary shares offered to total shares offered is negative and significant. The positive coefficient on insider ownership indicates that underpricing is higher when inside ownership levels are higher, which is consistent with our hypothesis *H1a*. The negative coefficient on secondary shares to total shares offered is consistent with hypothesis *H2a* that insiders will push for lower underpricing when they are selling their own shares in the offerings and thus have their own personal wealth at stake.

We also find that the coefficient on the dummy variable equal to one if the firm had its IPO in the past year is also negative and significant, which indicates that underpricing is lower in recent IPOs and is consistent with our hypothesis *H3*. This finding is also consistent with Mola and Loughran (2004), who find that there is less underpricing at the SEO if the firm has had a previous SEO within the past year. Finally, we find that underpricing is lower if the firm increased its price relative to the initial filing price range. This is consistent with our conjecture that an increase in price indicates strong demand for the stock, thus alleviating price pressure that would result in higher underpricing.

Results from Model 1 are similar to those in Corwin (2003) with two exceptions. First, Corwin finds that the coefficient on market capitalization is more significant than we find. However, Corwin's sample does not include pure secondary offerings; these offerings are of interest to us since they are the offerings in which managers are likely selling their own shares and thus have a personal motive to reduce underpricing. If we delete pure secondary offerings, the coefficient on market capitalization becomes more significant. This difference is driven by the fact that firms making pure secondary

offerings tend to have higher market capitalizations but don't have lower underpricing in the 1980s compared to firms issuing at least some primary shares as part of the offering. Second, Corwin finds that the coefficient on  $\text{tick} < 25$  is positive and significant. However, he interacts  $\text{tick} < 25$  with  $\ln(\text{price})$ . We replicate this result, but in doing so find that the correlation between  $\text{tick} < 25$  and the interaction variable is 0.96, so we leave this interaction out of our basic regression. Corwin also includes interaction terms on price pressure. We replicate these regressions, but again, the correlations between relative offer size and the interaction terms range from 0.72 to 0.88, so we do not include them in our basic regressions.

In Model 2, we replace the relative offer size variable used in past studies with our shares offered to float variable. In doing so, we are able to control for the size of the offer relative to the actual shares available for trading by the public. The coefficient on shares offered to float is positive and significant, as we suggest in hypothesis *H1b*. However, the coefficient on inside ownership loses its significance, which indicates that the importance of ownership is in its influence on float. Consistent with the findings in Model 1, the coefficient on secondary shares offered to total shares offered remains negative and significant, indicating that underpricing is lower when insiders' personal wealth is at stake. We also examine the economic significance of shares offered to float on underpricing. A one standard deviation increase in shares offered to float translates into an increase in underpricing of 0.4%. Given that average underpricing for our sample is 3.1%, the effect is economically significant. In contrast, a one standard deviation increase in relative offer size results in a 0.1% increase in underpricing.

If price pressure causes SEO underpricing, then it should be greatest when the amount offered is high and liquidity is low. Consequently, Model 3 includes adjusted daily trading volume as a percentage of shares outstanding as a measure of liquidity, along with an interaction term between a dummy for firms in the bottom quartile of this volume measure and shares offered to float. The results show that volume itself is insignificant. However, we find a positive and significant coefficient on the interaction term ( $\text{Low\_vol} \times \text{Offer\_to\_float}$ ), indicating that underpricing is higher for low volume firms with high shares offered to float.

We further test the influence that insider wealth concerns have on underpricing in Model 4. In order for insiders to directly influence the level of underpricing on their issuance, they must have some ability to pressure banks to reduce the level of underpricing. Arguably, the ability of management to sway banks in this manner should be related to the strength, or prestige, of the bank/underwriter. To test this prediction, we create an interaction term between the ratio of secondary to total shares offered and a dummy variable set equal to one if the lead underwriter ranking is greater than seven ( $\text{secondary} \times \text{maxrank}$ ).<sup>17</sup> The coefficient on this interaction is positive and significant, which indicates that more prestigious firms are better able to resist pressure from insiders to reduce underpricing further when managers' wealth is at stake.

In Model 5, we replicate Model 4 but add an interaction term between the ratio of secondary to total shares offered and insider ownership ( $\text{secondary} \times \text{ownership}$ ). Our rationale is that managers' incentive to reduce underpricing is even greater if their ownership in the firm is high and they are selling as part of the offering. Consistent with

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<sup>17</sup> Carter, Dark, and Singh (1998) define prestigious underwriters similarly. In sensitivity analysis we require an underwriter ranking of greater than or equal to 8 and find similar results.

this hypothesis, the coefficient on the interaction term is negative and significant. The coefficients on the other independent variables are largely unaffected.

In Model 6, we further examine whether the positive relation between insider ownership and underpricing found in Model 1 is driven by insider ownership reducing public float and consequently increasing price pressure and underpricing of the SEO issuance. Specifically, we add an interaction term between relative offer size and a dummy variable equal to one if the percent insider ownership is greater than the median (relative offer size  $\times$  high own) to the model. Consistent with the above prediction, the coefficient on relative offer size  $\times$  high own is positive and significant and the coefficient on the relative offer size variable loses its significance. These results suggest that the finding in previous research of a positive association between relative offer size and underpricing is driven in part by less float in firms with high insider ownership. Overall, the multivariate results in Table 5 provide evidence that low float results in temporary price pressure that significantly increases underpricing; this influence is moderated by the personal incentives of managers who sell their own shares in the offering, however.

## **V. Conclusion**

The magnitude of SEO underpricing has increased dramatically over the last 10-15 years. Much of this period is also associated with a hot IPO and strong bull market. Many of these firms have high inside ownership, and corresponding thin float, after the IPO and implement follow-on SEOs soon after. Therefore, it may be that the higher underpricing is partially due to temporary price pressure resulting from a downward sloping demand curve; this effect would be particularly strong in recent IPO firms with thin public float. Previous studies on SEO

underpricing use relative offer size, defined as the ratio of shares issued to total shares outstanding, to proxy for price pressure. However, this variable ignores the fact that the number of shares outstanding can be significantly different than the float and therefore may be a poor proxy for price pressure effects in recently public firms with thin float.

We examine the effect of several related variables on SEO underpricing: insider ownership prior to the SEO (and its effect on float), the fraction of secondary shares to total shares sold in the SEO, and the time since the IPO. We find that the effect of inside ownership is twofold. First, inside ownership reduces public float, thereby increasing temporary price pressure from the SEO and increasing underpricing. Second, the greater the percentage of secondary shares offered, the lower the underpricing, indicating that insiders may pressure banks to reduce underpricing when their personal wealth is at stake; this negative relation is mitigated if the firm employs a prestigious underwriter. In contrast, we find that relative offer size is insignificant once we control for the interaction between offer size and insider ownership.

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**Table 1****Distribution of SEOs over time**

This table reports the distribution of SEO offerings reported in SDC covering the period 1980 to 2004. The sample is limited to observations with data available on CRSP and Compustat. Sample with ownership data is the subset of the entire sample for which ownership data prior to the SEO can be obtained from (1) SEC proxy statements or registration filings or, (2) SDC. The years 1980-1990 represent the period where ownership data is unavailable.

| Years     | SEO Firms   |                               | Firms that had an IPO<br>within a year of the SEO |                         |
|-----------|-------------|-------------------------------|---|-------------------------|
|           | Sample Size | Sample with<br>ownership data | Number of<br>observations                         | Percentage<br>of sample |
| 1980-1985 | 1782        | -                             | -   | -                       |
| 1986-1990 | 956         | -                             | -   | -                       |
| 1991-1995 | 1892        | 1224                          | 245   | 20.02%                  |
| 1996-2000 | 1992        | 1848                          | 380   | 20.56%                  |
| 2001-2004 | 1098        | 1067                          | 69  | 6.47%                   |
| Total     | 7720        | 4139                          | 694   | 16.77%                  |

**Table 2****SEO Characteristics**

This table provides summary statistics for SEOs covering the period 1980-2004. Panel A provides information on SEOs characteristics for the entire sample, non-NYSE (N=5,237), and NYSE (N=2,483) listed firms. Panel B shows SEO characteristics for the sample of SEOs where ownership data is available (N=3,078 for the sample of non-NYSE listed firms and 1,061 NYSE listed firms, respectively). We follow Corwin (2003) and define Underpricing as  $(-1) * ((\text{offer price} - \text{price the day before the offer}) / (\text{price the day before the offer}))$ . Total proceeds are defined as the total amount of funds received from the SEO from all markets and is provided in millions of dollars. Relative offer size is the total shares issued divided by the shares outstanding on the day prior to the offer and the proportion of secondary shares offered is defined as the secondary shares offered divided by total number of shares offered. We define shares offered to float as the shares offered divided by the total shares outstanding adjusted for float by subtracting insider ownership. t-statistics (z-statistics) are provided for tests of differences in means and Wilcoxon rank-sum tests of whether NYSE and non-NYSE samples are drawn from different distributions shown in Panels A and B and tests of whether the sample with ownership data and the sample without ownership data are drawn from different distributions shown in Panel B.

**Panel A: Entire SEO Sample**

| Variable                               | N    | Entire Sample |        | Non-NYSE firms |        | NYSE firms |        | Test Statistics<br>Ho: NYSE = Non-NYSE |         |
|--|------|---------------|--------|----------------|--------|------------|--------|--|---------|
|  |      | Mean          | Median | Mean           | Median | Mean       | Median | Pr >  t                                | Pr >  Z |
| Offer price                            | 7720 | 25.50         | 21.25  | 22.68          | 18.50  | 31.45      | 28.00  | 0.0001                                 | 0.0001  |
| Underpricing                           | 7720 | 2.39%         | 1.37%  | 2.81%          | 1.75%  | 1.51%      | 0.59%  | 0.0001                                 | 0.0001  |
| Total proceeds (in millions)           | 7719 | 95.30         | 42.80  | 67.04          | 34.50  | 154.93     | 73.10  | 0.0001                                 | 0.0001  |
| Relative offer size                    | 7720 | 22.13%        | 18.16% | 24.96%         | 20.67% | 16.16%     | 12.33% | 0.0001                                 | 0.0001  |
| Proportion of secondary shares offered | 7720 | 30.16%        | 6.67%  | 25.20%         | 6.23%  | 40.63%     | 9.11%  | 0.0001                                 | 0.0001  |

Panel B: Sample with ownership data

| Variable                               | N    | Entire Sample |        | Non-NYSE firms |        | NYSE firms |        | Test Statistics<br>Ho: NYSE = Non-NYSE |         | Test Statistics<br>Ho: Own = Non-Own |         |
|--|------|---------------|--------|----------------|--------|------------|--------|--|---------|--------------------------------------|---------|
|  |      | Mean          | Median | Mean           | Median | Mean       | Median | Pr >  t                                | Pr >  Z | Pr >  t                              | Pr >  Z |
|  |      |               |        |                |        |            |        |  |         |                                      |         |
| Offer price                            | 4139 | 26.81         | 22.00  | 25.12          | 20.00  | 31.70      | 28.00  | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Underpricing                           | 4139 | 3.10%         | 2.07%  | 3.51%          | 2.49%  | 1.91%      | 1.08%  | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Total proceeds (in millions)           | 4139 | 127.93        | 66.60  | 91.88          | 54.00  | 232.50     | 132.00 | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Relative offer size                    | 4139 | 23.82%        | 19.33% | 25.31%         | 20.99% | 19.41%     | 14.80% | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Offer to float*                        | 4126 | 38.01%        | 27.31% | 41.23%         | 30.03% | 28.68%     | 18.36% | 0.0001                                 | 0.0001  | -                                    | -       |
| Proportion of secondary shares offered | 4139 | 31.31%        | 10.00% | 27.27%         | 9.09%  | 42.99%     | 24.79% | 0.0001                                 | 0.0001  | 0.0059                               | 0.0001  |

\* We remove 13 firms with extremely high ownership, and thus shares offered to float > 5.

**Table 3**  
**Firm Characteristics**

This table provides summary statistics for firms implementing SEOs from 1980-2004. Panel A provides information on SEOs characteristics for the entire sample, non-NYSE (N=5,237), and NYSE (N=2,483) listed firms. Panel B shows SEO characteristics for the sample of SEOs where ownership data is available (N=3,078 for the sample of non-NYSE listed firms and 1,061 NYSE listed firms, respectively). Market value is defined as the firm closing price multiplied by the number of shares outstanding on the day before the offer date, adjusted to 2004 dollars, and is provided in thousands. Price is the stock price on day prior to the offer. The standard deviation of returns is measured over 30 trading days ending 11 days prior to the offer date. The average trading volume is calculated using volume over the 250 trading days prior to the offer date; trading volume for firms on NASDAQ is divided by two to control for the fact that trades are often recorded twice, once for the seller to dealer transaction and once for the dealer to buyer transaction. Scaled volume is the average trading volume scaled by the number of shares outstanding on the day prior to the offer date. Insider ownership (HC) is the hand-collected ownership from the SEC filings. CAR is the cumulative market-adjusted return over the 5 days prior to the offer, where market return is the return on the CRSP value-weighted index. Positive (Negative) CAR is equal to the CAR if positive (negative) and is missing otherwise. Insider ownership (SDC) is the hand-collected ownership, when available, and SDC or Compact Disclosure ownership otherwise. t-statistics (z-statistics) are provided for tests of differences in means and Wilcoxon rank-sum tests of whether NYSE and non-NYSE samples are drawn from different distributions shown in Panels A and B and tests of whether the sample with ownership data and the sample without ownership data are drawn from different distributions shown in Panel B.

| Panel A: Entire SEO Sample    |      |               |         |                |         |            |           |                                |         |
|-------------------------------|------|---------------|---------|----------------|---------|------------|-----------|--------------------------------|---------|
| Variable                      | N    | Entire Sample |         | Non-NYSE firms |         | NYSE firms |           | Test Statistics                |         |
|                               |      | Mean          | Median  | Mean           | Median  | Mean       | Median    | Ho: NYSE = Non-NYSE<br>Pr >  t | Pr >  Z |
| Market value (in 000s)        | 7720 | 1,625,484     | 368,418 | 769,111        | 237,842 | 3,431,697  | 1,074,538 | 0.0001                         | 0.0001  |
| Shares outstanding (in 000s)  | 7720 | 35,343        | 12,386  | 18,914         | 9,341   | 69,992     | 26,252    | 0.0001                         | 0.0001  |
| Price (\$)                    | 7720 | 26.025        | 21.750  | 23.241         | 19.000  | 31.898     | 28.625    | 0.0001                         | 0.0001  |
| Standard deviation of returns | 7719 | 3.19%         | 2.84%   | 3.58%          | 3.23%   | 2.37%      | 2.21%     | 0.0001                         | 0.0001  |
| Average trading volume        | 7388 | 153,181       | 39,040  | 96,613         | 27,097  | 268,741    | 81,072    | 0.0001                         | 0.0001  |
| Scaled volume                 | 7388 | 0.38%         | 0.28%   | 0.38%          | 0.28%   | 0.38%      | 0.30%     | 0.7326                         | 0.0001  |
| Positive CAR                  | 2917 | 5.01%         | 3.55%   | 5.62%          | 3.93%   | 3.81%      | 2.81%     | 0.0001                         | 0.0001  |
| Negative CAR                  | 4803 | -6.32%        | -4.86%  | -7.11%         | -5.52%  | -4.58%     | -3.45%    | 0.0001                         | 0.0001  |

Panel B: Sample with ownership data

| Variable                      | N    | Entire Sample |         | Non-NYSE firms |         | NYSE firms |           | Test Statistics<br>Ho: NYSE = Non-NYSE |         | Test Statistics<br>Ho: Own = Non-Own |         |
|-------------------------------|------|---------------|---------|----------------|---------|------------|-----------|--|---------|--------------------------------------|---------|
|                               |      | Mean          | Median  | Mean           | Median  | Mean       | Median    | Pr >  t                                | Pr >  Z | Pr >  t                              | Pr >  Z |
| Market value (in 000s)        | 4139 | 1,833,239     | 446,454 | 1,049,494      | 324,543 | 4,106,912  | 1,154,438 | 0.0001                                 | 0.0001  | 0.0241                               | 0.0001  |
| Shares outstanding (in 000s)  | 4139 | 44,924        | 16,546  | 25,057         | 13,249  | 102,559    | 34,858    | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Price (\$)                    | 4139 | 27.484        | 22.875  | 25.847         | 20.750  | 32.233     | 28.563    | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Standard deviation of returns | 4139 | 3.60%         | 3.21%   | 3.99%          | 3.60%   | 2.50%      | 2.28%     | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Average trading volume        | 4122 | 221,229       | 58,354  | 137,009        | 44,547  | 466,377    | 144,053   | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Scaled volume                 | 4122 | 0.46%         | 0.35%   | 0.45%          | 0.34%   | 0.47%      | 0.39%     | 0.0914                                 | 0.0001  | 0.0001                               | 0.0001  |
| Positive CAR                  | 1587 | 5.86%         | 4.09%   | 6.45%          | 4.52%   | 4.31%      | 3.06%     | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Negative CAR                  | 2552 | -7.30%        | -5.50%  | -7.94%         | -6.10%  | -5.32%     | -3.92%    | 0.0001                                 | 0.0001  | 0.0001                               | 0.0001  |
| Insider Ownership (HC)        | 3729 | 27.53%        | 22.30%  | 29.80%         | 26.00%  | 20.31%     | 10.64%    | 0.0001                                 | 0.0001  | -                                    | -       |
| Insider Ownership (SDC)       | 4139 | 26.80%        | 21.12%  | 29.35%         | 25.35%  | 19.39%     | 9.75%     | 0.0001                                 | 0.0001  | -                                    | -       |

**Table 4****SEO Characteristics Conditional on Time since IPO and Shares offered to float**

This table details SEO characteristics conditional on timing and shares offered to float. Specifically, Panel A shows the relation between the time since the firm initiated its IPO and underpricing, shares offered to float, period since IPO, and overhang at IPO. Panel B examines the relation between the ratio of shares offered at the SEO to float and underpricing and the period since IPO. The first column consists of all SEOs with available ownership data and the second column is limited to SEOs in which at least some primary shares are sold as part of the SEO. Definitions of all variables are provided in Tables 2 and 3.

| Time Since<br>IPO     |                 | Entire Sample |       |       | Sample where Primary<br>Shares are Sold |       |       |
|-----------------------|-----------------|---------------|-------|-------|---|-------|-------|
|                       |                 | Variable      | N     | Mean  | Median                                  | N     | Mean  |
| 0-1 Year              | Underpricing    | 693           | 2.51% | 1.74% | 558                                     | 2.70% | 1.92% |
|                       | Offer to float  | 691           | 0.469 | 0.382 | 556                                     | 0.488 | 0.398 |
|                       | Years since IPO | 693           | 0.63  | 0.62  | 558                                     | 0.63  | 0.62  |
|                       | Overhang at IPO | 541           | 3.97  | 2.51  | 438                                     | 3.70  | 2.42  |
| 1-2 Years             | Underpricing    | 579           | 2.90% | 1.92% | 472                                     | 3.13% | 2.07% |
|                       | Offer to float  | 577           | 0.445 | 0.347 | 470                                     | 0.480 | 0.380 |
|                       | Years since IPO | 579           | 1.48  | 1.47  | 472                                     | 1.48  | 1.46  |
|                       | Overhang at IPO | 421           | 3.76  | 2.53  | 341                                     | 3.55  | 2.38  |
| 2-3 Years             | Underpricing    | 341           | 3.16% | 2.10% | 272                                     | 3.37% | 2.12% |
|                       | Offer to float  | 340           | 0.381 | 0.268 | 271                                     | 0.425 | 0.290 |
|                       | Years since IPO | 341           | 2.45  | 2.42  | 272                                     | 2.46  | 2.43  |
|                       | Overhang at IPO | 223           | 3.59  | 2.40  | 174                                     | 3.34  | 2.35  |
| 3-4 Years             | Underpricing    | 274           | 3.17% | 2.03% | 227                                     | 3.49% | 2.56% |
|                       | Offer to float  | 274           | 0.372 | 0.253 | 227                                     | 0.383 | 0.256 |
|                       | Years since IPO | 274           | 3.49  | 3.49  | 227                                     | 3.50  | 3.50  |
|                       | Overhang at IPO | 147           | 3.53  | 2.29  | 115                                     | 3.08  | 2.18  |
| 4-5 Years             | Underpricing    | 206           | 3.59% | 2.68% | 166                                     | 3.73% | 2.68% |
|                       | Offer to float  | 205           | 0.322 | 0.236 | 165                                     | 0.325 | 0.252 |
|                       | Years since IPO | 206           | 4.47  | 4.45  | 166                                     | 4.47  | 4.45  |
|                       | Overhang at IPO | 106           | 3.63  | 2.70  | 78                                      | 3.01  | 2.24  |
| 5 Years or<br>Greater | Underpricing    | 2045          | 3.28% | 2.20% | 1726                                    | 3.47% | 2.33% |
|                       | Offer to float  | 2038          | 0.338 | 0.217 | 1720                                    | 0.363 | 0.237 |
|                       | Years since IPO | 1006          | 10.61 | 8.98  | 859                                     | 10.68 | 9.01  |
|                       | Overhang at IPO | 332           | 3.10  | 2.39  | 274                                     | 2.75  | 2.33  |

\* If we cannot calculate the years since IPO because we do not have an IPO date from SDC, we assume that the firm has been public for greater than 5 years. Deleting these firms does not significantly change the underpricing, shares offered to float, or overhang of firms in this category, however.

**Table 4 Continued**

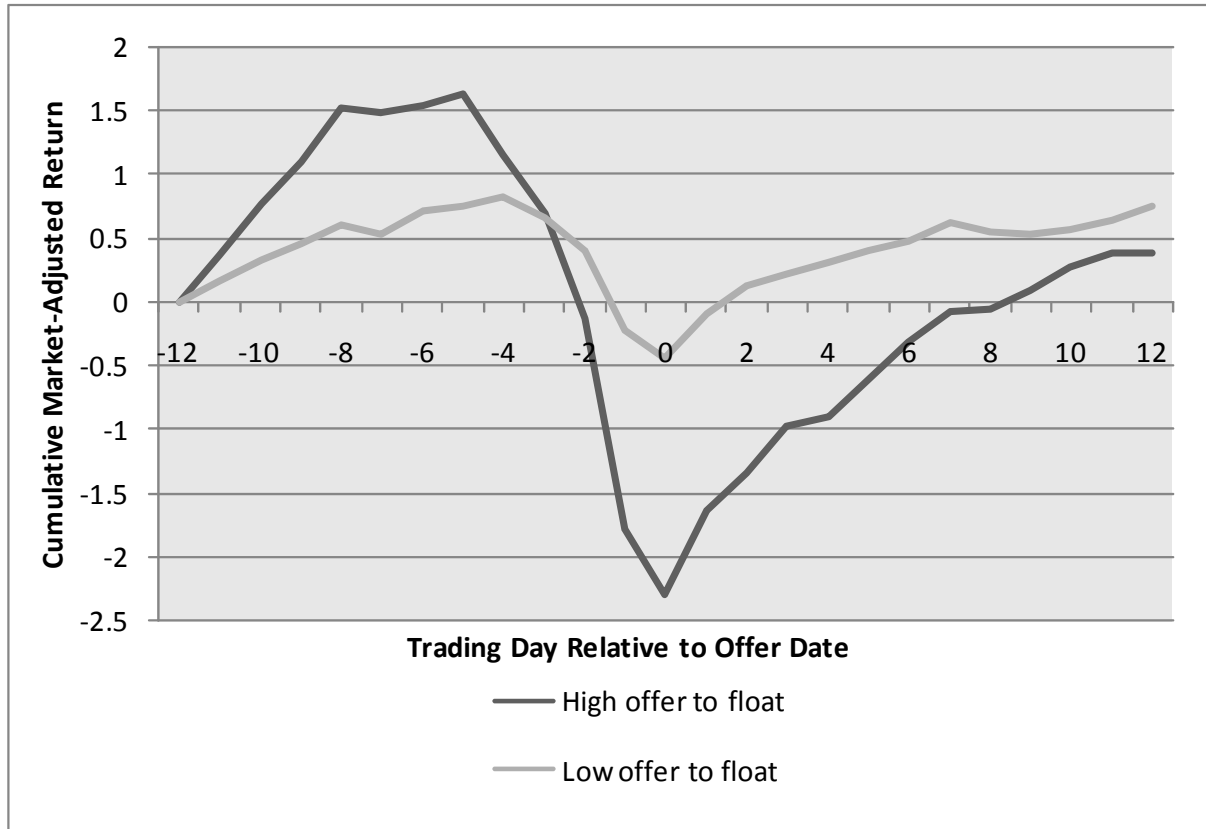
| Panel B: SEO characteristics separated by shares offered to float (offer to float) |                 |               |       |        |                                      |       |        |
|--|-----------------|---------------|-------|--------|--------------------------------------|-------|--------|
| Offer to float   | Variable        | Entire Sample |       |        | Sample where Primary Shares are Sold |       |        |
|  |                 | N             | Mean  | Median | N                                    | Mean  | Median |
| Less than 0.10   | Underpricing    | 525           | 2.21% | 1.40%  | 338                                  | 2.32% | 1.33%  |
|  | Offer to float  | 525           | 0.061 | 0.065  | 338                                  | 0.063 | 0.068  |
|  | Years since IPO | 297           | 7.89  | 6.16   | 188                                  | 9.05  | 7.63   |
| 0.10 to 0.1999   | Underpricing    | 935           | 2.65% | 1.60%  | 748                                  | 2.73% | 1.72%  |
|  | Offer to float  | 935           | 0.151 | 0.153  | 748                                  | 0.153 | 0.155  |
|  | Years since IPO | 684           | 6.01  | 4.19   | 539                                  | 6.34  | 4.52   |
| 0.20 to 0.2999   | Underpricing    | 822           | 2.75% | 1.88%  | 685                                  | 2.96% | 2.03%  |
|  | Offer to float  | 822           | 0.249 | 0.249  | 685                                  | 0.249 | 0.248  |
|  | Years since IPO | 639           | 4.19  | 2.70   | 526                                  | 4.41  | 2.96   |
| 0.30 to 0.3999   | Underpricing    | 568           | 3.20% | 2.38%  | 498                                  | 3.34% | 2.51%  |
|  | Offer to float  | 568           | 0.346 | 0.346  | 498                                  | 0.347 | 0.347  |
|  | Years since IPO | 452           | 3.94  | 2.09   | 390                                  | 4.08  | 2.18   |
| 0.40 to 0.4999   | Underpricing    | 358           | 3.40% | 2.36%  | 309                                  | 3.63% | 2.56%  |
|  | Offer to float  | 358           | 0.445 | 0.446  | 309                                  | 0.445 | 0.445  |
|  | Years since IPO | 295           | 3.93  | 1.75   | 252                                  | 4.00  | 1.76   |
| 0.50 to 0.5999   | Underpricing    | 248           | 3.37% | 2.47%  | 216                                  | 3.57% | 2.60%  |
|  | Offer to float  | 248           | 0.548 | 0.547  | 216                                  | 0.548 | 0.547  |
|  | Years since IPO | 200           | 3.27  | 1.44   | 174                                  | 3.34  | 1.52   |
| 0.60 to 0.6999   | Underpricing    | 181           | 4.25% | 3.40%  | 166                                  | 4.36% | 3.55%  |
|  | Offer to float  | 181           | 0.646 | 0.644  | 166                                  | 0.647 | 0.646  |
|  | Years since IPO | 144           | 3.18  | 1.72   | 131                                  | 3.26  | 1.80   |
| 0.70 to 0.7999   | Underpricing    | 132           | 3.56% | 2.44%  | 120                                  | 3.54% | 2.34%  |
|  | Offer to float  | 132           | 0.743 | 0.744  | 120                                  | 0.744 | 0.745  |
|  | Years since IPO | 108           | 2.98  | 1.44   | 97                                   | 2.71  | 1.42   |
| 0.80 to 0.8999   | Underpricing    | 84            | 3.33% | 2.36%  | 77                                   | 3.50% | 2.39%  |
|  | Offer to float  | 84            | 0.849 | 0.853  | 77                                   | 0.849 | 0.853  |
|  | Years since IPO | 62            | 4.43  | 2.12   | 56                                   | 4.59  | 1.86   |
| 0.90 to 0.9999   | Underpricing    | 61            | 4.59% | 2.88%  | 57                                   | 4.87% | 3.16%  |
|  | Offer to float  | 61            | 0.941 | 0.936  | 57                                   | 0.941 | 0.936  |
|  | Years since IPO | 49            | 3.93  | 1.50   | 45                                   | 4.01  | 1.50   |
| 1.0 or Greater   | Underpricing    | 212           | 5.53% | 4.20%  | 195                                  | 5.84% | 4.61%  |
|  | Offer to float  | 212           | 1.673 | 1.440  | 195                                  | 1.678 | 1.442  |
|  | Years since IPO | 160           | 4.21  | 2.10   | 146                                  | 4.35  | 2.26   |

## **Table 5**

### **Underpricing Regressions**

The models are estimated using available data from SEOs covering the period 1980-2004. The dependent variable is underpricing, which is defined as  $(-1) * ((\text{offer price} - \text{price the day before the offer}) / (\text{price the day before the offer}))$ .  $\text{Ln}(\text{Market Cap})$  is the log of market capitalization, where market capitalization is defined as price multiplied by the shares outstanding the day before the offer date. The standard deviation of returns is calculated using daily returns over 30 trading days ending 11 days prior to offer date. Relative offer size is equal to the total shares offered divided by shares outstanding the day prior to the offer. Shares offered to float is defined as follows;  $(\text{total shares issued}) / (\text{shares outstanding the day prior to the offer} * (1 - (\text{inside ownership})))$ .  $\text{Relative offer size} \times \text{high own}$  is an interaction term between the relative offer size and a dummy variable set equal to one if the percent insider ownership is above the median. CAR is the cumulative market-adjusted return over the 5 days prior to the offer, where market return is the return on the CRSP value-weighted index. Positive (Negative) CAR is equal to the CAR if positive (negative) and zero otherwise.  $\text{Ln}(\text{Price})$  is the log of the stock price on day prior to the offer. NYSE dummy is a dummy variable set equal to one if the stock traded on the NYSE at the time of the SEO.  $\text{Tick} < 25$  dummy is set equal to one if the decimal portion of the closing price on the day prior to the offer is at a \$0.25 increment. Recent IPO dummy is set equal to 1 if the IPO took place in past year. Secondary to total shares offered is defined as secondary shares offered divided total shares offered. Maximum underwriting ranking is the maximum underwriter ranking of the lead underwriter(s) in the SEO.  $\text{Secondary} \times \text{maxrank}$  is an interaction term between the secondary to total shares offered and a dummy equal to one if the lead underwriter ranking is greater than seven. Insider ownership is obtained from SEC filings or from SDC if SEC filings are unavailable.  $\text{Secondary} \times \text{ownership}$  is an interaction term between the secondary to total shares offered and insider ownership. Increase dummy is equal to one if the difference between the offer price and the original file price is positive. Volume is the average daily trading volume calculated over the 250 trading days prior to the offer date, scaled by the number of shares outstanding on the day prior to the offer date; trading volume for NASDAQ firms is divided by two to provide comparable measures of share volume across markets. p-values based on White's heteroskedasticity consistent  $\chi^2$  test are provided in parentheses below the parameter estimates.

| Independent Variable              | Model 1            | Model 2            | Model 3            | Model 4            | Model 5            | Model 6            |
|-----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Intercept                         | 0.0916<br>(0.000)  | 0.0857<br>(0.000)  | 0.0868<br>(0.000)  | 0.0895<br>(0.000)  | 0.0874<br>(0.000)  | 0.0960<br>(0.000)  |
| Ln(Market Cap.)                   | -0.0013<br>(0.070) | -0.0007<br>(0.280) | -0.0009<br>(0.200) | -0.0007<br>(0.298) | -0.0008<br>(0.264) | -0.0014<br>(0.065) |
| Standard deviation of returns     | 0.4192<br>(0.000)  | 0.4190<br>(0.000)  | 0.4180<br>(0.000)  | 0.4170<br>(0.000)  | 0.4171<br>(0.000)  | 0.4175<br>(0.000)  |
| Relative offer size               | 0.0063<br>(0.044)  | -                  | -                  | -                  | -                  | 0.0023<br>(0.456)  |
| Relative offer size × high own    | -                  | -                  | -                  | -                  | -                  | 0.0075<br>(0.048)  |
| Offer to float                    | -                  | 0.0097<br>(0.000)  | 0.0070<br>(0.007)  | 0.0097<br>(0.000)  | 0.0090<br>(0.000)  | -                  |
| Postive CAR                       | 0.0795<br>(0.000)  | 0.0784<br>(0.000)  | 0.0782<br>(0.000)  | 0.0781<br>(0.000)  | 0.0779<br>(0.000)  | 0.0799<br>(0.000)  |
| Negative CAR                      | 0.0188<br>(0.172)  | 0.0187<br>(0.175)  | 0.0190<br>(0.168)  | 0.0186<br>(0.176)  | 0.0192<br>(0.163)  | 0.0180<br>(0.087)  |
| Ln(Price)                         | -0.0128<br>(0.000) | -0.0126<br>(0.000) | -0.0126<br>(0.000) | -0.0126<br>(0.000) | -0.0124<br>(0.000) | -0.0127<br>(0.000) |
| NYSE dummy                        | -0.0004<br>(0.784) | -0.0010<br>(0.470) | -0.0007<br>(0.594) | -0.0010<br>(0.459) | -0.0010<br>(0.459) | 0.000<br>(0.812)   |
| Tick<25 dummy                     | 0.0008<br>(0.525)  | 0.0008<br>(0.531)  | 0.0007<br>(0.554)  | 0.0008<br>(0.519)  | 0.0008<br>(0.530)  | 0.0008<br>(0.503)  |
| Recent IPO dummy                  | -0.0076<br>(0.000) | -0.0073<br>(0.000) | -0.0069<br>(0.000) | -0.0073<br>(0.000) | -0.0073<br>(0.000) | -0.0076<br>(0.000) |
| Secondary to total shares offered | -0.0039<br>(0.003) | -0.0038<br>(0.005) | -0.0035<br>(0.009) | -0.0159<br>(0.004) | -0.0106<br>(0.072) | -0.0155<br>(0.001) |
| Maximum underwriter ranking       | -0.0021<br>(0.001) | -0.0022<br>(0.001) | -0.0022<br>(0.001) | -0.0027<br>(0.000) | -0.0026<br>(0.001) | -0.0025<br>(0.000) |
| Secondary × maxrank               | -                  | -                  | -                  | 0.0133<br>(0.019)  | 0.0122<br>(0.03)   | 0.0129<br>(0.007)  |
| Insider ownership                 | 0.0094<br>(0.001)  | 0.0008<br>(0.805)  | 0.0009<br>(0.796)  | 0.0010<br>(0.767)  | 0.0083<br>(0.089)  | 0.0058<br>(0.084)  |
| Secondary × ownership             | -                  | -                  | -                  | -                  | -0.0176<br>(0.005) | -                  |
| Increase dummy                    | -0.0072<br>(0.000) | -0.0076<br>(0.000) | -0.0074<br>(0.000) | -0.0076<br>(0.000) | -0.0075<br>(0.000) | -0.0072<br>(0.000) |
| Volume                            | -                  | -                  | 0.1495<br>(0.406)  | -                  | -                  | -                  |
| Low_vol × Offer_to_float          | -                  | -                  | 0.0047<br>(0.089)  | -                  | -                  | -                  |
| Year dummies                      | Yes                | Yes                | Yes                | Yes                | Yes                | Yes                |
| Adj. R2                           | 0.1947             | 0.1979             | 0.1990             | 0.1994             | 0.2007             | 0.1970             |



**Figure 1. Cumulative market-adjusted returns around the SEO offer date.** Market-adjusted returns are defined as returns net of the CRSP value-weighted index and are shown for the 25 trading day period ( $t = -12$  to  $+12$ ) relative to the SEO offer date. The high (low) shares offered to float sample is defined as all firms within the top (bottom) quartile of the shares offered to float measure, which is defined as follows;  $(\text{total shares offered}) / (\text{shares outstanding the day prior to the offer} * (1 - (\text{percent inside ownership})))$ .