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Robert M. Bowen

Xia CHEN
Singapore Management University, xchen@smu.edu.sg

Qiang CHENG
Singapore Management University, qcheng@smu.edu.sg

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Robert M. Bowen
University of Washington Business School

Xia Chen
Qiang Cheng*
Sauder School of Business
University of British Columbia

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* Corresponding author: Sauder School of Business, University of British Columbia, 2053 Main Mall, Vancouver, BC, Canada V6T 1Z2; E-mail: qiang.cheng@sauder.ubc.ca; Phone: 604-827-5156; Fax: 604-822-9470.

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Abstract

There is limited direct evidence on the impact of analyst coverage on the cost of capital. In this paper, we hypothesize that the amount and nature of analyst coverage can reduce information asymmetry among investors and thus lower the cost of raising equity capital. We investigate the effect of analyst coverage on the underpricing of seasoned equity offerings (SEOs), which is a substantial cost of issuing new shares. Based on 4,766 SEOs in the period 1984-2000, our results suggest that more analyst coverage is associated with lower SEO underpricing. Compared with firms without analyst coverage, firms with the median level of analyst coverage – three analysts – have a 1.19% lower SEO underpricing, a relative decrease of 38%. This effect is robust to controlling for other factors affecting SEO underpricing. We also examine additional attributes of analyst coverage and find that firms followed by analysts working for the lead underwriter, with a reputation for superior ability, or with lower forecast dispersion have incrementally lower SEO underpricing.

Key Words: Analyst coverage; information asymmetry; cost of raising capital; underpricing; seasoned equity offering

JEL Classification: G2, G32, M40

1. Introduction

Theorists have long recognized that information asymmetry among investors adversely affects the cost of raising equity capital (e.g., Diamond and Verrecchia 1991). When there is information asymmetry, relatively uninformed investors are reluctant to trade due to higher potential loss from transacting with informed investors (e.g., Glosten and Milgrom 1985; Kyle 1985). To trade, uninformed investors demand compensation for the risks of trading with informed investors (O'Hara 2003). In the case of issuing new equity, firms must issue shares at a discount to overcome the reluctance of uninformed investors. Such discounting leads to smaller proceeds to the firm and a higher cost of raising equity capital.[1]

Firms can reduce information asymmetry among investors through public disclosures or information intermediaries. Information asymmetry here refers broadly to differences in information sets *among* investors, including both differences in knowledge about the firm and the possibility that certain investors are not aware of the firm. In Merton's (1987) words, it refers to both the depth and breadth of investor cognizance.[2] While a large body of research investigates the impact of public disclosures on the cost of capital,[3] there is limited direct evidence on the impact of information intermediaries. Given financial analysts occupy a central role in the acquisition and dissemination of information in capital markets, we investigate whether the amount and nature of analyst coverage is associated with the cost of raising equity capital.

Given that analysts can increase investors' awareness of and knowledge about a firm, and presumably reduce information asymmetry among investors (Merton 1987), it follows that analyst coverage should lower the cost of raising equity capital, *ceteris paribus*. However, financial analysts recently have faced increased scrutiny from investors and regulators, who are concerned with analysts'

[1] See Dye (2001) and Verrecchia (2001) for reviews of the related theoretical literature.
[2] Thus, information asymmetry among investors is related to, but different from, information asymmetry between managers and investors.
[3] For example, Coller and Yohn (1997), Brown et al. (2004), and others investigate the impact of management forecasts and conference calls; Botosan (1997), Healy et al. (1999), and others study the impact of disclosure quality. Healy and Palepu (2001) provide an extensive review of this area.

alleged conflicts of interest. Such conflicts of interest arguably interfere with analysts' ability to reduce information asymmetry. In addition, Zhang (2001) argues that information acquisition by financial analysts can benefit informed investors relatively more and actually increase the level of information asymmetry among investors. Thus, whether analyst coverage reduces the cost of raising equity capital is an empirical issue.

We investigate this issue in a context where we can directly measure the cost of raising equity capital – the documented underpricing of seasoned equity offerings (SEOs). SEO underpricing occurs when the offer price is lower than the closing price on the day prior to the offer date and represents a substantial cost to the firm raising capital (Altinkilic and Hansen 2003). In the 1990s, SEO underpricing is 2.82% of offer proceeds on average and aggregates to over $8 billion. Underpricing represents a loss of $6 million in offer proceeds for an average seasoned equity offering during 2000.

SEO underpricing provides a powerful setting to examine the effects of analyst coverage on the information environment for several reasons. First, theory suggests that SEO underpricing results directly from the information asymmetry among investors (Parsons and Raviv 1985, among others). Thus, our evidence can substantiate the link between analyst coverage and information asymmetry. Second, unlike *indirect* measures (such as bid-ask spread) or *estimates* of cost of capital (such as the implicit discount rate used by market participants in valuing the firm's equity), SEO underpricing is a direct measure of cost of raising capital and can be accurately measured. Third, analyzing SEO underpricing is less likely to be subject to methodological issues found in alternative settings. For example, the SEO setting is unlikely to be subject to endogeneity issues because underpricing occurs only on the offer date and is unlikely to affect analyst coverage prior to this date. Further, SEO underpricing is not subject to confounding events because any information related to the offering itself should be incorporated into stock prices when the SEO is announced, which is generally one month before the offer date. Lastly, relying on an extensive literature in finance (e.g., Corwin 2003; Mola and Loughran 2004; among others), we are able to control for other determinants of SEO underpricing.

Based on 4,766 SEOs in the period 1984-2000, we find that more analyst coverage is associated with reduced SEO underpricing, consistent with analyst coverage reducing information asymmetry among investors and the cost of raising equity capital. Compared with firms without analyst coverage, firms with the median level of analyst coverage – three analysts – have a 1.19% lower SEO underpricing, and firms with the third quartile level of analyst coverage – eight analysts – have a 1.89% lower SEO underpricing, a relative decrease of 38% and 60%, respectively. This result holds when we control for other factors affecting SEO underpricing suggested in prior research, such as firm size, past returns, return volatility, relative offer size, and the increasing trend in underpricing.

To further investigate the relation between the nature of analyst coverage and the cost of raising equity capital, we examine three proxies for the quality of analyst coverage. First, we predict that analysts working for the lead underwriter can further reduce SEO underpricing. These analysts have better access to information about the firm and have stronger incentives to collect and evaluate these data. Such information is then passed on to capital markets through their research reports. We find that firms followed by analysts working for the lead underwriter have incrementally lower underpricing; SEO underpricing is 1.65% lower for firms with lead underwriter coverage than those without, a relative decrease of 54%. Second, we predict that firms followed by analysts with high ability, such as *Institutional Investor* All-American analysts or more experienced analysts, have incrementally lower SEO underpricing, since these analysts presumably have better ability to gather and process information. Our results are consistent with this prediction; SEO underpricing is 1.32% lower for firms with high ability analyst coverage than those without, a relative decrease of 44%. Third, we predict and find that firms followed by analysts with lower earnings forecast dispersion have incrementally lower SEO underpricing. A decrease in forecast dispersion of one standard deviation is associated with a decrease in SEO underpricing of 0.43%, a relative decrease of 14%.

These findings suggest that the cost of raising capital decreases with both the quantity and quality of analyst coverage. To evaluate the robustness of our results, we conduct several additional analyses. First, we predict and find that the mitigating effect of analyst coverage on SEO underpricing is more

dramatic for small firms than for large firms because information asymmetry among investors is higher for small firms and thus the marginal benefit of analyst coverage is greater. Second, some firms issued multiple SEOs and we find that for consecutive SEOs from the same firm, increased analyst coverage is associated with decreased underpricing. Third, our inferences are robust to the potential impact of information asymmetry on the amount of analyst coverage and to other determinants of analyst coverage, such as firm size, institutional ownership, the number of shareholders, and trading volume. Lastly, we find similar results when we use alternative measure of analyst coverage and forecast dispersion and when we control for additional variables that might affect SEO underpricing, such as the proportion of primary shares in the total offerings, lead underwriter reputation, and mispricing proxies.

Overall, this paper contributes to the literature by providing *direct* evidence on the relation between analyst coverage and the cost of raising equity capital of followed firms. It extends the literature on the association between characteristics of the information environment and the cost of raising capital. Our results suggest that when analyst coverage is higher, one important cost of issuing equity – SEO underpricing – is lower. These results are consistent with financial analysts being effective information intermediaries and are in contrast with the concern that incentives to generate investment banking and trading revenues bias analysts' research so that they contribute little to enhance the information environment of the firms they follow.

Our evidence is important to studies assuming that analyst coverage benefits the followed firms. For example, Lang and Lundholm (1993, 1996), Healy et al. (1999), Lang et al. (2003), among others, use an increased level of analyst coverage to measure the benefit of improved corporate disclosure. The evidence provided in this paper is consistent with analyst coverage reducing the level of information asymmetry among investors and the cost of raising capital, and thus lends empirical support for this widely made assumption.

The evidence also has implications for firms that seek to raise capital using SEOs. While the importance of analyst coverage for firms raising equity capital has been recognized, the underlying reasons are not well understood. For example, Krigman et al. (2001) find that firms conducting SEOs

within three years of an IPO switch lead underwriters to improve analyst coverage. They conclude their study by calling for more research on understanding why issuers clamor for analyst coverage: "why issuers place such high value on sell-side research coverage is a significant and important question for future research (p. 278)." The evidence provided in this paper suggests that greater analyst coverage is associated with a significantly lower cost of raising equity capital.

Finally, the evidence in this paper is potentially useful to policy makers contemplating regulations that affect analysts' research. For example, the U.S. Securities and Exchange Commission (SEC) recently approved new rules (i.e., NASD Rule 2711 and NYSE Rule 472) that (i) attempt to protect analysts from potential influence by related investment banking business and (ii) encourage independent research by firms that have no investment banking business. The evidence provided in this paper highlights an important potential negative (positive) side effect of these regulations – if they reduce (increase) the level or quality of analyst coverage, they may also increase (decrease) the cost of raising equity capital, *ceteris paribus*.

The remainder of this paper is organized as follows. Section 2 discusses related prior research and the advantages of using SEO underpricing as a measure of the cost of raising equity capital. Section 3 develops our research hypotheses. Section 4 presents data and variable measurement. Section 5 reports our primary empirical results. Section 6 provides additional analyses and Section 7 concludes.

2. Relation to prior research

We first review the related literature on analyst coverage and then elaborate on why we choose the SEO underpricing setting to analyze the impact of analyst coverage on the cost of raising equity capital.

Analyst coverage and information asymmetry

Prior studies have examined the impact of analyst coverage on the informativeness of stock prices. Lys and Sohn (1990) and Womack (1996) find that analysts' research outputs are associated with significant stock price movements, consistent with analysts' research conveying information. Prior

research also finds that greater analyst coverage is associated with an improvement in the dissemination of information. This improvement is reflected by a smaller price response to current earnings (Lobo and Mahmound 1989), more informative prices with respect to future earnings (Ayers and Freeman 2003), faster incorporation of common information into price (Brennan et al. 1993), and lower extent of stock mispricing (Hong et al. 2000; Elgers et al. 2001; Griffin and Lemmon 2002).

While these studies suggest that analyst coverage increases the informativeness of stock prices, they do not directly address whether analyst coverage is negatively associated with the cost of issuing capital. Moreover, financial analysts are not perfect information intermediaries. Critics argue that sell-side analysts sacrifice their independence to support the investment banking business (Michaely and Womack 2002). Analysts' conflicts of interest might result from a stronger linkage between analyst research and investment banking activities, and the increasingly important role of analysts as strategy advisors to the companies they follow (Healy and Palepu 2001). Conflicts of interest cast doubt on the effectiveness of analysts in reducing information asymmetry. Consistent with these concerns, Lin and McNichols (1998) and Michaely and Womack (1999) find that conflicts of interest, proxied by underwriting affiliation, adversely affect the informativeness of analysts' earnings forecasts and stock recommendations.

Some argue that analyst coverage can even increase information asymmetry among investors. For example, Zhang (2001) argues that "private information production … has the effect of widening the information gap between informed and uninformed investors and increasing the firm's cost of capital (p. 363)."

The above discussion indicates the importance of directly investigating the impact of analyst coverage on the cost of raising equity capital. For this purpose, we choose the SEO underpricing setting. As discussed in detail later in the hypothesis development section, the main argument underlying the impact of analyst coverage on SEO underpricing is that investors' divergence of opinions decreases with analyst coverage. Using abnormal trading volume around SEO announcement dates as proxy for divergence of opinions among investors, we substantiate the negative association between

analyst coverage and divergence of opinions. The analyses are discussed at the end of Section 4. However, it is possible that some inherent firm characteristics (e.g., firm size, information environment characteristics) drive *both* analyst coverage and divergence of opinions (and thus SEO underpricing). That is, we face an omitted correlated variable problem. We attempt to address this problem by (i) controlling for firm characteristics in the multiple regressions, (ii) examining the relation between change in analyst coverage and change in SEC underpricing between consecutive SEOs, and (iii) using residual analyst coverage from the regression of analyst coverage on firm size (to further control for the impact of firm size). Despite these attempts, we cannot completely rule out the possibility that some omitted firm characteristics drive our results, and we caution readers to keep this in mind when interpreting the results.

Advantages of analyzing SEO underpricing

In the SEO underpricing setting, we can directly measure the cost of raising equity capital in this setting. SEOs are registered with the SEC under a red-herring (preliminary) prospectus. Once the registration statement has been filed with the SEC, the waiting period begins. During the waiting period, which typically lasts around 20 days, the underwriter solicits non-binding indications of interest from potential investors. The offer becomes effective when the firm files the final prospectus with the SEC. The final offer price is typically set after the stock market closes on the day prior to the offer date. Underpricing occurs if the offer price is lower than the closing market price on the day prior to the offer date. Because the offer price is typically lower than the closing price both before and after the offer, SEO underpricing reflects a cost of raising equity capital for the issuers (Altinkilic and Hansen 2003).

SEO underpricing can be substantial. Of all SEOs in the period 1984-2000, 31% were priced at the closing price on the day prior to the offer, and 63% were priced under. The economic significance of underpricing can be gauged by two measures: the magnitude of underpricing relative to gross spreads (the difference between the offer price and what the issuer receives) and the dollar amount of underpricing (percentage underpricing times proceeds). In our sample period, gross spreads are around

5% of total proceeds. In the 1980s, underpricing is about 15% of gross spreads; this number increases to over 60% in the 1990s. Similarly, the annual dollar amount of underpricing is less than $50 million in 1980s, but increases to over $500 million in mid 1990's, and reaches $1.8 billion in 2000.

Since SEO underpricing is a direct measure of the cost of raising equity capital and can be accurately measured,[4] it is preferred to indirect measures, such as the bid-ask spread, or other estimates, such as the discount rate estimated from market values and analysts' earnings forecasts based on certain valuation models. These indirect measures or estimates are subject to various limitations. For example, Callahan et al. (1997) suggests that information conveyed from *discrete* bid-ask spread is limited. Likewise, estimated discount rates are noisy: "Not only is the estimation procedure based on assumptions about a valuation model of relevance, it also relies crucially on the quality of the inputs of the valuation model (Joos 2000, p. 133)."[5]

In addition, SEO underpricing has methodological advantages over alternative settings that can be used to investigate the impact of analyst coverage on the cost of capital. First, since SEO underpricing is measured over a short window (one day) and after analyst coverage is measured, it is less likely to be subject to endogeneity problems than, say, analyzing firm valuation.[6] Analyzing firm valuation, as in Chung and Jo (1996), can be problematic because prior research shows that analysts tend to follow large firms to attract more trade commissions (e.g., Bhushan 1989; O'Brien and Bhushan 1990; McNichols and O'Brien 1997; Hayes 1998; Barth et al. 2001). Second, analyzing SEO underpricing is not subject to confounding events as new information regarding a SEO is incorporated into stock prices at the

[4] Note that SEO underpricing is only one component of cost of raising capital in the SEO setting. Other components are related to underwriting fees and price changes around SEO. Examining the impact of analyst coverage on those components is left for future research.

[5] Gebhardt, Lee, and Swaminathan (2001, GLS) use a residual income valuation model to estimate the discount rate and examine its relation with analyst coverage and forecast dispersion, among other factors. Although they find consistent results in their univariate analyses, they do not include analyst coverage in their multivariate analyses and they find inconsistent results for forecast dispersion. This paper complements GLS by using a more direct measure of the cost of raising equity capital and by studying other attributes of analyst coverage, such as superior access to information and superior ability.

[6] One might be concerned that growing firms attract analyst coverage and are more likely to have SEOs, potentially causing an endogeneity problem. However, there is no theoretical argument or empirical evidence linking past growth with SEO underpricing. When we explicitly control for growth, we find that (i) our results are not affected and (ii) growth is not associated with underpricing.

announcement date of the SEO. In contrast, a positive market impact of initiation of analyst coverage, as found in Branson et al. (1998) and Bradley et al. (2003), does not necessarily imply a reduction in the cost of capital because initiation of analyst coverage is almost always associated with favorable stock recommendations (Bradley et al. 2003).

SEO underpricing and short-selling constraints

An alternative view of SEO underpricing is that it arises from short-selling constraints. When there are short-selling constraints, the stock may be overpriced prior to the SEO because optimistic investors' valuations are reflected, but pessimists' valuations are not (Miller 1977). Thus, SEO underpricing potentially reflects an adjustment of prior overpricing, rather than a higher cost of issuing equity capital.

For this argument to explain SEO underpricing, underwriters must adjust for overpricing when they set offer prices. However, they may not have the ability to do so because individual investors' valuations, and thus the extent of overpricing, are unknown. Furthermore, underwriters may not have incentives to correct overpricing because they benefit from a higher offer price and it is a common practice to set the offer price based on the observed stock price prior to the offer.[7]

Moreover, Miller's argument suggests a positive price reaction to SEO announcements if uncertainty increases due to the SEO and optimistic investors bid up the stock price. However, prior research (e.g., Asquith and Mullins 1986) finds that stock prices generally decrease around SEO announcements. Thus, it seems that, even if optimistic investors tend to drive up stock prices, this behavior has little impact in the SEO setting. Furthermore, market prices on average are not lower after SEOs when there are fewer short-selling constraints. In our sample, the return from the closing price before SEO to the closing price after SEO has a mean of -0.05% and a median of 0.00%. Neither is significantly different from zero at the 0.10 level. This evidence is inconsistent with the argument that

[7] Kieschnick et al. (2003) argue that legal liability can motivate the underwriters of IPOs to set offer prices comparable to industry peers. In the SEO setting, however, such litigation concern is minimal because the SEO firm is well established and it is reasonable to set the offer price based on the prevailing stock price.

optimistic investors bid up the stock price prior to the offer and the underwriter then adjusts the stock price downward when setting the offer price.

Lastly, the role of short-selling in the SEO setting appears to be different from that under Miller's argument – moving stock prices to their fundamental values and reducing underpricing. In the SEO setting, short-selling has been argued to increase price volatility and SEO underpricing (Gerard and Nanda 1993; Safieddine and Wilhelm 1996). This concern motivated the SEC to impose Rule 10b-21 in order to curb manipulative short-selling before SEOs.

Overall, the above discussion suggests that SEO underpricing is unlikely to arise from short-selling constraints. To further ensure that mispricing does not affect our results, we explicitly control for mispricing proxies in sensitivity tests discussed in Section 6.

3. Hypothesis development

The development of our main hypotheses proceeds in three steps. First, we review causes of SEO underpricing. There are several theoretical studies using information asymmetry among investors to explain underpricing of equity issues. For example, Rock (1986) argues that underpricing is necessary to attract uninformed investors to the new issue market. The particular study that focuses on explaining SEO underpricing is Parsons and Raviv (1985), which we discuss in detail below. Second, we discuss the effects of analyst coverage on underpricing. Finally, we introduce additional hypotheses related to attributes of analyst coverage.

SEO underpricing

Parsons and Raviv's basic argument for SEO underpricing is that, because of variation in investors' valuations, investors require a discount from the market price for SEO shares because they may not be able to purchase their full demand due to potential oversubscription. We elaborate below.

A SEO process has two stages: the announcement stage when the company announces its intention to issue a SEO, and the offer stage when the underwriter hired by the company selects the offer price and allocates shares. In the offer stage, the underwriter will offer shares at an initial offer

price, and investors requesting to purchase at the initial price are allocated their full demand, except in cases of oversubscription. In cases of oversubscription, investors are allocated a prorated fraction of their full demand, and in cases of undersubscription, the underwriter lowers the offer price and investors waiting to purchase at a lower price are allocated their portion of the remaining securities. The underwriter's objective is to choose offer prices that maximize the proceeds from the offering. The underwriter's problem is complicated by investors having differential valuations of the company. Parsons and Raviv assume that there are two types of investors: investors with a high valuation and investors with a low valuation. Valuations are only known to the investor, and the key question for the underwriter is how to set the initial offer price.

On one hand, given the allocation rule, the underwriter has to choose an initial offer price low enough to encourage high valuation investors to purchase at the initial offer price, rather than attempting to purchase at a subsequently lowered price. On the other hand, the high valuation investors recognize that they can successfully purchase at a lower price only in the case of undersubscription at the initial offer price. That is, they may not be able to purchase if they wait for the lowered price. The underwriter uses this threat to charge a relatively high initial offer price, which extracts some of the surplus from high valuation investors. Of course, without knowledge of investors' valuations, the underwriter cannot set the initial offer price high enough to extract the entire surplus. In equilibrium, due to this tradeoff, the initial offer price is a weighted average of the low and high valuations.

Instead of buying new shares, high valuation investors can purchase shares in the open market before the offer. While high valuation investors might not be able to have their full demand for new shares fulfilled because of the possibility of oversubscription, they can purchase shares with certainty in the market of old securities. As a result, the initial offer price is lower than the price for old securities, so that high valuation investors are indifferent between purchasing old shares with certainty and purchasing new shares with a probability of less than one. That is, underpricing occurs.

Information asymmetry, analyst coverage, and SEO underpricing

While differences across investor valuations is a necessary condition for the existence of underpricing in Parsons and Raviv's (1985) model, the level of the difference positively affects the level of underpricing. The intuition is as follows. If the divergence in investors' valuations is high, the incentives for high valuation investors to wait for the lowered price are stronger at a given offer price. In order to attract high valuation investors at the initial offer price, the underwriter has to lower the initial offer price more relative to the high valuation. A relatively lower initial offer price boosts the demand from high valuation investors for the new issues and accordingly, the probability of oversubscription is higher. Thus high valuation investors are willing to pay more, relative to the initial offer price, to purchase a share with certainty from the open market of old securities. That is, the amount of underpricing is larger.

Underpricing is also affected by the number of potential investors in the firm. As the number of potential investors interested in new shares increases, high valuation investors are less willing to wait for the lowered price, and thus the underwriter is able to increase the initial offer price and still attract enough interest from high valuation investors. Hence, the amount of underpricing is negatively related to the size of the potential investor base.

In summary, SEO underpricing increases with information asymmetry among investors, including differences in investors' valuations and lack of investor interest. In extreme cases when there are no differences in investors' valuations or when there are an infinite number of potential investors, SEO underpricing will not occur at all.

If financial analysts fulfill their role as information intermediaries in the capital markets, they collect and disseminate information to capital market participants. More analyst coverage increases analysts' collective ability to uncover and/or disseminate information, and as a result, increases the quality of public information (i.e., the precision of public information with respect to firm value).[8] It

[8] Analysts' reports may not be immediately available to all investors, but the information therein will be quickly reflected in stock prices in an efficient stock market. That is, investors can have access to analyst' information either directly (immediate access or with a lag) or indirectly (through observing stock prices).

can be shown that more precise public information reduces the variation of investors' valuations. As generally done in the literature, an individual investor's expectation is assumed to be a weighted average of public information and private information, with the corresponding precision (inverse of variance) as weights. When public information becomes more precise, the weight on public information is higher and the weight on private information is lower. As a result, individual investors' valuations are more clustered around public information, reducing the dispersion among investors.[9] Put another way, as analysts bring more information to the market, the overlap of investors' information sets becomes larger. This greater overlap of information reduces differences in investors' valuations.

In summary, as more analysts cover a firm, pubic information becomes more informative and divergence in investor valuations is reduced. Using abnormal trading volume on the announcement date to proxy for divergence in investors' valuations, we confirm that analyst coverage reduces divergence in investors' valuations. This analysis is presented in section 4.

At the same time, more analyst coverage increases the investor base. Indeed, Merton (1987) argues that financial analysts can increase investors' awareness of and knowledge about a firm and that both effects should reduce information asymmetry among investors. Based on these discussions, we predict that:

H1: SEO underpricing decreases with analyst coverage.

Effect of attributes of analysts coverage on SEO underpricing

As information intermediaries, analysts with better access to company information or higher ability should reduce information asymmetry among investors more than would less informed and less qualified analysts, *ceteris paribus*. Under the 'superior access' hypothesis, research reports by analysts associated with the lead underwriter are more informative because these analysts have better access to company information and they gain valuable insights from the due diligence and selling processes

[9] This is formally modeled by Barron et al. (1998) (Proposition 3) and Gu (2005) (Proposition 2). While these two papers examine the impact of public information quality on divergence in individual analysts' forecasts, the same models apply to divergence in individual investors' valuations.

(Bradley et al. 2003). Under the 'superior ability' hypothesis, research from analysts with higher ability should be more informative. We use two proxies for high ability analysts. First, we use *Institutional Investor* All-American team analysts, i.e., analysts that institutional investors perceive to have high ability. Prior research finds that All-American team analysts' earnings forecasts are more accurate and their stock recommendations are more profitable (Stickel 1992). Second, we use experienced analysts. Hong and Kubik (2003) find that promotion and job termination are correlated with the quality of analysts' research output, such as earnings forecast accuracy, and that financial analysts with low ability tend to be demoted and leave the profession. Thus, experienced analysts are more likely to have high ability. Consistent with this argument, Clement (1999) finds that more experienced analysts have more accurate earnings forecasts.

If analysts' forecasts are more dispersed, analysts as a group are less effective in disseminating information and reducing the divergence in investors' opinions. As a result, firms with lower analyst forecast dispersion arguably have lower information asymmetry among investors, holding analyst coverage constant. Thus, we predict that these firms should have incrementally lower underpricing.

In sum, we hypothesize that analysts with superior access to information (H2), analysts with superior ability (H3), and analysts with less divergent forecasts (H4) are associated with incrementally lower SEO underpricing:

H2: SEO underpricing decreases incrementally with coverage by analysts who have better access to company information, i.e., those associated with the lead underwriter.

H3: SEO underpricing decreases incrementally with coverage by analysts who have superior ability, i.e., *Institutional Investor* All-American analysts or experienced analysts.

H4: SEO underpricing increases incrementally with earnings forecast dispersion.

4. Sample and data

The initial sample includes 8,007 SEOs of common shares in the period 1981-2000 collected from the Securities Data Company's (SDC) Global New Issues database. As in prior research on SEO underpricing, we impose the following restrictions on our sample.

1) The issues must include some primary offerings. In primary offerings, a firm issues new shares and receives the proceeds, and thus underpricing reflects a cost of raising capital to the firm.[10]
2) The issues are offered by firms listed on NYSE or NASDAQ.[11]
3) The issues should have data from CRSP in order to calculate our measure of underpricing.
4) The offer price should be between $3 and $400 to ensure that small or illiquid firms do not drive our results.
5) The issue date should be in 1984 or later so that we can reliably estimate analyst coverage using the I/B/E/S Detailed Earnings Forecasts file.[12]

These restrictions reduce the sample size by 1069, 1110, 163, 84, and 800, respectively. We also delete 15 observations with extreme underpricing, i.e., outside the range [-0.50, 0.50], because prior research (e.g., Corwin 2003) notes that observations of extreme underpricing are likely due to data errors. As a result, the final sample includes 4,766 SEO issues in the period 1984-2000.[13]

The two key variables for this paper are analyst coverage and SEO underpricing. Analyst coverage is measured as the number of unique analysts issuing earnings forecasts, based on the I/B/E/S Detailed Earnings Forecasts file, in the year prior to the offer. We also use alternative measures of analyst coverage, as discussed in Section 6. As in Hong et al. (2000), if no earnings forecast is reported by I/B/E/S for a firm, its analyst coverage is set to be zero. As in prior research, underpricing is defined as negative one times the return from the closing price on the day prior to the offer date to the offer price. Prior studies (e.g., Safieddine and Wilhelm 1996) observe that the offer date reported in SDC is incorrect for offers that took place after the close of trading. Following prior research, we use a volume-based adjustment method to correct for errors in the offer date. If trading volume on the day after the SDC offer date is more than twice that on the SDC offer date and more than twice the average daily

[10] The other type of offerings is secondary offerings, in which a group of current shareholders sell their shares to other investors and the firm does not receive proceeds. Analyzing SEOs with 100% primary offerings (77% of the sample) or including a ratio of primary offerings to total offerings as a control variable in the analyses does not affect our results reported below.
[11] To be consistent with prior research, we exclude SEOs of AMEX-listed firms (7% of the original sample) and those of firms listed on regional exchanges (4%), although including them does not affect our results.
[12] Since the I/B/E/S Detailed Earnings Forecasts file started coverage in January 1983 and we measure analyst coverage in the year prior to the offer, our sample of SEOs starts in 1984. Although the I/B/E/S Summary file started coverage in January 1979, the coverage prior to 1983 is limited and has little variation (Hong et al. 2000).
[13] Prior research finds that SEOs by utilities have lower underpricing. About 8% (i.e., 388) of our sample SEOs were issued by utilities. Excluding these observations or including a dummy for utilities in the regressions does not affect our results reported below.

trading volume over the 250 trading days prior to the SDC offer date, then the day following the SDC offer date is used as the 'correct' offer date. This correction applies to 36.1% of the sample. Altinkilic and Hansen (2003) and Corwin (2003) find that this approach is accurate for at least 98% of all previously misclassified offers.

Table 1 presents descriptive statistics on the sample SEOs and analyst coverage. Panel A presents characteristics of these issues. The average offer price is $25 and average proceeds are $85 million. The gross spread, representing the difference between the offer price and what the issuer receives, is on average 5.12% of proceeds. Mean underpricing is 2.38%. All of these descriptive statistics are similar to those reported in prior research. Panel B presents the number of SEOs and the mean underpricing in each year. The number of SEOs is generally higher subsequent to 1990, as is the amount of underpricing. As seen from Figure 1, mean underpricing gradually increases from the 1980s to the 1990s. Regressing the mean underpricing on a year variable yields a coefficient of 0.16%, significant at the 0.001 level using a two-tailed t-test. Figure 1 also plots the mean underpricing over the sample period for NYSE firms and for NASDAQ firms. Consistent with prior research, underpricing is higher for NASDAQ firms than for NYSE firms in all years except 1988.

Panel C of Table 1 reports the level of analyst coverage across SEOs. Approximately one-fourth of the sample (1,186) has no analyst coverage.[14] Another one-fourth of the sample has analyst coverage from 1 to 3, another one-fourth from 4 to 7, and the remainder has 8 or more analysts. We use these four almost equal-sized groups in the univariate analysis. Note that analyst coverage for these SEO firms, as well as high ability analyst coverage discussed below, is comparable to non-SEO firms with similar size. This suggests that inferences from this paper are generalizable to a broader sample.

Analyst coverage and divergence of opinions

[14] It is possible that I/B/E/S failed to include some forecasts. This potential measurement error could bias against finding a difference between firms with zero analyst coverage and firms with positive analyst coverage. Given that I/B/E/S has comprehensive coverage, the misclassification problem is unlikely to be severe. We discuss the implication of this potential measurement error in detail when presenting results.

Before reporting our tests of the relation between analyst coverage and SEO underpricing, we first test whether analyst coverage reduces divergence of opinions among investors, a key argument underlying our hypotheses. While results supportive of our hypotheses are consistent with analyst coverage reducing divergence of opinions among investors, a direct test confirming this argument strengthens our inferences.

One commonly used proxy for divergence in investors' valuations in the extant literature is abnormal trading volume around public announcements (Kim and Verrecchia 1991). The intuition is that public announcements induce non-liquidity traders with divergent valuations to trade. The public announcement in our context is the SEO announcement. Thus, we examine the impact of analyst coverage on abnormal trading volume around SEO announcements, i.e., the larger the abnormal trading volume, the larger the presumed divergence of opinions among investors with respect to the impact of SEOs on firm value. If analyst coverage can reduce divergence of opinions, we expect a negative relation between analyst coverage and abnormal trading volume. To control for liquidity trading, we measure abnormal trading volume as share turnover around a SEO announcement standardized by the average turnover in the control period (i.e., the two-months before SEO announcement). Note that we analyze abnormal trading volume around the SEO announcement date instead of around the offer date because (i) the newly offered shares of the SEO will confound trading volume around the offer date, and (ii) the major news release related to the SEO is at the announcement.

Prior research on trading volume (e.g., Bamber et al. 1999) suggests that the following control variables should be included in the model: firm size, NYSE dummy, the absolute value of stock returns on the announcement day, relative offer size, market trading volume, and year dummies. Firm size and NYSE dummy are included to control for the quality of prior information, stock returns are included to control for information events that might affect the trading of particular firms, relative offer size is included to control for the impact of the SEO size on trading volume, and market trading volume and year dummies are included to control for market-wide portfolio rebalancing and year fixed effects. Since we measure abnormal trading volume on the SEO announcement date, uncertainty about SEO

completion can also lead to investors' divergence of opinions and potentially confound the results on analyst coverage. Accordingly, we control for sales growth and stock returns in the year prior to the SEO announcement date, which, along with firm size, have been identified prior studies (e.g., Clarke et al. 2001) as important determinants of whether the SEO will be eventually completed at the time of SEO announcement.

We regress the abnormal trading volume measure on analyst coverage and these control variables, and the results are reported in Table 2. We find that analyst coverage is negatively associated with abnormal trading volume around SEO announcements, consistent with analyst coverage reducing divergence in investors' valuations. Thus, we confirm the argument that analyst coverage reduces divergence in investors' valuations. This result, along with analyst coverage increasing the investor base, suggests that analyst coverage reduces information asymmetry among investors by increasing both investors' knowledge about and awareness of a firm. Based on results in Parsons and Raviv (1985), we predict that analyst coverage reduces SEO underpricing, as stated in Hypothesis H1. Below, we test this hypothesis.

5. Empirical results

Univariate analysis of the relation between analyst coverage and SEO underpricing

Figure 2 plots the average underpricing of SEOs across levels of analyst coverage. Consistent with H1, underpricing decreases with analyst coverage, from 4.05% (3.16%) for firms covered by one (zero) analyst to 0.00% for firms covered by 31 or more analysts.

Two interesting observations emerge from this figure. First, the average underpricing for firms without analyst coverage is not higher than underpricing for firms with analyst coverage of one and is comparable to firms with analyst coverage of two. One potential reason is that I/B/E/S may not include earnings forecasts for some firms, as discussed earlier. In one sensitivity analysis, we replicate our analyses after excluding observations with zero analyst coverage and we find similar results (not tabulated). Second, the relation between analyst coverage and underpricing appears to be nonlinear –

underpricing decreases with analyst coverage, but at a decreasing rate. This nonlinear relation likely results from the decreasing marginal benefit of analyst coverage. To control for this nonlinear relation, we use a log transformation of analyst coverage in multiple regressions below. Alternative approaches, such as including squared analyst coverage in the regressions, yield similar inferences.

To test whether the observed decrease in underpricing is statistically significant, we split the sample into four almost equal-sized groups based on the level of analyst coverage as shown in Panel C of Table 1. Table 3 reports the mean underpricing for each group and t-statistics for the difference between groups. The untabulated results based on median comparisons are similar. Overall, the results in Table 2 suggest that underpricing for firms with low analyst coverage is significantly higher than for firms with high analyst coverage. The mean underpricing for Group 2 (3.31%) is higher than that for Group 3 (2.05%), which is in turn higher than that for Group 4 (1.04%). All of these differences are significant at the 0.001 level. As suggested in Figure 2, firms with zero analyst coverage (Group 1) have similar underpricing to Group 2, but significantly higher underpricing than Groups 3 and 4.

Multivariate analysis of the relation between analyst coverage and SEO underpricing

In this section, we use multiple regression analysis to test whether the impact of analyst coverage on underpricing holds after controlling for other variables affecting SEO underpricing.

Prior research on SEO underpricing uses firm size to proxy for information asymmetry among investors and finds mixed results (Corwin 2003). Beatty and Ritter (1986) argue that underpricing is larger for firms with high uncertainty. Consistent with this argument, Corwin (2003) finds that underpricing increases with return volatility.

Scholes (1972) argues that, if the aggregate demand curve for a firm's shares is downward sloping, then the increase in supply (i.e., new shares) will drive down the price. Any permanent decrease in price due to an increased supply of shares should occur on the announcement date of the SEO, not on the offer date. However, underpricing may occur if there is temporary price pressure on

the offer date. Corwin (2003) uses the offer size relative to outstanding shares to proxy for price pressure and finds that underpricing is higher for firms with relatively large offer size.

Gerard and Nanda (1993) argue that investors may manipulate prices by selling in the pre-offer market in order to depress the offer price. Manipulative trading, on one hand, can exacerbate the uncertainty problem and positively affect underpricing. On the other hand, it can decrease the market price and negatively affect underpricing (as measured) if underwriters take into account the temporary drop in prices. Furthermore, the manipulative trading effect should be reduced after SEC Rule 10b-21, which intends to address the manipulative trading problem by banning short-selling before offers. Corwin (2003) finds that underpricing is positively correlated with negative pre-offer returns, but the results on the effect of Rule 10b-21 are mixed (Safieddine and Wilhelm 1996).

Another potential source of underpricing is the practice of rounding the offer price. Underwriters tend to round the closing prices down to the nearest integer value or to a value with an increment of $0.25 when setting the offer price (Mola and Loughran 2004). Thus, underpricing should be larger for firms with closing prices that are not at a $0.25 increment, and for firms with small prices (as the same dollar magnitude of underpricing is relatively large in percentage terms for firms with small prices).

Based on the above discussion, we include the following control variables: firm size, return volatility, relative offer size, pre-offer return, a Rule 10b-21 dummy, price level, a tick size dummy, and a NYSE dummy. Negative and positive pre-offer returns are included separately to better control for the potential manipulative trading effect. As in Corwin (2003), we also include the average IPO underpricing in the same month as the SEO to control for additional common factors affecting both IPO and SEO underpricing. Figure 1 shows an increasing trend in SEO underpricing, potentially due to changes in sample composition and changes in underwriter composition, e.g., more issues are underwritten by large underwriters for firms with high uncertainty (Mola and Loughran 2004).

Accordingly, we include year dummies to control for this trend. Measurement of all independent variables follows prior research and is summarized in the Appendix.[15]

Panel A of Table 4 reports descriptive statistics on the independent variables used in the multiple regression analyses. The distribution of analyst coverage is skewed with a mean of about 6 analysts and a median of 3. Our proxy for firm size is market value of equity, which averages $994 million; mean return volatility is 0.033; average relative offer size is 22.1% of the pre-offer outstanding shares; mean closing price before the offer is $26; 82.4% of the issues are offered after Rule 10b-21 became effective (on August 25, 1988); firms listed on the NYSE issue 41.6% of SEOs; and compared with SEOs, IPOs have much higher underpricing, 21.4% on average.

Panel B of Table 4 reports the Pearson (Spearman) correlation matrix in the lower (upper) triangle. The correlations between underpricing and other variables suggest that, as predicted, underpricing is lower for firms with high analyst coverage, for large firms, for firms with low return volatility, for firms with relatively small issues, for firms with low magnitude of pre-offer returns, for firms with high market prices, for SEOs offered in months with low IPO underpricing, and for firms listed on the NYSE. While the correlations between some independent variables are high, multicollinearity is not a serious concern as the condition index is under 30 for all our regression specifications (Belsley et al. 1980). We include all variables in the regressions to reduce concern about omitted correlated variables.

Table 5 reports results from the regressions of SEO underpricing on analyst coverage and control variables. Model 1 includes analyst coverage only. The results confirm those reported in Figure 2 and Table 3. The relation between analyst coverage and SEO underpricing is negative and significant at the 0.001 level. Compared with firms without analyst coverage, firms covered by three analysts (the

[15] Corwin (2003) also investigates whether underpricing is affected by the transaction cost of buying shares from the open market and the practice of setting the offer price at the closing bid quote on the day prior to the offer. Testing these arguments requires intraday quote data, which is available only after 1993 and only for firms with TAQ data, and thus significantly reduces our sample size. Additionally, Corwin shows that the results on other variables are similar in the restricted sample. Thus, it is unlikely that our results on analyst coverage would change if we add these controls.

median analyst coverage in the sample) have a 1.19% lower underpricing and firms covered by eight analysts (the third quartile of analyst coverage) have a 1.89% lower underpricing after controlling for the trend in underpricing. These represent a relative decrease of 38% and 60%, respectively.

Model 2 includes analyst coverage and the control variables. The coefficient on analyst coverage remains significantly negative. While the magnitude is smaller than in Model 1, it is still economically significant. Compared with firms without analyst coverage, firms covered by three analysts have a 0.55% lower underpricing and firms covered by eight analysts have a 0.88% lower underpricing, a relative decrease of 17% and 28%, respectively. The results for the control variables are similar to those reported in prior research. While the impact of return volatility is positive, the impact of firm size is insignificant after controlling for other control variables, potentially due to the high correlation between firm size and other control variables such as relative offer size and price. Underpricing is higher for relatively large offers, consistent with higher temporary price pressure on these firms. Both pre-offer return variables have significant positive coefficients. While the impact of tick size (tick<1/4) is insignificant, the impact of price on underpricing is negative, consistent with known underwriter pricing practices. The effects of Rule 10b-21 dummy, NYSE dummy, and IPO underpricing are each insignificant.

In sum, the multiple regression analyses confirm results reported in the univariate analyses and are consistent with our first hypothesis that SEO underpricing decreases with analyst coverage. Compared with firms without analyst coverage, firms covered by three (eight) analysts have a lower level of underpricing, from 0.55% to 1.19% (from 0.88% to 1.89%), depending on the model specification.[16]

Attributes of analyst coverage and SEO underpricing

[16] One may argue that analyst coverage proxies for issuers' bargaining power over brokerage houses in setting the offer price because high analyst coverage firms tend to have high growth opportunities and thus great potential of future underwriting business. This is unlikely to be the reason for the observed results for several reasons. First, as discussed before, growth opportunities do not affect underpricing. Second, we control for other variables that are more likely to proxy for issuers' bargaining power, such as firm size and the relative size of the offering.

In this section, we test the hypotheses that analysts with superior access to information (H2), superior ability (H3), or lower forecast dispersion (H4) are associated with incrementally lower SEO underpricing. To capture the effect of analysts with superior access, we define a dummy variable – lead underwriter coverage – that equals one if an analyst from the lead underwriter covers the firm in the year prior to the offer. To capture the effect of analysts with superior ability, we define a dummy variable – high ability analyst coverage – that equals one if at least two analysts following the firm in the year prior to the SEO are *Institutional Investor* All-American team analysts or experienced analysts.[17] An analyst is considered to be an experienced analyst in a given year if his or her general experience is in the top quartile of analysts' general experience in that year. An analyst's general experience is measured as the number of quarters between the first earnings forecast issued by the analyst (for any firm) and the offer date of the SEO. We rely on I/B/E/S, which tracks individual analysts even if they change brokerage houses, to identify the first earnings forecast.[18]

Forecast dispersion is defined as the standard deviation of one-year-ahead earnings forecasts in the month before SEO, deflated by the closing price prior to the offer. Because earnings forecasts reported in I/B/E/S are subject to rounding errors due to stock splits (as documented in Diether et al. 2002), we use unadjusted earnings forecasts obtained directly from I/B/E/S.

Panel A of Table 6 reports descriptive statistics on these three variables. Because lead underwriter coverage and high ability coverage are not well-defined for observations with zero analyst coverage, the related analyses are based on the 3,580 SEOs with positive analyst coverage. Among SEOs with positive analyst coverage, 67.3% have lead underwriter coverage and 57.6% have high

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Third, as discussed below, we find that coverage by analysts affiliated with lead underwriters, which is unlikely to increase issuers' bargaining power, negatively affects SEO underpricing.

[17] This cutoff point is chosen such that about half of the SEOs with positive analyst coverage have high ability analyst coverage. Using alternative cutoff points (one or three) yields similar results (not tabulated). 80.2% (40.1%) of the SEOs with positive analyst coverage have at least one (three) high ability analyst following.

[18] We do not restrict the first earnings forecast to be for a specific firm or industry because we believe that general experience helps investors form perceptions of an analyst's ability. Because I/B/E/S detailed forecast data are only available from 1983 onward, our experience measure might have low variation in early sample years. This biases against finding results on analyst experience. Using relative ranks within a given year mitigates this bias.

ability analyst coverage.[19] To ensure the validity of estimated forecast dispersion, forecast dispersion is only calculated for SEOs with at least three analysts following, a total of 2,627 SEOs.[20] The mean forecast dispersion is 0.0052. Because the sample with forecast dispersion is different from the sample with lead underwriter coverage and high ability analyst coverage, we test H4 separately from H2 and H3.

Panel B of Table 6 reports regression results for tests of H2 and H3. Since we are testing the incremental effects of superior access and superior ability, we include analyst coverage in all specifications. We also include interactions between analyst coverage and the dummies for lead underwriter coverage and high ability analyst coverage to control for any differential effect of analyst coverage (number of analysts following) on SEO underpricing. Thus, the coefficient on analyst coverage reflects the impact of analyst coverage on SEO underpricing for SEOs *without* coverage from analysts with superior access or ability.

The first two models in Table 6 test H2 and H3 separately. Consistent with the hypotheses, lead underwriter coverage and high ability analyst coverage each significantly reduce SEO underpricing, holding total analyst coverage constant. Coverage by analysts from the lead underwriter reduces SEO underpricing by 2.00% (Model 1), and coverage by high ability analysts reduces underpricing by 2.02% (Model 2). The coefficient on analyst coverage is significantly negative as before. The coefficients on the interactions between analyst coverage and lead underwriter coverage or high ability analyst coverage dummies are significantly positive, consistent with the marginal benefit of additional analyst coverage being smaller for SEOs that already have coverage from analysts with superior access or ability.

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[19] Lead underwriters that do not cover the firm prior to the SEO generally initiate coverage right after the SEO: more than 90% of SEOs have lead underwriter coverage after the SEO.

[20] We also replicate the analyses using an alternative measure of dispersion: absolute value of the maximum forecast minus the minimum forecast scaled by absolute value of the median forecast, for the sample of SEOs with more than two analysts following. The results (not tabulated) are similar to those reported.

Model 3 includes lead underwriter coverage and high ability analyst coverage in the same regression. The results are similar to those from Model 1 or 2. This finding suggests that both superior access and superior ability can further reduce underpricing, holding total analyst coverage constant. Model 4 further controls for other determinants of underpricing and the results are essentially the same as those from Model 3. The results on control variables are similar to those reported in Table 4 and thus are not tabulated.[21]

Panel C of Table 6 reports the results for tests of H4. Since this sub-sample (with at least three analysts following) only represents 55% of the full sample, we first replicate the main analyses using this sub-sample (Model 1 and Model 2). The results on analyst coverage are weaker than those reported in Table 5, mainly due to a smaller sample size and a sample composed of SEOs with a relatively high level of analyst coverage. The marginal impact of analyst coverage on SEO underpricing is especially small for SEOs with very high level of analyst coverage, as can be seen from Figure 2. When we exclude SEOs with more than 20 (8) analysts following (about 7% (23%) of the full sample), the coefficient on analyst coverage in Model 2 becomes significant at the 5% (1%) level. This indicates that for firms already with sufficiently high level of analyst coverage, the benefit of an additional analyst is likely small.

Model 3 and Model 4 include both analyst coverage and forecast dispersion. After controlling for analyst coverage, forecast dispersion has a significant positive association with SEO underpricing. A decrease in forecast dispersion of one standard deviation (0.0082) in Model 3 is associated with a decrease in SEO underpricing of 0.43% (= 0.5221 × 0.0082). The results hold after controlling for other determinants of SEO underpricing, as indicated in Model 4.

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[21] Note that the results on analyst ability complement Mola and Loughran's (ML, 2004) finding that lead underwriters with strong research teams (proxied by the number of *Institutional Investor* All-American analysts) extract rents from SEO firms in the form of higher SEO underpricing. While we focus on the impact of *all* high-ability analysts on SEO underpricing, ML focus on the impact of only those high ability analysts who work for lead underwriters. When we add a dummy variable to indicate coverage by high ability analysts affiliated with lead underwriters, we find that its coefficient is significantly positive and the coefficients on other variables remain similar. This suggests that although superior ability can reduce SEO underpricing, its marginal impact is smaller if superior ability analysts are employed by lead underwriters.

In summary, our results on H2 suggest that coverage by analysts working for the lead underwriter can further lower SEO underpricing, consistent with the superior access hypothesis. Superior access to information possessed by analysts who work for lead underwriters seems to outweigh their potential conflicts of interest in this context. Consistent with H3, our results suggest that coverage by analysts with superior ability (All-American or experienced analysts) further lowers SEO underpricing, and consistent with H4, firms with less divergent forecasts have incrementally lower SEO underpricing. Overall, these results suggest that, when analysts have superior access, superior ability, or greater consensus, their coverage is associated with a further decrease in cost of raising equity capital.

6. Additional analyses

The effect of analyst coverage on SEO underpricing conditional on firm size

If reducing information asymmetry among investors lowers the cost of raising capital, this effect should be smaller for firms that already have less information asymmetry. To the extent that large firms have less information asymmetry than small firms, analyst coverage has the potential to reduce SEO underpricing more for small firms than for large firms. We test this prediction by including an interaction variable between market value and analyst coverage in our regressions.

Panel A of Table 7 reports the results of two regression specifications. Model 1 includes analyst coverage, market value, and the interaction variable, and Model 2 adds other control variables. In both specifications, the main effect of analyst coverage continues to be significantly negative. The interaction variable has a significant positive coefficient, which is consistent with our prediction that the opportunity to reduce information asymmetry among investors, and thus the impact of analyst coverage on SEO underpricing, is smaller for large firms.

Firms with multiple SEOs

Our sample SEOs were issued by 3,131 unique firms: 2,162 firms issued only one SEO, 635 firms issued two SEOs, 170 issued three SEOs, and 164 issued four or more SEOs. Since the full sample includes multiple SEOs from the same firm, one might suspect that the error terms of the regressions are

subject to cross-sectional correlation. This concern is unlikely to affect our results as we already control for firm-specific characteristics identified by prior research that might affect SEO underpricing. However, to further address this concern, we run all analyses using only the first SEO by each firm (not tabulated) and find results similar to those reported above.

Since 969 firms have multiple SEOs, we also analyze whether the *change* in analyst coverage is negatively correlated with the *change* in underpricing for consecutive SEOs of the same firm. As shown in Figure 3, increased analyst coverage is generally associated with decreased underpricing, and decreased analyst coverage is generally associated with increased underpricing. The difference in the change in underpricing between the group with increased analyst coverage and the group with decreased analyst coverage is significant at the 0.03 level or better based on t-statistics or Wilcoxon Z-statistics. Further analyses (not tabulated) indicate that the effect is mainly driven by the change in lead underwriter coverage and high ability analyst coverage. It appears that firms with increased coverage by analysts with superior access to information or superior ability have lower underpricing in later SEOs.

Using residual analyst coverage to further assess the unique impact of analyst coverage

One concern with the reported results on analyst coverage is that the result might be driven by the determinants of analyst coverage, especially firm size. Prior research suggests that firm size, growth, price level, return volatility, and turnover, can affect analyst coverage (Bhushan 1989; O'Brien and Bhushan 1990; among others). Hong et al. (2000) find that firm size is the dominant determinant of analyst coverage and other factors do not substantially contribute to explaining the cross-sectional variation in analyst coverage beyond firm size. In the main analyses, we control for firm size (and other determinants of analyst coverage) and our results are robust. Here we report results from an alternative approach: analyzing the impact on underpricing of residual analyst coverage, i.e., residuals from the regressions of analyst coverage on firm size, as in Hong et al. This is a conservative approach in the

sense that residual analyst coverage only captures the unique effect of analyst coverage while the effect common to both firm size and analyst coverage is attributed to firm size.

Panel B of Table 7 presents the mean SEO underpricing for four equal-sized groups classified based on residual analyst coverage.[22] The mean underpricing is 3.01%, 2.92%, 2.10%, and 1.49% for these groups from low to high residual analyst coverage, respectively. The difference between the low coverage group (Group 1) and the high coverage group (Group 4) is significant at the 0.001 level.

Since the negative association between analyst coverage and underpricing might vary with firm size as discussed above, we split the sample into three equal-sized sub-samples based on market value, and report the mean underpricing for each intersection of size-based sub-samples and residual analyst coverage groups. Consistent with the negative relation between size and underpricing, small firms tend to have higher SEO underpricing than large firms. More important and consistent with our hypothesis, analyst coverage has a negative impact on SEO underpricing *within* each size-based sub-sample. The differences between groups 1 and 4 are 1.83%, 1.08%, and 1.12% for small, medium, and large firms, respectively. All these differences are significant at the 0.001 level.

In another effort to disentangle the impact of analyst coverage from that of firm size, we add the square of market value of equity to control for the potentially nonlinear relation between firm size and underpricing. Note that we already take logs of market value to control for potential nonlinearity. In this additional analysis (not tabulated), we find a significantly negative coefficient on market value and a significantly positive coefficient on squared market value, consistent with SEO underpricing decreasing with firm size at a decreasing rate. More important, the effect of analyst coverage on underpricing is robust; the coefficient on analyst coverage is almost the same as reported in Table 5. We also consider two alternative proxies for firm size (sales and total assets) and, again, the results (not tabulated) on analyst coverage are similar to those reported.

[22] Untabulated results indicate that there are no significant differences in market capitalization between different residual analyst coverage groups for the full sample or within any size-based sub-sample. This observation suggests that this approach successfully controls for the impact of firm size.

In sum, the above tests suggest that the documented relation between analyst coverage and SEO underpricing is unlikely to be driven by firm size.

Controlling for the potential impact of information asymmetry on analyst coverage

One potential concern with our inferences is that low information asymmetry among investors may attract analyst coverage, leading to the observed negative correlation between analyst coverage and SEO underpricing. As discussed earlier, in this paper's context, low information asymmetry refers to either low divergence in investors' knowledge or broad investor interest. Because these two dimensions have different implications for analyst coverage, we address them separately.

First, from a theoretical point of view, analysts tend to follow firms with high divergence in investors' valuations, because private information acquisition activities for these firms are more profitable (Bhushan 1989). That is, high divergence in investors' valuations *increases (rather than decreases)* analyst coverage. Extant research finds results consistent with this argument: analyst coverage is higher for firms with higher return volatility or more intangible assets (Bhushan 1989; Brennan and Hughes 1991; Barth et al. 2001). Thus, our evidence on the negative association between analyst coverage and SEO underpricing is unlikely to be driven by the influence of this dimension of information asymmetry on analyst coverage.[23]

Second, broad investor interest might attract analyst coverage, as there is high demand for analysts' research (O'Brien and Bhushan 1990). To address this possibility, we explicitly control for investor interest. In the analyses reported above, we already include some proxies for investor interest, such as firm size. Another potentially important proxy is institutional ownership. We explicitly test whether the results on analyst coverage hold after controlling for institutional ownership. We collect

[23] When a firm has a more forthcoming disclosure policy, presumably leading to lower information asymmetry among investors, the cost of following the firm is lower, and hence analyst coverage increases. While this cost argument might explain the results on analyst coverage, it does not explain the incremental impact of lead underwriter coverage and high ability analyst coverage on SEO underpricing. In a sensitivity test (not tabulated), we explicitly control for disclosure quality, using the number of management forecasts in the year prior to the SEO as a proxy. The results on analyst coverage hold and the coefficient on the disclosure quality proxy is marginally significantly negative.

institutional ownership data from CDA/Spectrum, and use institutional ownership at the beginning of the calendar quarter in which the SEO was issued in our analyses. Institutional ownership is available for 4,006 SEOs and averages 37.2%.

Results are reported in Panel C of Table 7. The first two columns (Model 1 and Model 2) replicate the analyses reported in Table 5. In this slightly smaller sample, the results on analyst coverage are similar to those reported in Table 5 for the full sample. Model 3 includes both analyst coverage and institutional ownership. The results on analyst coverage remain similar to those reported above. Consistent with its being a proxy for investor interest, institutional ownership has a significant negative coefficient. The results are robust to including control variables (Model 4).

An arguably better proxy for short-term investor interest is the ownership of institutional investors who actively trade. We use the approach described in Bushee (1998) to identify active institutional investors (called "transient" in Bushee 1998) who trade more frequently relative to other institutional investors. Similar to total institutional ownership, active institutional ownership is measured at the beginning of the calendar quarter in which the SEO was issued. Active institutional ownership has a mean of 10.9%. The results based on active institutional ownership are reported in the last two columns of Panel C of Table 7. Like total institutional ownership, active institutional ownership is negatively associated with SEO underpricing after controlling for analyst coverage (Model 5) and additional control variables (Model 6). The coefficient on analyst coverage remains significantly negative.

In additional analyses (not tabulated), we control for other proxies for investor interest: the number of institutional investors, the number of total shareholders, trading volume over the year prior to SEO, stock returns in the year prior to SEO, and whether the firm belongs to S&P 500. Not surprisingly, these proxies are highly correlated with firm size and institutional ownership. After controlling for these proxies, the negative coefficient on analyst coverage remains significant.

In sum, the negative relation between analyst coverage and SEO underpricing is robust to including proxies for investor interest. Note that our approach here is conservative in the sense that the impact of analyst coverage on SEO underpricing through its influence on investor interest is not

captured by the coefficient on analyst coverage. The coefficient only captures the impact of analyst coverage through reducing differences in investors' knowledge. Overall, although we cannot completely rule out the alternative explanation that low information asymmetry among investors attracts analyst coverage, the above discussions suggest that our results are more consistent with analyst coverage reducing information asymmetry among investors than with this alternative explanation.

Other sensitivity tests

We also conduct additional analyses to ensure that our results are robust to alternative measure of analyst coverage, to other factors potentially affecting SEO underpricing, and to different sample periods.

Alternative measures of analyst coverage

One potential limitation of our measure of analyst coverage is that it does not distinguish between analysts with sporadic forecasts from those with frequent forecasts. For example, an analyst who issues a single forecast early in the year might have little impact on the information environment of the firm before SEO issuance. To address this concern, we use two alternative approaches to measure analyst coverage. First, we use a shorter horizon to measure analyst coverage – the number of unique analysts who issue forecasts in the six months or three months, rather than one year, before the SEO issuance. A shorter horizon should better capture the impact of analyst research activity on information environment before SEO issuance. Second, we use the number of earnings forecasts issued in the year prior to SEO issuance to capture analysts' research effort. The results (not tabulated) based on these alternative measures are similar to those reported.

Lead underwriter reputation

Prior research (e.g., Beatty and Ritter 1986) suggests that lead underwriter reputation might affect underpricing. Underwriters with a better reputation are better at placing shares, which tends to reduce underpricing. Including a lead underwriter reputation score (collected from Jay Ritter's homepage) in

the regressions does not affect the results related to analyst coverage, and the reputation score has a negative association with underpricing, consistent with prior research.

The impact of potential mispricing

If a stock is overvalued, managers are more likely to issue new shares (Myers and Majlof 1984, among others) and, at the same time, analysts may be more likely to cover such stock (Jegadeesh et al. 2004). To ensure the robustness of our inferences, we control for potential mispricing by including proxies for return momentum and glamour stock characteristics. Specifically, we include stock returns in the year before SEO and P/B (P/E) measured at the end of the most recent fiscal year before the SEO. The results on analyst coverage (not tabulated) remain qualitatively similar and none of the mispricing proxies are significant.

Results for sub-periods

To investigate whether the results hold for different sample periods, we redo all regression analyses for two sub-periods: 1984-1990 and 1991-2000. We find similar results regarding analyst coverage for each sub-period. We also run yearly regressions over the sample period and base our results on the average of yearly coefficients and the associated t-statistics with the Newey-West correction (Fama and MacBeth 1973; Newey and West 1987). The results (not tabulated) for analyst coverage are similar to those reported.

7. Conclusion

In this paper, we investigate whether the amount and nature of analyst coverage reduces the cost of raising equity capital by reducing information asymmetry among investors (including divergence in valuations and lack of investor interest). Examining the association between analyst coverage and the cost of raising capital is important given financial analysts' role as major information intermediaries in the capital markets. It is also timely given the recent criticism of financial analysts from regulators and investors, who are concerned with analysts' alleged conflicts of interest. We choose a setting, seasoned equity offering (SEO) underpricing, where we can directly measure the cost of raising equity capital.

This setting also provides a powerful research design because, compared with alternative settings, SEO underpricing is less subject to measurement errors, endogeneity problems, and confounding concurrent events.

Based on 4,766 SEOs in the period 1984-2000, we find that analyst coverage is negatively correlated with SEO underpricing. The difference in SEO underpricing is both economically and statistically significant. Compared with firms without analyst coverage, firms followed by three (eight) analysts have a 1.19% (1.89%) lower SEO underpricing, a relative decrease of 38% (60%). The impact of analyst coverage on SEO underpricing is larger for small firms and for firms with relatively low analyst coverage. Further evidence indicates that coverage by analysts with superior access to information (analysts affiliated with the lead underwriter of a SEO), by analysts with superior ability (*Institutional Investor* All-American team analysts and experienced analysts), or by analysts with less divergent forecasts is associated with a further decrease in SEO underpricing. These findings are consistent with the cost of raising equity capital decreasing with both the quantity and the quality of analyst coverage.

In interpreting our results, an important caveat to remember is that some omitted inherent firm characteristic(s) may lead to *both* higher analyst coverage and lower divergence of opinions among investors, which in turn leads to lower SEO underpricing. While we address this issue in several ways, we cannot completely rule out the possibility that omitted firm characteristics drive our results.

Overall, this paper contributes to the literature by providing evidence consistent with analyst coverage lowering the cost of raising equity capital. Such evidence should be of interest to researchers using analyst coverage to proxy for the degree of information asymmetry among investors, to researchers assuming that a higher level of analyst coverage is a benefit of improved financial reporting or voluntary disclosure, and to firms interested in reducing the cost of raising equity capital. The evidence is also potentially useful to policy makers contemplating regulations that attempt to address analysts' alleged conflicts of interest and encourage independent analyst research. The results in this

paper suggest that new regulations could have a negative (positive) economic consequence if they reduce (increase) analyst coverage, resulting in a higher (lower) cost of raising equity capital.

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Appendix: Variable Measurement

Variable	Measurement
Dependent variable	
SEO Underpricing	Negative one times the close-to-offer return, which is calculated from the previous day's closing price to the offer price.
Analyst characteristics	
Analyst Coverage	The number of unique analysts issuing earnings forecasts as covered in I/B/E/S in the year prior to the offer. We use log transformation, ln(1+analyst coverage), in regressions.
Lead Underwriter Coverage	One if at least one of the analysts following the firm in the year prior to the offer is employed by the lead underwriter, zero otherwise.
High Ability Analyst Coverage	One if at least two of the analysts following the firm in the year prior to the offer are *Institutional Investor* All-American team analysts or experienced analysts. Experienced analysts are those with general experience in the top quartile of all financial analysts covered in I/B/E/S in that year. Individual analysts' general experience is measured as the number of quarters between the first earnings forecast issued by the analyst (for any firm) and the offer date of the SEO.
Forecast Dispersion	The standard deviation of one-year-ahead earnings forecasts in the month before the SEO, deflated by the closing price prior to the offer.
Control variables	
Market Value	Closing price on the day prior to the offer times the total outstanding shares prior to the offer. We use log transformation, ln(market value), in regressions.
Volatility	The standard deviation of daily returns in the year prior to the offer.
Relative Offer Size	Offered shares divided by total outstanding shares prior to the offer.
CAR	The cumulative market adjusted return over the five days prior to the offer, where market return is defined as the return on the CRSP value-weighted index. CAR_positive (CAR_negative) is CAR if CAR is positive (negative), and zero otherwise.
Price	The closing price on the day prior to the offer. We use log transformation, ln(price), in regressions.
Tick<1/4	A dummy variable that equals one if the decimal portion of the closing price on the day prior to the offer is not an increment of $0.25.
Rule10b-21	A dummy variable that equals one if the issues are offered after Rule 10b-21 became effective on August 25, 1988.
IPO Underpricing	The average underpricing across all IPOs in the same month as the SEO, where monthly underpricing estimates for IPOs are obtained from Jay Ritter's web page at http://bear.cba.ufl.edu/ritter/ipoall.html.
NYSE Dummy	A dummy variable that equals one if the firm was listed on the NYSE at the time of the offer and zero if the firm was listed on NASDAQ.

Figure 1
SEO underpricing by year

This figure plots the mean seasoned equity offering (SEO) underpricing by year. Underpricing is defined as negative one times the return from the closing price on the day prior to the offer to the offer price. The sample includes 4,766 SEOs on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text.

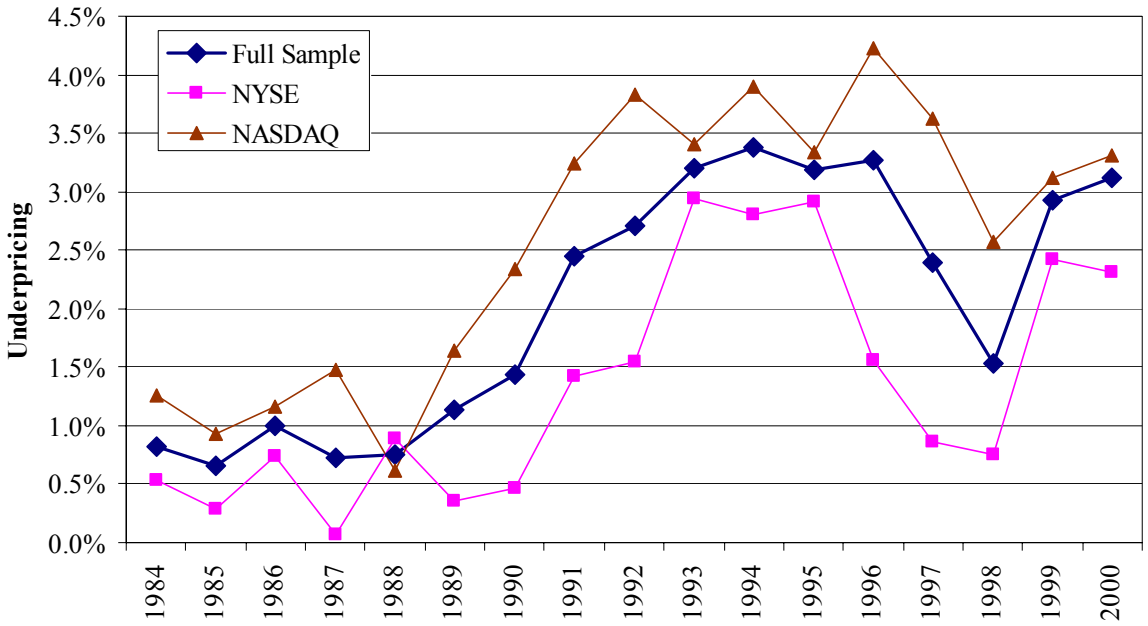

Figure 2
Analyst coverage and SEO underpricing

This figure plots mean seasoned equity offering (SEO) underpricing by the level of analyst coverage. Underpricing is defined as negative one times the return from the closing price on the day prior to the offer to the offer price. Analyst coverage is measured as the number of unique analysts issuing earnings forecasts in the year prior to the offer, based on the I/B/E/S Detailed Earnings Forecasts file. The sample includes 4,766 SEOs on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. The last point on the figure (31 analysts) represents 99 observations with analyst coverage of 31 or more.

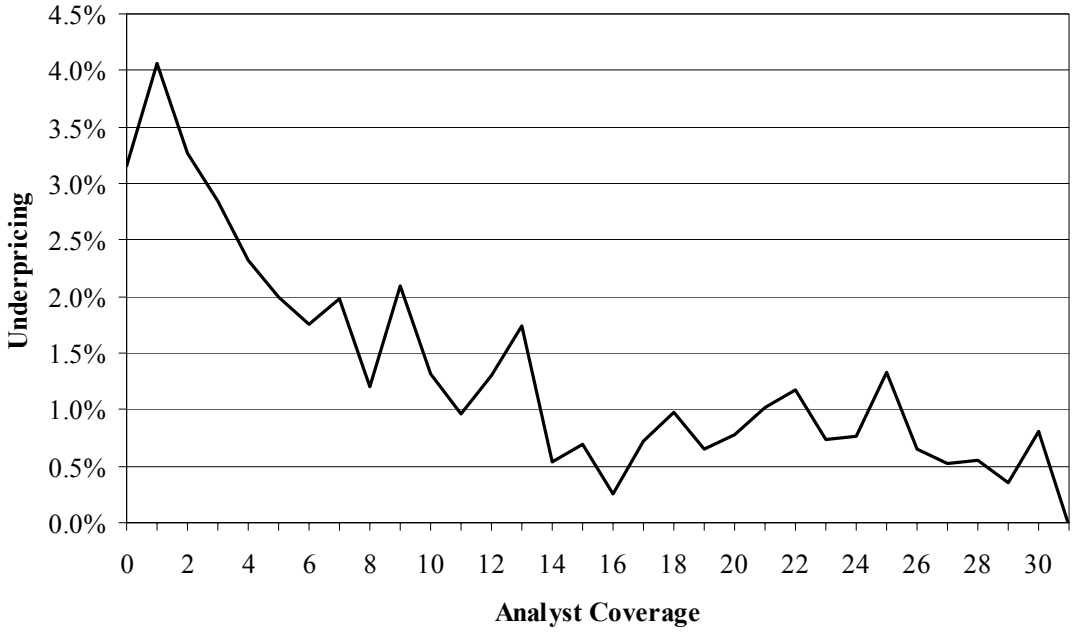

Figure 3
Change in analyst coverage and change in SEO underpricing

This figure plots the mean change in seasoned equity offering (SEO) underpricing versus the change in analyst coverage for firms with multiple SEOs. Of our sample firms, 635 firms have two SEOs, 170 have three SEOs, and 164 have four or more SEOs. We measure the change in analyst coverage and the change in underpricing for consecutive SEOs (that is, 1st SEO vs. 2nd SEO, 2nd SEO vs. 3rd SEO, 3rd SEO vs. 4th SEO) and then estimate the mean of the change in underpricing for each level of change in analyst coverage.

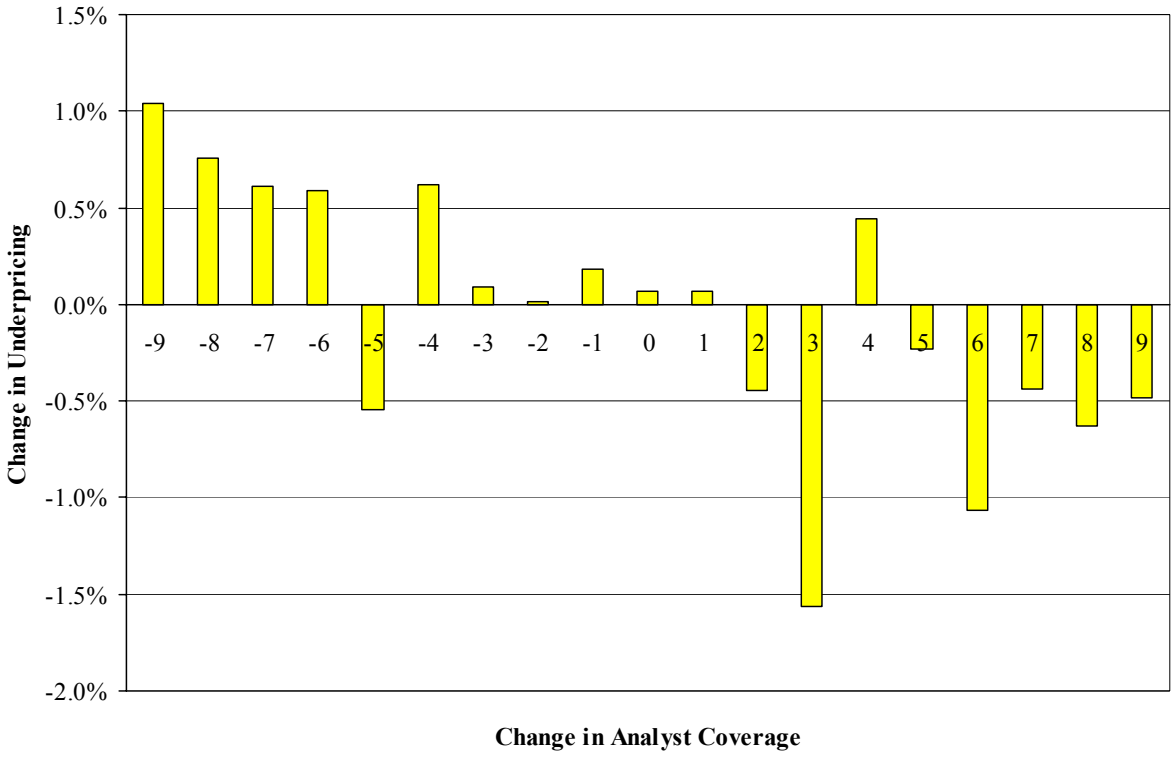

Table 1
Descriptive statistics on SEOs and analyst coverage

The sample includes 4,766 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. Underpricing is defined as negative one times the return from the closing price on the day prior to the offer to the offer price. Analyst coverage is measured as the number of unique analysts issuing earnings forecasts in the year prior to the offer, based on the I/B/E/S Detailed Earnings Forecasts file.

Panel A: Descriptive statistics on SEO characteristics

Characteristic [a]	N	Mean	Std.	1st Quartile	Median	3rd Quartile
Offer Price ($)	4,766	25.42	18.88	14	21.5	31
Offer Proceeds ($million)	4,766	85.27	144.32	22.50	45.90	90.80
Gross Spread (%)	4,521	5.12	1.37	4.47	5.22	5.93
Underpricing (%)	4,766	2.38	4.46	0.00	1.00	3.23

[a] Offer proceeds (offer price times shares offered in the market) are the gross amount of proceeds from the SEO. Gross spread represents the difference between offer proceeds and the amount the issuer receives, and is used to compensate the underwriters participating in the issue. Gross spread reported in the table is deflated by offer proceeds.

Panel B: Yearly number of SEOs and the associated mean underpricing

Year	N	Mean underpricing
1984	106	0.82%
1985	225	0.66%
1986	284	1.00%
1987	174	0.73%
1988	71	0.75%
1989	131	1.14%
1990	106	1.44%
1991	320	2.45%
1992	287	2.71%
1993	432	3.20%
1994	272	3.38%
1995	416	3.19%
1996	499	3.27%
1997	488	2.39%
1998	368	1.54%
1999	288	2.93%
2000	299	3.11%
Total	4,766	2.38%

Table 1 (continued)
Descriptive statistics on SEOs and analyst coverage

Panel C: Descriptive statistics on analyst coverage

Analyst coverage group [b]	Analyst coverage	N	Subtotal
Group 1	0	1,186	1,186
Group 2	1	312	1,193
	2	429	
	3	452	
Group 3	4	388	1,146
	5	310	
	6	254	
	7	194	
Group 4	8	155	1,241
	9	132	
	10	99	
	11	102	
	12	73	
	13	80	
	14	49	
	15	57	
	16	44	
	17	30	
	18	38	
	19	29	
	20	36	
	21	31	
	22	31	
	23	27	
	24	22	
	25	23	
	26	18	
	27	22	
	28	14	
	29	14	
	30	16	
	31 and above [c]	99	

[b] Groups are defined by the number of analysts covering the firm and are of approximately equal size.
[c] There are less than 10 observations with a particular analyst coverage level which is higher than 30. For convenience, we report all observations with analyst coverage of 31 and above in one line.

Table 2
Regression of abnormal trading volume on analyst coverage

The dependent variable is abnormal trading volume on the SEO announcement day, measured as share turnover (trading volume scaled by total outstanding shares) on the announcement day, standardized by average turnover in the control period (the two-month period before the announcement day). The sample includes 4,510 SEOs on the NYSE and NASDAQ from 1984 through 2000. Stock return is measured on the announcement day. Market trading volume is the average abnormal trading volume of all stocks covered by CRSP on the SEO announcement day. Sales growth is the percentage increase in sales in the fiscal year before SEO announcement. Past stock returns are the market-adjusted buy-and-hold returns in the year before SEO announcement. Please see the Appendix for the measurement of other variables.

	Coefficients (T-statistics)
Intercept	-0.376
	(-6.84)
Analyst Coverage	-0.039
	(-3.85)
Firm Size	-0.018
	(-1.83)
NYSE Dummy	0.322
	(15.97)
|Stock Return|	3.525
	(7.97)
Relative Offer Size	-0.044
	(-0.69)
Market Trading Volume	0.394
	(3.59)
Sales Growth	-0.054
	(-6.91)
Past Stock Returns	-0.111
	(-14.52)
Year Dummies	Yes
Adj. R^2	0.127

Table 3
Univariate analysis of the relation between analyst coverage and SEO underpricing

The sample includes 4,766 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. Underpricing is defined as negative one times the return from the closing price on the day prior to the offer to the offer price. Analyst coverage is measured as the number of unique analysts issuing earnings forecasts in the year prior to the offer, based on the I/B/E/S Detailed Earnings Forecasts file.

	Group 1	Group 2	Group 3	Group 4
Analyst Coverage	0	1-3	4-7	8 and above
Number of SEOs	1,186	1,193	1,146	1,241
Mean underpricing (%)	3.16	3.31	2.05	1.04
t-statistics for differences in mean underpricing compared with:				
Group 2	-0.73			
Group 3	5.50 ***	7.79 ***		
Group 4	10.77 ***	14.61 ***	7.43 ***	

*** Significant at the 0.001 level based on one-tailed tests.

Table 4
Descriptive statistics on the independent variables

The sample includes 4,766 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. Please see the Appendix for variable measurement.

Panel A: Descriptive statistics on variables used in multiple regressions

	Mean	Std.	1st Quartile	Median	3rd Quartile
Analyst Coverage	5.785	7.115	0	3	8
Market Value ($million)	994	3,847	110	271	738
Volatility	0.033	0.018	0.019	0.030	0.041
Relative Offer Size	0.221	0.212	0.104	0.179	0.281
CAR_Positive	0.018	0.045	0	0	0.018
CAR_Negative	-0.039	0.053	-0.058	-0.017	0
Rule10b-21	0.824	0.381	1	1	1
Price ($)	26	19	14	22	32
Tick<1/4	0.398	0.490	0	0	1
IPO Underpricing	0.214	0.209	0.112	0.155	0.210
NYSE Dummy	0.416	0.493	0	0	1

Table 4 (continued)
Descriptive statistics on the independent variables

Panel B: Correlation matrix
The lower (upper) triangle reports Pearson (Spearman) correlations. To be consistent with later regression analyses, we use log transformation of analyst coverage (ln(1+Analyst Coverage)), market value, and price in estimating correlations.

	Under-pricing	Analyst Coverage	Market Value	Volatility	Rel. Offer Size	CAR_ Positive	CAR_ Negative	Price	Tick <1/4	Rule 10b-21	IPO Underpricing	NYSE Dummy
Underpricing		-0.18	-0.24	0.43	0.29	0.09	-0.03	-0.21	0.01 [a]	0.24	0.10	-0.34
Analyst Coverage	-0.20		0.51	0.00 [a]	-0.38	0.03	0.04	0.39	0.00 [a]	-0.05	0.07	0.11
Market Value	-0.21	0.52		-0.22	-0.67	0.06	0.10	0.74	0.11	0.19	0.24	0.39
Volatility	0.25	-0.01 [a]	-0.10		0.29	0.05	-0.20	-0.18	-0.03	0.20	0.21	-0.64
Relative Offer Size	0.23	-0.29	-0.49	0.15		-0.02 [a]	-0.10	-0.46	-0.07	0.04	-0.05	-0.30
CAR_Positive	0.06	0.05	0.10	0.22	0.00 [a]		0.82	0.11	-0.02 [a]	0.00 [a]	0.09	-0.02 [a]
CAR_Negative	-0.07	0.05	0.10	-0.33	-0.08	0.30		0.14	-0.01 [a]	-0.05	0.03 [a]	0.15
Price	-0.21	0.38	0.74	-0.07	-0.36	0.17	0.13		0.00 [a]	0.09	0.23	0.20
Tick<1/4	0.01 [a]	-0.01 [a]	0.11 [a]	0.00 [a]	-0.02 [a]	0.01 [a]	-0.01 [a]	-0.01 [a]		0.09	-0.01 [a]	-0.01 [a]
Rule 10b-21	0.16	-0.06	0.19	0.19	0.04	0.06	-0.08	0.09	0.09		0.54	-0.13
IPO Underpricing	0.04	0.10	0.29	0.40	-0.07	0.24	-0.11	0.31	0.02	0.81		-0.09
NYSE Dummy	-0.17	0.11	0.38	-0.55	-0.16	-0.11	0.23	0.18	-0.01 [a]	-0.13	-0.13	

[a] indicates that the correlation is insignificant at the 0.05 level based on two-tailed tests. All other correlation coefficients are significant at the 0.05 level or lower.

Table 5
Multiple regressions of SEO underpricing on analyst coverage and control variables – tests of H1

The dependent variable is SEO underpricing. The sample includes 4,766 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. Please see the Appendix for variable measurements. T-statistics are shown below the coefficients (in parentheses).

	Predicted signs	Model 1	Model 2
Intercept		0.0218	0.0289
		(13.22)	(6.59)
Analyst Coverage – H1	-	-0.0086	-0.0040
		(-14.11)	(-5.53)
Market Value	-		-0.0010
			(-1.24)
Volatility	+		0.4540
			(9.43)
Relative Offer Size	+		0.0224
			(6.74)
CAR_Positive	?		0.0337
			(2.23)
CAR_Negative	?		0.0272
			(2.04)
Rule10b-21	-		0.0018
			(0.49)
Price	-		-0.0083
			(-5.60)
Tick<1/4	+		0.0004
			(0.29)
IPO Underpricing	+		-0.0100
			(-1.17)
NYSE Dummy	-		0.0001
			(0.06)
Year Dummies		Yes	Yes
Adj. R^2		0.080	0.153
The effect of coverage by three analysts (%)[a]		-1.19	-0.55
The effect of coverage by eight analysts (%)[a]		-1.89	-0.88

[a] These numbers represent the difference in underpricing between SEOs covered by three (median analyst coverage) or eight analysts (the third quartile) and SEOs with zero analyst coverage, and are calculated as the coefficient on analyst coverage multiplied by ln(1+3), or ln(1+8).

Table 6
Attributes of analyst coverage and SEO underpricing

Panel A: Descriptive statistics on analyst coverage attributes

The sample includes all seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. Lead underwriter coverage and high ability analyst coverage are defined only for firms with positive analyst coverage, and forecast dispersion is estimated only for firms with at least three analysts following. Please see the Appendix for variable measurement.

	N	Mean	Std.	1st Quartile	Median	3rd Quartile
Lead Underwriter Coverage	3,580	0.673	0.469	0	1	1
High Ability Analyst Coverage	3,580	0.576	0.494	0	1	1
Forecast Dispersion	2,627	0.0052	0.0082	0.0009	0.0023	0.0057

Table 6 (continued)
Attributes of analyst coverage and SEO underpricing

Panel B: Does SEO underpricing vary with the quality of analyst coverage? – tests of H2 and H3

The dependent variable is SEO underpricing. The sample includes 3,580 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text and have positive analyst coverage. Control variables include Market Value, Volatility, Relative Offer Size, CAR_Positive, CAR_Negative, Price, Tick<1/4, Rule10b-21, IPO Underpricing, and NYSE Dummy. Please see the Appendix for variable measurement. T-statistics are shown below the coefficients (in parentheses).

	Predicted signs	Model 1	Model 2	Model 3	Model 4
Intercept		0.0408	0.0378	0.0421	0.0416
		(14.30)	(12.57)	(12.85)	(8.12)
Analyst Coverage – H1 [a]	-	-0.0158	-0.0161	-0.0163	-0.0091
		(-10.81)	(-8.02)	(-7.57)	(-4.30)
Lead Underwriter Coverage – H2 [b]	-	-0.0200		-0.0165	-0.0153
		(-5.98)		(-4.61)	(-4.46)
High Ability Analyst Coverage – H3 [b]	-		-0.0202	-0.0132	-0.0152
			(-4.91)	(-3.01)	(-3.53)
Analyst Coverage × Lead Underwriter [c]	+	0.0073		0.0056	0.0052
		(4.13)		(3.00)	(2.91)
Analyst Coverage × High Ability [c]	+		0.0089	0.0051	0.0077
			(3.75)	(2.02)	(3.10)
Control Variables		No	No	No	Yes
Year Dummies		Yes	Yes	Yes	Yes
Adj. R^2		0.118	0.113	0.121	0.198

[a] This coefficient reflects the impact of analyst coverage on underpricing for SEOs without lead underwriter or high ability analyst coverage.
[b (c)] This coefficient reflects the impact of lead underwriter or high ability analyst coverage on overall SEO underpricing – intercept effect (on the impact of analyst coverage, i.e., the number of analysts following, on SEO underpricing – slope effect).

Table 6 (continued)
Attributes of analyst coverage and SEO underpricing

Panel C: Does SEO underpricing vary with forecast dispersion? – tests of H4

The dependent variable is SEO underpricing. The sample includes 2,627 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that have at least three analysts following and meet the sample restrictions described in the text. Control variables include Market Value, Volatility, Relative Offer Size, CAR_Positive, CAR_Negative, Price, Tick<1/4, Rule10b-21, IPO Underpricing, and NYSE Dummy. Please see the Appendix for variable measurement. T-statistics are shown below the coefficients (in parentheses).

	Predicted signs	Model 1	Model 2	Model 3	Model 4
Intercept		0.0231	0.0167	0.0195	0.0134
		(8.57)	(3.28)	(7.19)	(2.60)
Analyst Coverage – H1	-	-0.0080	-0.0018	-0.0084	-0.0024
		(-8.24)	(-1.35)	(-8.73)	(-1.72)
Forecast Dispersion – H4	+			0.5221	0.3058
				(7.00)	(3.82)
Control Variables		No	Yes	No	Yes
Year Dummies		Yes	Yes	Yes	Yes
Adj. R^2		0.073	0.124	0.089	0.128

Table 7
Additional analyses on the relation between analyst coverage and SEO underpricing

Panel A: Does the effect of analyst coverage on SEO underpricing vary with firm size?

The dependent variable is SEO underpricing. The sample includes 4,766 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. Control variables include Volatility, Relative Offer Size, CAR_Positive, CAR_Negative, Price, Tick<1/4, Rule10b-21, IPO Underpricing, and NYSE dummy. Please see the Appendix for variable measurement. T-statistics are shown below the coefficients (in parentheses).

	Predicted signs	Model 1	Model 2
Intercept		0.0461	0.0424
		(10.66)	(8.14)
Analyst Coverage – H1	-	-0.0177	-0.0135
		(-7.58)	(-5.72)
Market Value	-	-0.0083	-0.0039
		(-10.51)	(-3.64)
Analyst Coverage × Market Value	+	0.0022	0.0016
		(6.10)	(4.21)
Control Variables		No	Yes
Year Dummies		Yes	Yes
Adj. R^2		0.144	0.157

Table 7 (continued)
Additional analyses on the relation between analyst coverage and SEO underpricing

Panel B: Residual analyst coverage and SEO underpricing

The sample includes 4,766 seasoned equity offerings (SEOs) on the NYSE and NASDAQ from 1984 through 2000 that meet the sample restrictions described in the text. Residual analyst coverage is the residual of a regression of analyst coverage on market value. Four equal-sized analyst coverage groups are formed based on quartiles of residual analyst coverage in the sample. Independently, the sample is split into three equal-sized sub-samples based on market value. The table reports the mean underpricing for each residual coverage group or for each intersection of residual coverage groups and size-based sub-samples.

Residual analyst coverage group	Full sample	Sub-samples based on firm size		
		Small	Medium	Large
1 (Low coverage)	3.01%	4.40%	2.66%	1.89%
[N]	[1,191]	[411]	[385]	[395]
2	2.92%	3.70%	2.67%	2.12%
[N]	[1,192]	[464]	[395]	[333]
3	2.10%	3.36%	1.70%	1.13%
[N]	[1,192]	[405]	[431]	[356]
4 (High coverage)	1.49%	2.57%	1.58%	0.76%
[N]	[1,191]	[308]	[378]	[505]
1 – 4	1.52% ***	1.83% ***	1.08% ***	1.12% ***
(t-statistics)	(7.96)	(4.66)	(3.23)	(4.44)

*** Significant at the 0.001 level based on one-tailed tests.

Table 7 (continued)
Additional analyses on the relation between analyst coverage and SEO underpricing

Panel C: Results after controlling for institutional ownership

The dependent variable is SEO underpricing. The sample includes 4,006 seasoned equity offerings (SEOs) from 1984 through 2000 that have institutional ownership data from CDA/Spectrum and meet the sample restrictions described in the text. Total and active institutional ownership are measured at the beginning of the calendar quarter in which the SEO was issued. We follow Bushee (1998) to identify active institutional investors. Control variables include Market Value, Volatility, Relative Offer Size, CAR_Positive, CAR_Negative, Price, Tick<1/4, Rule10b-21, IPO Underpricing, and NYSE Dummy. Please see the Appendix for variable measurement. T-statistics are shown below the coefficients (in parentheses).

	Predicted	Basic models		Total institutional ownership		Active institutional ownership	
	signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept		0.0262	0.0230	0.0319	0.0172	0.0278	0.0179
		(15.09)	(4.34)	(18.09)	(3.23)	(15.97)	(3.34)
Analyst Coverage – H1	-	-0.0082	-0.0050	-0.0050	-0.0037	-0.0069	-0.0043
		(-12.45)	(-6.52)	(-7.11)	(-4.77)	(-10.03)	(-5.48)
Institutional Ownership	-			-0.0390	-0.0254	-0.0477	-0.0403
				(-12.46)	(-7.63)	(-6.75)	(-5.69)
Control Variables		No	Yes	No	Yes	No	Yes
Year Dummies		Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2		0.071	0.157	0.105	0.169	0.081	0.164