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Strategic disclosure, analyst behavior and equity flotation costs

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Abstract

We document that the quality of public and private information available to investors improves before seasoned equity offerings (SEO) but deteriorates shortly thereafter. As firms improve their financial communication, analyst earnings forecasts become more accurate and less biased. However, forecast optimism increases after the offering. Firms that enhance the quality of their public information before SEOs increase the likelihood of the offering being a success and reduce the costs of raising finance: underwriters are more likely to exercise their overallotment option, which increases the issue proceeds beyond the prospectus amount, and the underwriting fee decreases. Changes in private information quality induce higher information asymmetry between informed and uninformed investors, increasing flotation costs. The results are robust to controlling for endogeneity in the offering size and underwriter quality. Our findings are consistent with firms strategically improving their information disclosure around seasoned equity issues.

1. Introduction

A firm's financial communication, through both voluntary and mandatory information disclosures, and information generated by external parties, shape its information environment. Managers endogenously determine the amount and quality of public information available to investors, partly in response to industry standards and norms and the behavior of other market participants, such as analysts and investors. Less than full disclosure leads to information asymmetry as managers withhold part of their information, which remains private. Myers and Majluf (1984) predict that information asymmetry increases the cost of raising external finance, a prediction that has wide empirical support.¹

We argue that firms face strong incentives to improve their financial communication before raising external capital in order to reduce information asymmetry and encourage investor participation in the offering, thereby securing the issue proceeds and reducing the cost of external finance. If a company strategically improves the quality of its public signals before an equity offering, an optimal analyst response is to issue less optimistically biased and more accurate forecasts before the equity offering to support the firm's actions.

We infer the level and changes in the quality of the firm's information environment around seasoned equity offerings (SEOs) by examining analyst earnings forecasts in terms of forecast dispersion, mean squared forecast error and the number of forecasts issued. Our findings support the prediction that firms strategically improve the quality of their information environment before equity issues. We find temporary improvements in the quality of public information before SEOs and deteriorations thereafter. In response to changes in public information disclosure, analysts engage in private information acquisition, which improves their signal precision. Public information precision improves more than

¹ Typical SEO announcement period average abnormal returns range from -1.16% (Jegadeesh, Weinstein, and Welch, 1993) to -3.56% (Mikkelson and Partch, 1986) compared to an insignificant price reaction to straight debt offering announcements (Chaplinsky and Hansen, 1993, Johnson, 1995 and Jung, Kim and Stulz, 1996). Studies also report high equity underpricing and underwriting costs.

private information precision in the two-year window before the equity issue quarter, as the median ratio of public to the sum of private and public quality increases. This confirms that the quality of the firm's information environment improves before an equity offering. Following the transaction, both public and private signal quality decrease.

Analysts issue less biased and more accurate earnings forecasts (EPS) before the offering, contributing to the improvement in the firm's information environment. However, the bias increases shortly after the offering. This is consistent with Ali (1996), who reports optimism in analyst earnings forecasts after the offering only. Bradshaw, Richardson and Sloan (2006) also show lower optimism in one-year-ahead EPS forecasts before equity issues and an increase in optimism afterwards.

Firms are willing to incur the costs of improving disclosure quality if it influences an offering's success and lowers the cost of external capital. We consider an offering a success if investor demand exceeds the allocated number of shares, allowing the broker to exercise the overallotment option to meet additional demand. This increases the issue proceeds beyond the prospectus amount. We measure the cost of raising capital by the underwriting fee. The underwriting fee compensates brokers for the underwriting risk, i.e. the capital risk committed in buying securities from the issuer and reselling them to investors at the issue date.²

We show that firms that improve the quality of public signals succeed in raising more than the prospectus amount of equity, as measured by the increased likelihood that the underwriter exercises the overallotment option, consistent with a higher than anticipated demand for a firm's shares. The likelihood of exercising the overallotment option is negatively related to changes in private information quality. Increased private information precision suggests increased heterogeneity in investors' information sets and a resultant

² In a fixed price, firm commitment offering, which dominates in the US, the equity offering is purchased by the underwriter and resold to investors on the issue day by the selling group (lead-underwriters, co-managers, other syndicate members and dealers). This ensures the issuer receives the prospectus amount.

information asymmetry between informed and uninformed investors.³ This discourages uninformed investors from participating in the offering because of a higher risk of wealth expropriation by informed investors. Levels of private and public information precision have no bearing on the likelihood that the overallotment option is exercised. We find no relation between analyst EPS forecast bias and the likelihood of exercising the overallotment option. Combined with a decreasing bias before the issue, this suggests that analysts do not use earnings forecasts to hype an issuing firm's stock but rather they play an important intermediation role in the market by certifying the offering and monitoring managerial behavior.

The ratio of the underwriting fee to gross proceeds decreases with improvements in public signal quality. This shows that the offering risk, that is, the underwriter's risk that investor demand falls short of the initial share subscription level leaving the broker with the shares, decreases as the quality of the firm's information environment improves. Changes in private information quality have a negative effect on the underwriting fees. EPS forecast bias—a proxy for analyst opportunism—has no effect on underwriting fees paid by the issuer. This is consistent with analyst forecasts credibly transmitting new information to the market in an unbiased manner around the offering date and public and private signal quality having first-order effects on underwriting risk.

Our results confirm increased offering proceeds and lower costs of external capital for firms that improve their information environment quality. The results are robust to controlling for the firm's investment opportunity set, security risk, profitability, share liquidity, hot issue periods, offering size, price run-up, the quality of analyst following, underwriter characteristics and the size of the underwriting syndicate. We also control for

³ Botoson, Plumlee and Xie (2004) argue that an analyst's information set reflects that of investors. Barron, Byard and Kim (2002) find that changes in the quality of analyst's private and public information around earnings announcements predict investor trades, supporting the relation between analyst and investor information sets.

endogeneity in the choice of underwriter and in setting the offering size, using instrumental variables. Firms may choose reputable underwriters to certify the quality of the offering. Managers set the issue size taking into consideration the firm's investment needs and information asymmetry. Results from instrumental variables regressions corroborate the main results. Replicating the analysis with analyst forecast dispersion, forecast error and the number of forecasts issued as information quality measures gives results that are qualitatively similar but weaker, since these measures reflect the net effect of changes in public and private information quality.

This paper contributes to three literature streams. First, it provides evidence on firms' strategic use of information before equity issues to facilitate the offering and increase issue proceeds. Lee and Masulis (2009) is the only study to address the relation between the firm's accounting quality (as measured by accruals quality) and equity flotation costs. They find that lower accruals quality increases the underwriting fee, the negative announcement effect and the likelihood of the offering withdrawal. We respond to Verrecchia's (2001, 174) suggestion, in his essays on disclosure, that "another potential research activity that I hope will result from this document is empirical work that forges a link between disclosure and its economic consequences. While I am interested in all such links, let me suggest again that the one with the greatest potential may be the link between disclosure and information asymmetry reduction".

Second, this study contributes to the literature on information asymmetry between informed and uninformed investors (e.g. Kim and Verrecchia, 1994, 1997, Easley, Hvidjkaer and O'Hara, 2002 and Botosan, Plumlee, and Xie, 2004).⁴ We differentiate between the impact of levels and changes in private information precision and document their negative effects on security offering proceeds. Higher private signal precision suggests increased

⁴ Indirectly, our study also relates to the literature linking firm disclosure to the cost of capital (e.g. Healy, Hutton, and Palepu, 1999 and Leuz and Verrecchia, 2000).

asymmetry in the information sets available to informed and uninformed investors, which discourages uninformed investor participation in SEOs. Firms need to consider the effect that improved disclosure quality before the offering has on current and target shareholder groups.

Third, we show that analysts respond to changes in the firm's information environment. Increased public information quality drives private information acquisition, suggesting their complementary nature and the need to consider both components when evaluating changes in corporate disclosure policy. Studies often ignore the relation between the precision of public and private signals and consider firm disclosure choices in isolation from other information producers, such as analysts.⁵ We find that earnings forecast bias falls before equity offerings. This suggests that analysts play an important role in monitoring managers' behavior and certifying quality as opposed to the common view of opportunistic analyst forecasts around capital market transactions.

The paper continues as follows. Section 2 develops the empirical hypotheses. Section 3 explains the model. Section 4 describes the data and reports results on changes in public and private information quality and analyst forecast bias around equity issues. We investigate the relation between the quality of the firm's information environment and the net cost of raising equity in Section 5. A brief note on potential further research areas follows in Section 6. Section 7 concludes.

2. Hypotheses development

The pecking order theory predicts that the cost of external financing increases with information asymmetry between managers and investors. Firms can minimize issue costs by timing offerings in periods when information asymmetry is low. These include periods following value-relevant information releases (e.g. earnings announcements), as Korajczyk,

⁵ Notable exceptions are Byard and Shaw (2003) who find higher public and private information precision for firms with reputations for higher disclosure quality and Barron, Byard, and Kim (2002) who show that analysts engage in private information acquisitions immediately after earnings announcements.

Lucas and McDonald (1992) suggest. However, managers may also actively engage in activities to improve public information quality and facilitate upcoming equity issues. Lang and Lundholm (2000) examine 41 equity offerings in 1992 and find that firm disclosure increases in the six months leading up to equity issue announcements and attribute this to managers “preparing the ground” for equity offerings. Lang and Lundholm (2000, 627) report that, “Beginning six months before the offering, however, the issuing firms dramatically increase their disclosure activity relative to the prior six-month period They make more frequent disclosures regarding their performance, provide more detail and more management interpretation of their results, and are generally more optimistic in their statements relative to the previous six months”. This leads to our first hypothesis:

Hypothesis 1: The quality of public information increases before SEOs.

Managers possess private information that is not available to the public. This information asymmetry provides incentives for analysts to devote resources to access private information, which they pass on to their clients. Analysts process public information from company reports, management guidance, industry and macroeconomic news, and other market participants. Following particular stocks and industries, they develop firm- and industry-specific knowledge over time, which forms the basis for their ability to identify private information. Kim and Verrecchia (1994, 1997) propose theoretical models where a public information release triggers private information acquisition by sophisticated information producers.⁶ Barron, Byard, and Kim (2002) show that earnings announcements incentivize analysts to seek new private information, implying the complementary nature of public and private information signals. If a firm’s public disclosure increases before capital raising transactions, analysts are likely to increase their private information acquisition activities, influencing their private signal quality. Corporate capital market transactions are

⁶ These models contrast with earlier theoretical models of Diamond (1985) and Kim and Verrecchia (1991) that suggest higher public information quality reduces incentives to acquire private information.

also likely to increase the demand for analyst reports, especially in the presence of high information asymmetry between investors and managers, stimulating analysts' private information acquisition. This leads to our second hypothesis.

Hypothesis 2: Analysts' private signal precision increases before SEOs.

Companies may strategically change their disclosure policies before SEOs to improve the information quality available to investors and reduce information asymmetry between the firm and investors. Information quality improvements encourage investor participation, increasing issue proceeds and lowering equity flotation costs, such as the underwriting fee. This gives our third hypothesis.

Hypothesis 3: An increase in public signal precision before SEOs increases offering proceeds and lowers flotation costs.

High private signal precision suggests better informed investors have superior information. In the presence of high information asymmetry *among* investors, uninformed investors require compensation to purchase new securities as they face the risk of wealth expropriation when trading with a better informed counterparty after the offering.⁷ Higher private signal precision may increase the difficulty and cost of placing new securities with investors. This gives our fourth hypothesis.

Hypothesis 4: An increase in private signal precision before SEOs lowers offering proceeds and increases flotation costs.

Analysts who issue inaccurate and optimistically biased forecasts offset firms' actions to improve information quality. Optimistically biased analyst forecasts may be driven by the need to secure investment banking business. However, rational investors may interpret analyst actions to hype the stock as supporting a firm's timing of an overvalued equity issue, jeopardizing the offering as investors shun the issue. Consequently, biased forecasts reduce

⁷ For example, Bamber, Barron, and Stober (1997, 1999) find that dispersion changes drive stock trading around earnings announcements, consistent with increased private information trading by informed investors.

the quality of the firm's information environment and can have a negative impact on offering proceeds and issue costs. This leads to our fifth, dual, hypothesis.

Hypothesis 5a: Analysts issue unbiased forecasts before SEOs.

Hypothesis 5b: Biased analyst forecasts before SEOs lower the offering proceeds and flotation costs.

In the next section we describe a model to measure the quality of public and private information around external capital raising transactions.

3. Empirical model

We infer a firm's public and private information quality from analyst EPS forecasts. EPS forecasts are the primary research outputs that feed into secondary forecasts such as stock recommendations and target prices. Malmendier and Shanthikumar (2009) report that sophisticated institutional investors are the main consumers of EPS forecasts. Institutional investors are often the primary investor group targeted by equity issuers. Altinkilic, Balashov and Hansen (2009) report that analysts revise EPS forecasts up to ten times more frequently than stock recommendations. Bradshaw (2004) finds that investors earn higher returns by relying on earnings forecast-based valuation models than on stock recommendations. Francis and Soffer (1997) find an incremental price impact of earnings forecast revisions over recommendation revisions. Consequently, EPS forecasts are the primary tool analysts use to disseminate private information to investors, with a particular emphasis on institutional investors.

Analysts use public and private signals to forecast company earnings. An earnings forecast is a weighted average of public and private signals about firm value, where signal quality determines weights. Public information disclosures provide information about a firm's earnings stream that is available to all market participants and their quality determines

the average error that analysts make in forecasting earnings (the common forecast error). If private signal precision is higher than public signal precision, including private signals in individual analyst forecasts reduces forecast error but increases forecast dispersion (the standard deviation of individual analysts' forecasts). The ratio of idiosyncratic to mean error decreases with analyst following due to diversification. These insights motivate Barron, Kim, Lim, and Stevens (1998) to model the relation between properties of the analysts' information environment and properties of their forecasts. Barron et al. (1998) propose a setting where an analyst has two signals, one private one public. The public signal, $\bar{y}$, equals the firm's true earnings, y , plus an error term,

$$\bar{y} = y + \varepsilon \quad (1)$$

Public signal precision is $PUB = 1/\sigma_\varepsilon$, where $\varepsilon \sim N(0, \sigma_\varepsilon)$. Analyst i 's private signal, z_i , is

$$z_i = y + \eta_i \quad (2)$$

where $\eta_i \sim N(0, \sigma_{\eta_i})$. Private signal precision is $PRIV_i = 1/\sigma_{\eta_i}$. Analyst i 's EPS forecast, μ_i , is the precision weighted average of private (z_i) and public ($\bar{y}$) signals used in forming expectations of true earnings,

$$\mu_i = E(y | \bar{y}, z_i) = \frac{PUB \times \bar{y} + PRIV_i \times z_i}{PUB + PRIV_i} \quad (3)$$

Higher public signal quality (precision) results in a greater weight on public information in forming earnings expectations.⁸

When all analysts observe equally precise private signals, $PRIV_i = PRIV$, Barron et al. (1998) define the following properties of analyst forecasts as a function of private and

⁸ Barron, Kile and O'Keefe (1998) show that $PRIV_i \times z_i$ is analyst i 's total private information and is the precision weighted sum of j private signals, z_{ij} , each with precision $PRIV_{ij}$ that the analyst observes before releasing a forecast. When all signals have equal precision, $\sum_j z_{ij} PRIV_{ij} = \sum_j z_{ij} PRIV_i = PRIV_i \times z_i$. A similar interpretation applies to $PUB \times \bar{y}$.

public signal precision. Dispersion, D , in individual analyst forecasts around the consensus (mean) forecast, $\mu = \sum_{i=1}^N \mu_i / N$, is a function of signal precision and reflects the idiosyncratic component of analyst forecasts, $PRIV$, relative to total information, $PUB + PRIV$, as follows

$$D = \text{var}(\mu_i - \mu) = \frac{PRIV}{(PUB + PRIV)^2} \quad (4)$$

Lower quality public information increases dispersion, consistent with the literature that uses dispersion as a proxy for firm value uncertainty (heterogeneity in investor beliefs) (Diether, Malloy, and Scherbina, 2002). However, if private signal precision exceeds public signal precision, lower private signal precision increases dispersion. This supports Abarbanell, Lanen, and Verrecchia's (1995) argument that forecast dispersion is an inadequate proxy for investor uncertainty about firm value. Diether, Malloy, and Scherbina (2002) find that high dispersion predicts negative future stock returns and question the use of dispersion as a risk proxy.⁹

The squared error, SE , in the consensus forecast reflects uncertainty about public signal precision, common to all analysts, and undiversified idiosyncratic uncertainty, $PRIV/N$,

$$SE = E[(y - \mu)^2] = \frac{PUB + PRIV/N}{(PUB + PRIV)^2} \quad (5)$$

Low quality (imprecise) private information diversifies away in the consensus forecast, μ , as the number of forecasts increases.

Reversing the relations between signal precision and the properties of analyst forecasts allows us to infer the quality of public and private signals that analysts use in forecasting firm earnings. Public information quality is

⁹ Johnson (2004) argues that interpreting dispersion as a proxy for unpriced information risk explains the negative relation between dispersion and expected returns

$$PUB = \frac{SE - D/N}{(SE + D(1 - 1/N))^2} \quad (6)$$

and private information quality is

$$PRIV = \frac{D}{(SE + D(1 - 1/N))^2} \quad (7)$$

Equations (6) and (7) allow tests for changes in the quality of public and private information around equity issue from observable properties of analyst forecasts. The ratio of public information precision to the sum of public and private information precision, *Rho*, gives the importance of public relative to total information available to analysts,¹⁰

$$Rho = \frac{PUB}{PUB + PRIV} = \frac{SE - D/N}{SE + D(1 - 1/N)} \quad (8)$$

Equation (8) summarizes the effect of changes in public and private signal precision on the firm's information environment. Differentiating equation (8) with respect to *N* shows that higher analyst following increases the precision of public to total information, indicating an improvement in the firm's information environment. Increased analyst competition as firm following intensifies increases the cost of private information acquisition. At the margin, analysts rely more on public signals in forming earnings forecasts. This is consistent with previous studies that associate higher analyst following with better quality of the firm's information environment.¹¹

3.1 Analyst behavior around equity issues

Analysts play an important information intermediation role in the market. Issuing objective and accurate forecasts before an offering certifies its quality and constrains the opportunistic use of managerial disclosures to hype the firm's stock. This is analysts'

¹⁰ Barron et al. (1998) refer to *Rho* as a consensus measure. However, the literature tends to use consensus to describe the mean analyst forecast and we follow this convention.

¹¹ Bowen, Chen and Cheng (2008) report that a higher analyst following reduces SEO underpricing.

monitoring role. However, firms' capital raising transactions can influence analyst objectivity as these transactions require the services of investment banks who are the principal employers of investment analysts. Analysts may face conflicts of interest and issue optimistically biased earnings forecasts to ingratiate themselves with the company in the hope of obtaining an investment banking mandate. This scenario is consistent with analysts' opportunistic use of forecasts. However, research outputs lacking in objectivity decrease analysts' and investment banks' reputations for timely, unbiased and accurate forecasts.¹² In addition, investors can judge optimistically biased forecasts as attempts to hype a firm's stock and support the issue of overvalued equity.¹³ In this setting biased analyst forecasts reduce the quality of a firm's information environment.

We measure analyst forecast bias as the expected difference between actual EPS and the individual analyst forecast

$$FB = E(y - \mu_i) \quad (9)$$

Accurate and objective forecasts facilitate career progress (Hong, Kubik, and Solomon, 2000) and are instrumental in building reputational capital for analysts and their employers (Jackson, 2005).¹⁴ Forecast bias damages an analyst's and a broker's reputational capital for objective research and reduces forecast accuracy. Forecast inaccuracy feeds into lower demand for the specific analyst's research reports leading to lower trading commissions for the analyst's broker house and investment banking business.

¹² Krigman, Shaw, and Womack (2001) report that 75% of surveyed CFOs and CEOs choose their IPO underwriters based on the quality of analyst research and reputation in the firm's industry.

¹³ Cheng, Liu and Qian (2006) report that institutional investors use both sell- and buy-side reports in decision making with only 5% of institutional investors relying on buy-side reports alone. Analyst forecast bias likely influences institutional investor decisions to purchase issuing firms' shares. For example, fiduciary constrained investors such as pension funds cannot invest in risky stocks with poor information quality and hyping the stock may discourage their participation in the offering.

¹⁴ One of the main criteria for Institutional Investor magazine's All American analyst award is accuracy of earnings forecasts.

The properties of analysts' research reports, such as public and private information content, and forecast bias are likely to change in response to variations in firm disclosure policy around SEOs.

3.2 Strategic changes in the firm's information environment and their impact on equity flotation costs

Myers and Majluf (1984) show that in the presence of information asymmetry, equity financing has the highest capital acquisition cost. As a result, firms face incentives to improve the quality of their information environment before equity issues. We examine the evolution of public (*PUB*) and private (*PRIV*) information quality, and their ratio (*Rho*) over three year pre- and post-issue periods.

We conduct two tests of the prediction that strategic changes in a firm's disclosure policy influence an offering's success and its cost. First, if investor demand exceeds the allotted amount, the underwriter will exercise the overallotment option to fill the buy orders. Underwriters routinely oversell offerings, anticipating that part of the initial purchase orders gathered during the book building process are withdrawn. If the demand for a firm's stock is high and the stock price increases after the offering, the underwriter can purchase additional shares at the (higher) market price or exercise the allotment option at the (lower) offering price to fill the buy orders. We consider an offering a success if the overallotment option is exercised. Second, we examine the underwriting fee, which compensates the underwriter for the risk of capital committed when purchasing the offering from the issuer. We discuss the relation between the firm's information environment, analyst behavior and net offering benefits in detail below.

3.2.1 The likelihood of exercising the overallotment option

Underwriters often take short positions before offerings and oversell the stock, as some of the initial buy orders filled during the book building process are likely to be withdrawn.¹⁵ Demand for securities in excess of the offering amount leads to price increases on the offering day. To cover the short position and allocate oversold shares, the underwriter can exercise an overallotment option and buy additional securities from the issuer at the offering price to place in the market. Exercising the overallotment option increases the number of shares issued by up to 15% of the prospectus amount. We draw primarily on previous evidence on the use and determinants of overallotment options from the IPO literature, as the value and the likelihood of exercising the overallotment option in the context of SEOs is largely underexplored (Hansen, Fuller, and Janjigian, 1987, Ritter 1998, Chen and Ritter 2000, Aggarwal, 2000, Lewellen 2006, Ellis, Michaely, and O'Hara 2000, Zhang 2004, Jenkinson and Jones 2007).¹⁶

The likelihood of exercising the overallotment option increases for security issues with lower information asymmetry and expected to perform well.¹⁷ We control for levels and changes in public and private information quality. Higher public information quality levels (*PUB*) and changes (Δ *PUB*) reduce the information asymmetry and uncertainty investors face when participating in offerings. Higher private information quality levels (*PRIV*) and changes (Δ *PRIV*) may deter investors from participating in offerings as they signal higher information asymmetry between informed and uninformed investors. We use log transformations of *PUB* and *PRIV* to give better normal distribution approximations and proper test specifications. If firms issue new equity to pursue profitable growth

¹⁵ As share subscriptions during the book building process are non-binding, overselling ensures, on average, the entire share uptake by investors. Overselling shares also acts as a price stabilization mechanism to prevent price declines after the issue. Overallotment provisions are also an option-based part of underwriter compensation.

¹⁶ A literature search reveals only one study of the overallotment option in the context of SEOs. Hansen et al. (1987) investigate the determinants of the overallotment option for a sample of 75 SEOs during 1979–1983.

¹⁷ The overallotment option is a call option with exercise price equal to the offering price and exercisable within a 30-day window after the issue date.

opportunities, optimism about firm prospects may attract higher investor participation. More valuable growth options and higher past investment rates and firm profitability suggest high values of new investment opportunities financed by the offering, which should increase the demand for shares. We use the log book-to-market ratio ($\ln B/M$) and the investment ratio (INV/A) of Lyandres, Sun and Zhang (2008) to measure growth options, and return on equity (ROA) to measure the value and marginal contribution of new investment opportunities to the firm. Smaller firms with higher stock price volatility are more difficult to value and may face lower investor demand. The market value of common equity (MV) captures firm size and stock price volatility over the previous 12 months ($Price\ STD$) captures uncertainty about firm value. Strong pre-offering return performance suggests investor optimism, which may increase investor demand. Loughran and Ritter (1995) report that firms time offerings in periods when their stock is overvalued. We use the difference between the firm's and the market's six month buy and hold returns before the issue date, $pBHAR$, to measure pre-offering misvaluation. We control for the exchange of issue ($Exchange$), the hot issue period during the dot-com bubble, 1997–2000 (HOT) and industry effects (*Industry dummies*) using Kenneth French's industry definitions. We distinguish between pure secondary offerings and combinations of secondary offerings and equity sales by major shareholders (*Issue type*). We expect to find no relation between the likelihood of exercising the overallotment option and EPS forecast bias (FB) if analysts play a monitoring and certifying role. The relation between forecast bias and the overallotment option should be positive if analysts bias their forecasts to hype the firm's stock in the hope of winning an underwriting mandate.¹⁸ Previous studies report that analysts with greater experience issue more accurate forecasts (Mikhail, Walther and Willis, 1997). We control for the quality of analyst following using analyst experience (A_exp), which is the number of years an analyst is present on the IBES

¹⁸ Optimism in analyst EPS forecasts leads to negative values of FB .

database, and analyst EPS accuracy rankings (A_QEPS).¹⁹ We expect offerings underwritten by reputable brokers and with a large marketing syndicate to stimulate investor demand. As it is costly to obtain and maintain reputation (Chemmanur and Fulghieri 1994), reputable investment banks certify an offering's quality.²⁰ We measure broker reputation (B_Under) as the value of all equity offerings underwritten by the broker from 36 to 6 months before the issue relative to the value of all offerings over this period.²¹ The size of the underwriting syndicate is the number of lead underwriters ($\#Lead$). We control for the offering's value, measured as the log value of the issue in \$ millions ($\ln Proceeds$), as large offerings attract wider media and investor attention. The empirical model takes the form,

$$\begin{aligned} \Pr(Overallotment = 1) = & \beta_0 + \beta_1 \Delta \ln PUB + \beta_2 \Delta \ln PRIV + \beta_3 \ln PUB + \beta_4 \ln PRIV + \beta_5 \ln B/M + \beta_6 \ln INV/A \\ & + \beta_7 ROA + \beta_8 \ln MV + \beta_9 price STD + \beta_{10} pBHAR + \beta_{11} Exchange + \beta_{12} HOT \\ & + \beta'_{13} Industry dummies + \beta_{14} Issue type + \beta_{15} FB + \beta_{16} A_exp + \beta_{17} A_QEPS \\ & + \beta_{18} B_Under + \beta_{19} \#Lead + \beta_{20} \ln Proceeds + u \end{aligned} \quad (10)$$

3.2.2 The underwriting fee

The underwriting fee compensates the underwriter for the offering risk born when purchasing the offering from the issuer, which originates from information asymmetry between the firm and investors. Other flotation costs include the management fee, which compensates for the syndicate's marketing effort (the roadshow, the book building process, preparing the prospectus, due diligence) and the selling concession that compensates underwriters (lead underwriter, other syndicate members and co-managers) and non-

¹⁹ To obtain annual analyst EPS accuracy rankings, we sort analysts on the mean error of their forecasts issued in the previous year and rank from smallest to highest error. Analysts issuing more accurate forecasts receive lower ranks. Our procedure is similar to Starmine Analyst Awards rankings, see www.excellence.thomsonreuters.com/awards/starmine.

²⁰ An underwriter may refuse to underwrite or withdraw from underwriting an issue if the risk of offering failure and resultant reputation loss is high.

²¹ Lee and Masulis (2009) use Carter and Manaster's (1990) reputation ranks from Jay Ritter's webpage to control for underwriter quality. These are broker ranks based on IPO activity only calculated every 3 (2005–2007) to 9 years (1992–2000). We replicate our analysis using these ranks as a proxy for broker quality and find qualitatively similar results.

underwriters (dealers) for reselling equity to the public. The management fee and the selling concession depend on the issuer's target investor group (blockholders, institutional investors or small individual investors) and the equity selling channels chosen for the issue. As a result, strategic changes in the firm's information environment that influence information asymmetry levels are unlikely to influence these costs.

We relate the ratio of the underwriting fee to gross issue proceeds to log levels and changes in public and private information quality. Previous studies (Altinkilic and Hansen, 2000, Eckbo and Masulis, 1992, Butler, Grullon and Weston, 2005 and Lee and Masulis, 2009) find flotation costs increase with the issuer's risk. We measure security risk by stock price daily standard deviation and firm market capitalization. Jensen (1986) and Stulz (1990) point out that high leverage limits a firm's ability to exploit new investment opportunities since adverse liquidity shocks have a negative effect on investment as leverage increases. We measure log leverage ($\ln LEV$) as the log ratio of debt to total assets. If demand for the firm's shares is expected to be high, underwriting risk falls. Higher growth option potential should stimulate investor demand. We use the book-to-market ratio, investment rates and return on assets to measure a firm's growth options and profitability. Abnormal stock return before the issue controls for issue timing. Butler et al. (2005) report that investment banks charge lower fees to firms with more liquid stock before the offering. Higher SEO stock liquidity can increase the uptake of new shares as it facilitates continuous share trading. To capture the effect of stock liquidity on issue uptake, we use the firm's turnover ratio (TR), which is the ratio of share volume to the number of shares outstanding in the month. We use industry, exchange, issue period and issue type dummies (Industry dummies, Exchange, *HOT*, and Issue type). Early evidence of Smith (1977) shows that flotation costs fall with offering size, suggesting economies of scale. We control for the offering's size using the log

of gross issue proceeds. We relate the underwriting fee to analyst forecast bias and analyst and broker characteristics from equation (10). The empirical model specification is

$$\frac{\text{underwriting fee}}{\text{gross proceeds}} = \beta_0 + \beta_1 \Delta \ln PUB + \beta_2 \Delta \ln PRIV + \beta_3 \ln PUB + \beta_4 \ln PRIV + \beta_5 \ln B/M + \beta_6 \ln INV/A + \beta_7 ROA + \beta_8 \ln MV + \beta_9 \text{price STD} + \beta_{10} pBHAR + \beta_{11} \text{Exchange} + \beta_{12} HOT + \beta'_{13} \text{Industry dummies} + \beta_{14} \text{Issue type} + \beta_{15} FB + \beta_{16} A_exp + \beta_{17} A_QEPS + \beta_{18} B_Under + \beta_{19} \#Lead + \beta_{20} \ln Proceeds + \beta_{21} \ln LEV + \beta_{22} TR + u \quad (11)$$

Underwriting fees and issue proceeds have only positive values and we estimate equation (11) using a Tobit model.

4. Data

Our sample of seasoned equity issues is from the SDC New Issues database and includes all companies issuing seasoned equity that make pure primary offerings or combinations of primary and equity sales by a major shareholder (combinations). We include SEOs by NYSE/AMEX/Nasdaq listed US industrial, financial and utility firms but exclude unit offerings, private placements, exchange offers of stock, 144A offers, cancelled offers and spin-off related issues. We collect information on individual analyst EPS forecasts and actual EPS from the IBES detail files.²² To calculate sample equivalents of public and private signal quality from equations (6) and (7) and the ratio of public information precision to the sum of public and private information precision, Rho , from equation (8), stocks must have at least three one-year-ahead EPS forecasts per quarter. Forecast dispersion, D , is the quarterly variance in individual analyst forecasts for a company. Squared error, SE , is the squared difference between the mean EPS forecast for the quarter and actual EPS. N is the number of forecasts in the quarter. Forecast bias, FB , is the mean forecast bias for the quarter scaled by the end-of-previous quarter stock price. PUB , $PRIV$ and FB are for each quarter-end three

²² We winsorize analyst and actual EPS at 1% level.

years before and after the offering. The initial sample includes 5,075 SEOs from January 1982 to June 2007.²³ As in Barron et al. (2002) we use only positive values of public information precision, which leaves 4,292 SEOs. We use log transformations of *PUB* and *PRIV* to give better normal distribution approximations. *Rho* is based on log values of *PUB* and *PRIV*. Figure 1 shows the distribution of SEOs by issue year. The number of equity issues gradually increases from an average of 68 per year in the 1980s to an average of 152 from 1990 to 1998. Issuing activity increases sharply in the later sample period, averaging 265 issues per year.

4.1 Public and private information quality around equity offerings

We should observe stable levels of a firm's information quality before and after the issue if the firm does not alter its disclosure around the offering. Table 1, Panels A and B show mean $\ln PUB$, $\ln PRIV$, *Rho* and forecast bias in the three years before and after the issue, and their differences.²⁴ Mean (median) public quality is 3.362 (3.438) before the issue, decreasing to 3.2 (3.306) after the offering. Mean (median) private signal quality is 2.005 (2.294) before and 1.814 (2.171) after the offering. On average, private information precision is smaller than public information precision. The mean ratio of $\ln PRIV$ to $\ln PUB$ is 60% in the pre-issue period and 57% in the post-issue period. This is consistent with the firm being the main information supplier to the market. The relative importance of public to total information quality, *Rho*, has a median of 0.538 before and 0.531 after the issue.²⁵ This suggests higher public information content in analyst forecasts and the important information intermediation role of analysts' research reports. Mean (median) analyst forecast bias is

²³ For comparison, Lee and Masulis (2009) investigate 963 SEOs over 1990–2002. Bowen, Chen and Cheng (2008) examine 4766 SEOs over 1981–2000.

²⁴ The issue quarter is part of the post-offering period.

²⁵ *Rho* exhibits high right skewness (skewness coefficient of 204) compared to $\ln PUB$ (−2.7) and $\ln PRIV$ (−0.5) over the 36-month event window. As a result, in the case of *Rho*, we rely on the median test. Mean and median tests for other variables produce consistent and qualitatively similar results.

−1.69% (0.09%) in the pre-issue period, increasing to −2.32% (−0.19%) in the post-issue period. Panel B confirms lower public and private signal quality and increasing forecast bias in the post-issue period based on a *t*-test with firm-clustered robust standard errors and a Wilcoxon rank-sum test.

Previous studies infer the quality of the firm's information environment from analyst forecast error, forecast dispersion or the number of forecasts issued. We report mean and median *SE*, *D* and *N* in the bottom rows of Panels A and B. We find significantly lower median *SE*, *D* and *N* before the equity issue. Median *SE* is 0.012 before and 0.014 after the issue. Median analyst forecast dispersion is 0.002 before and 0.003 after the offering. The mean number of forecasts per quarter increases from 9.511 before to 10.284 after the issue. Results for squared error and forecast dispersion are consistent with those for $\ln PUB$ and $\ln PRIV$. However, equations (4) and (5) show that changes in the quality of public and private information influence both measures. In isolation, *SE* and *D* do not distinguish the effect of changes in public and private information quality on the firm's information environment in the presence of strategic disclosure by the firm.

Panel C reports correlation coefficients between information quality measures and analyst forecast bias. There is a positive correlation between $\ln PUB$ and $\ln PRIV$ of 0.599. A richer information environment incentivizes analysts to use their experience and skill to acquire better quality private information. The correlation between the information quality measures and analyst forecast bias is positive and stronger for $\ln PRIV$. Better quality public and private information reduces forecast bias. Opaque and low quality financial communication may create better conditions to disguise forecast optimism (whether forecast optimism is driven by economic incentives, e.g. investment banking business, or by psychological and behavioral biases). As public and private information quality increases, analysts may find it difficult to justify overly optimistic forecasts. A positive correlation

between public and private information quality and forecast bias is consistent with Lim (2001) who argues that analysts may trade off bias for better access to management to improve forecast accuracy. As information quality improves, analysts do not need to bias their forecasts to improve forecast accuracy.

4.1.1 Quarterly evolution in the quality of the public and private signals around equity issues

The evidence on higher pre-issue public and private information quality may result from the (one-off) announcement date information in analyst forecasts. Figure 2 shows the quarterly evolution of median $\ln PRIV$, $\ln PUB$ and Rho over the 3-years before and after the issue quarter.²⁶ Figure 2a shows results for $\ln PUB$. Median public information precision increases from 3.16 in quarter -12 to a peak of 3.592 in quarter -2 . This coincides with the quarter of the last annual earnings announcement before the issue. The mean (median) number of days between the last annual and quarterly earnings announcements and the issue date is 164 (153) and 42 (41). Korajczyk et al. (1992) find, in their sample of 637 SEOs over 1978–1983, that equity issues follow shortly after annual earnings announcements as new information reduces information asymmetry. Our results suggest that firms do not time equity issues to closely follow earnings announcements. Other earnings announcement quarters do not show significant increases in $\ln PUB$. Median public information quality is 3.501 one quarter before the issue, decreasing sharply to 3.174 in quarter seven, and settling at an average 3.225 for the remaining period.

Figure 2b shows the evolution of private signal quality, which mirrors that of public, but at a lower level. The precision of analysts' signals increases from 1.93 in quarter -12 to an average of 2.312 over quarters -11 to -2 ; $\ln PRIV$ shows two peaks, in quarters -6 and -2 , which include the earnings announcement dates preceding the issue quarter. This confirms

²⁶ Using mean results produces qualitatively similar results.

results in Barron et al. (2002) and Kim and Verrecchia (1994, 1997) that analysts engage in private information production around earnings announcements, which increases their private signal precision and the private information content of analyst reports. Private information quality falls from 2.275 one quarter before the issue to 1.998 in quarter four, leveling at an average of 2.112 over the remaining sample period. Figure 2c shows the evolution of the public to total information quality ratio. Median *Rho* increases from 0.535 in quarter -12 to 0.546 one quarter before the issue. Following the offering there is a steep decline in the relative importance of public information, consistent with Figure 2a. *Rho* declines from 0.542 in the issue quarter to 0.524 in quarter 12.

For comparison, Figure 3 reports the quarterly evolution of squared error, forecast dispersion and the number of analyst forecasts over the 3-years before and after the issue quarter. Figure 3a shows results for the squared error in mean forecast. *SE* decreases from 0.017 in quarter -12 to a low of 0.01 in quarter -2; *SE* increases to 0.015 in quarter 4 leveling at 0.014 for the remaining period. Higher private information quality lowers analyst disagreement reducing forecast dispersion. Figure 3b shows forecast dispersion decreasing from 0.028 in quarter -9 to 0.022 one quarter before the issue. Dispersion in analyst forecasts increases after the offering to a peak of 0.03 nine quarters after the issue. Figure 3c reveals very little variation in the number of analyst forecasts issued before the offering but an upward trend in *N* after the offering. Securing coverage by the underwriter's analysts after the issue forms an important part of the underwriting agreement and influences the choice of broker (Krigman, Shaw and Womack, 2001). Firms may also use equity offerings to attract higher analyst following by unaffiliated analysts. Overall, Figures 2 and 3 confirm results in Table 1 that SEO firms improve the quality of their information environment before the issue, particularly strongly in the four quarters before the issue.

Table 1 shows smaller analyst forecast bias before the equity issue. Figure 4 shows the evolution of median analyst forecast bias in the six years around the issue quarter (mean forecast bias shows a similar pattern but at a lower level). We analyze median forecast bias, consistent with Abarbanell and Lehavy (2003), who find that managing earnings to meet or beat analyst forecasts leads to a higher proportion of negative than positive forecast errors, influencing the mean forecast error. Using median forecasts adjusts for asymmetry in the forecast distributions. Gu and Wu (2003) reach a similar conclusion. Forecast bias falls from -0.25% in quarter -12 to -0.16% in quarter -5 and increases sharply to a peak of 0.09% in quarter -2 . *FB* decreases sharply from 0.03% in the issue quarter to -0.22% three quarters later and levels at an average of -0.25% over the remaining period, similar to pre-offering levels. Figure 4 confirms that analyst earnings forecasts are less biased around the offering date, contributing to improvements in the firm's information environment.²⁷ Barron et al. (1998) argue that the construct validity of *PUB* and *PRIV* decreases with forecast bias. Forecast bias increases analyst forecast error, leading to higher mean squared error and inflating estimates of public information quality. Figures 2 and 4 show improved public information quality as forecast bias falls, which confirms the validity of *PUB* and *PRIV*.

4.1.2 Annual changes in $\ln$ *PUB*, $\ln$ *PRIV* and *FB* around equity issues

To further test if firms strategically improve the quality of their information environment before the issue, Table 2 reports the significance of mean and median annual changes in *PUB*, *PRIV* and *Rho* before and after the issue. The annual numbers are based on quarterly values within a year. There are significant mean (median) annual changes in $\ln$ *PUB* from year -3 to -2 of 0.076 (0.128) and from year -2 to -1 of 0.07 (0.074). Following the issue, $\ln$ *PUB* decreases by a mean (median) 0.112 (0.094) from year -1 to year 1 , by

²⁷ Consistent with unbiased analyst EPS forecasts, Frankel, McNichols and Wilson (1995) find objective management earnings forecasts before external capital acquisitions.

0.145 (0.162) from year 1 to year 2 and by 0.065 (0.019) from year 2 to year 3. Changes in private information quality follow a similar pattern, with $\ln PRIV$ increasing by a mean (median) 0.181 (0.157) from year -3 to year -2 and by 0.115 (0.107) from year -2 to year -1 . Private information quality decreases annually by a mean (median) 0.2 (0.162) in the first two years after the issue. We find significant improvements in median Rho from 0.537 in year -2 to 0.543 in year -1 and consecutive mean annual reductions of 0.006 for the three years after the issue. Mean Rho shows no significant changes. The bottom rows of Table 2 show a significant reduction in mean and median forecast bias before issues. The mean (median) forecast bias falls from -2.11% (-0.17%) in year -2 to -0.97% (0.06%) in year -1 . Optimism in analyst earnings forecasts increases in the two years after the issue.

4.1.3 Portfolio analysis of changes in information quality around equity issues

Disclosure changes are costly for firms. In-house management and financial accounting systems have to adjust to produce more accurate information. Better disclosure can provide competitors with valuable information, which may erode a firm's competitive position. Firms will change their disclosure when the marginal benefits of better quality information exceed the costs. In equilibrium, firms increase disclosure quality until the marginal benefits equals the marginal costs. This should lead to an inverse relation between levels and changes in public information quality around equity issues.²⁸ Table 3 shows results from SEO tercile sorts based on $\ln PUB$ measured at the beginning of the three year window before issue.²⁹ Issuing firms in Portfolio 1 with the lowest ex ante public information quality significantly increase their public signal quality from a mean (median) 0.381 (1.088) to 1.941 (2.04) compared to a significant reduction from 6.493 (6.201) to 4.852

²⁸ In a similar context, Habib and Ljungqvist (2001) find that IPO underwriters take costly actions to reduce information asymmetry until the marginal cost equals the marginal benefit from reduced underpricing.

²⁹ If a firm has missing $\ln PUB$ in quarter -12 , we take the next observation closest to the beginning of the event window. Missing $\ln PUB$ in the beginning of event window narrows the sample to 3,217 observations.

(4.998) for portfolio 3 issuers with the highest ex ante information quality. Issuers in Portfolio 2 show a significant but small reduction in mean (median) $\ln PUB$ of 0.162 (0.095) but no change in $\ln PRIV$. Median Rho increases significantly by 0.153 for portfolio 1 issuers but decreases by 0.019 for Portfolio 3 issuers. This confirms that firms with the lowest ex ante $\ln PUB$ improve the quality of their information environment. Mean (median) analyst forecast bias is -1.43% (0.08%) for the lowest ex ante quality issuers compared to -1.64% (0.05%) for portfolio 2 issuers and -0.52% (0.1%) for portfolio 3 issuers.

The results in Section 4 support hypotheses 1 and 2 that companies improve their public information quality before equity issues, which in turn promotes higher analyst private signal precision. Analysts contribute to positive changes in the firm's information environment and issue less biased forecasts around the equity issue, confirming hypothesis 5a. Our findings are inconsistent with an argument that information asymmetry encourages managers to time the issue of misvalued securities to transfer wealth from new to existing investors (Jensen, 2005).³⁰ To maintain their overvaluation, firms may manipulate information (e.g. issue overly optimistic management discussion and analysis) and reduce the quality of their financial communication. Analysts may face conflicts of interest if they are under pressure to ingratiate themselves with the company and issue favorably biased research forecasts that hype the firm's stock in the hope of obtaining investment banking mandates (Lin and McNichols, 1998, Michaely and Womack, 1999, and Bradley, Jordan, and Ritter, 2003).

5. The relation between properties of the firm's information environment and the net benefits of raising external capital

³⁰ According to this argument, information asymmetry between investors and managers about true firm value allows managers to recognize overpricing and issue securities to exploit the temporary window of opportunity.

We predict that better financial communication serves to secure the issue proceeds and lower equity flotation costs. We test this prediction by relating levels and changes in public and private information quality to the likelihood of exercising the overallotment option and to the underwriting fee using the empirical models in equation (10) and (11). Levels and changes in *PUB* and *PRIV* are relative to the quarter preceding the issue. This ensures the latest information is available to investors with no hindsight bias and avoids including issue quarter information in analyst forecasts. Stock market and accounting data are from the CRSP/Compustat merged database. To allow for at least one year to measure analyst experience on IBES, the sample period starts in 1983. Additional requirements limit the sample to 2,208 offerings, of which 1,117 SEOs have the overallotment option and 1,091 offerings have non-missing information on underwriting fees.

Table 4 shows descriptive statistics for the regression variables for SEOs with the overallotment option. We winsorize *MV*, *B/M*, *LEV*, *INV/A*, *ROA*, at 1% level. The levels are indistinguishable from the SEO sample with non-missing information on underwriting fees apart from higher analyst EPS accuracy ranking for SEOs with the overallotment option.³¹ Firms raise on average over \$192 million. Mean $\ln MV$ is 6.721, $\ln B/M$ is -0.785 , $\ln LEV$ is -0.724 and *INV/A* is 0.073. SEO stock price standard deviation is 5.591 and offering firms have a mean *ROA* of -0.003 and *TR* of 0.093. SEOs exhibit strong pre-offering stock price performance, with mean *pBHAR* equal to 72.5%. Over half of equity issuers list on Nasdaq and 19.2% take place during the bubble period 1997–2000. Primary offerings are 74.6% of the sample. An average broker underwrote 6.3% of all equity issues over the previous 30 months. The number of lead underwriters is 1.27. On average, analysts have been in the IBES database for the past 5.482 years. Average EPS quality ranking of analyst following is 1702; given a mean (median) *A_QEPS* value for IBES of 1584 (1459),

³¹ Unreported results show that the levels of $\ln PUB$, $\ln PRIV$ and *Rho* are indistinguishable from the full sample in Table 1.

SEOs are followed on average by analysts issuing less accurate EPS. The overallotment option is exercised in 75.1% of issues selling an additional \$20.368 million of equity. Mean underwriting fee is \$1.3m, equaling 0.9% of gross proceeds.

Figure 5 shows the annual distribution of mean offering proceeds, the sum of offering proceeds and the exercised overallotment option and underwriting fee over the sample period. Issue proceeds average \$127.1 million from 1983 to 1996 and increase sharply during the bubble period peaking at \$443.5 million in 2000. Issue proceeds decrease to \$198.2m in 2002 and level out at \$211m over the remaining sample period. The distribution of the oversold amount from the overallotment option and the underwriting fee mirrors that of issue proceeds. Average oversold value is \$9.67m from 1983 to 1996, it increases to \$97.3m in 2000 and decreases to \$14.86m in 2001 leveling at \$16.79m till the end of the sample period. Mean underwriting fee increases from \$0.717m in 1983 to \$1.098m in 1997, peaks at \$2.673m in 2000 and levels out at a mean \$1.862m over the remaining sample period.

5.1 Regression results

Hypotheses 3 and 4 predict that firms strategically change their financial communication before raising capital to facilitate the offering, lower information asymmetry and boost the offering proceeds.³² To test these predictions, we examine the relation between properties of the firm's information environment and the likelihood of exercising the overallotment option and underwriting fees relative to issue proceeds.

5.1.1. The likelihood of exercising the overallotment option

Table 5 reports results of the logit model, equation (10), predicting the likelihood of exercising the overallotment option. If the underwriter exercises the overallotment option

³² Firms may change their financial communication to accomplish a number of other goals, such as attracting particular investor groups (e.g. institutional investors, blockholders). Media attention is likely captured by the quality of private information.

and sells more shares than filed in the offering prospectus registered with the SEC, we consider an offering a success. As the last four quarters before the offering are likely to have a stronger bearing on investors' decisions to participate in the offering, we include median changes in $\ln PUB$ and $\ln PRIV$ one year before the issue ($\Delta PUB\ 1year$, $\Delta PRIV\ 1year$) in addition to changes over the 3-year pre-offering period ($\Delta PUB\ 3year$, $\Delta PRIV\ 3year$).

Only 1,117 out of 2,208 SEOs have the overallotment option and we test for the presence of sample selection bias. We predict the likelihood of an underwriter having an overallotment option increases with the issue proceeds, broker quality, firm risk and growth option content, during hot issue periods and for firms with low quality information environment. We do not find a significant correlation between residuals from the model predicting the presence of the overallotment option and residuals from the model predicting the likelihood of exercising the overallotment option at a 1% significance level. We tried different model specifications and exclusion restrictions but never rejected the null hypothesis of equations independence. This suggests our sample is free of selection bias.

A pre-offering one-year improvement in PUB increases the likelihood of selling additional equity, shown by a significant positive coefficient of 0.028 on $\Delta PUB\ 1year$.³³ Both $\ln PUB$ and $\Delta PUB\ 3year$ are insignificant. The results suggest that changes in public signal quality by the firm shortly before the offering influence the issue proceeds. The significant negative coefficient of -0.034 on $\Delta PRIV\ 1year$ suggests that higher private information precision increases information asymmetry between informed and uninformed investors, discouraging offering participation. This supplements results in Botosan, Plumlee, and Xie (2004) who find that increases in private signal precision suggest more private information available to informed investors, which offsets the effect of higher public information quality on the cost of capital. We find no evidence that forecast bias influences

³³ Tests for multicollinearity between the independent variables using variance inflation factors give a highest score value less than 3.31, indicating little concern for multicollinearity.

issue proceeds as the *FB* coefficient is indistinguishable from zero. This confirms our earlier results that analyst forecast bias falls around the offering, supporting the information intermediation and monitoring role of analysts before equity issues. Underwriters of small firms are more likely to exercise the overallotment option ($\ln MV = -0.357$), which contradicts our prediction that greater uncertainty inherent in valuing these firms lowers investor demand. Firms issuing equity during the internet bubble period are more likely to succeed in raising higher proceeds ($Hot = 0.631$). Firms followed by better earnings forecasters, i.e. analysts with lower *A_QEPS* ranking, are more likely to exercise the overallotment option (marginal effect of *A_QEPS* = -0.01%). Higher valued offerings attract larger investor interest and contribute to the likelihood of exercising the overallotment option ($\ln Proceeds$ coefficient of 0.487).

The results in Table 5 provide evidence consistent with hypotheses 3 and 4 that an increase in public (private) signal precision before SEOs increases (decreases) offering proceeds.

5.1.1.1. Endogeneity considerations: the choice of underwriter and offering size

Firms endogenously choose their underwriters. Apart from marketing and underwriting services, brokers provide a valuable role certifying the quality of offerings. Underwriting low quality offerings damages a broker's reputation, reducing the present value of future investment banking and share trading income. This cost of reputation loss ensures a broker's credibility as a certifier of issue quality (Fang 2005). Firms may attempt to reduce the negative effect that information asymmetry has on offering proceeds by hiring reputable underwriters. In addition, Lee and Masulis (2009) observe that offering size is endogenously determined by the firm. Managers set the offering size in relation to the firm's information asymmetry, investment needs, and analyst behavior. Neglecting the endogeneity of broker

characteristics and offering proceeds in relation to net offering benefits may lead to biased and inconsistent estimates.

We control for the endogenous choice of the underwriter and the offering size using an instrumental variables approach. To ensure identification, the instruments need to be (weakly) exogenous to the regression predicting the likelihood of exercising the overallotment option but correlated with the underwriter quality and offering size. We use firm age as an instrument for the issue size. Younger firms require more investment capital at the start of their life cycle and may depend more on equity financing compared to mature firms, which have easier access to the loan and the debt market. We argue that firm age is exogenous to the model predicting the likelihood of exercising the overallotment option. Unexpectedly high investor demand for a firm's shares that leads an underwriter to exercise the overallotment option should be independent of a firm's age. We measure a firm's age as the difference between a firm's IPO date and the issue date (*Age*).

We use the average value of all offerings from 36 to 6 months before the issue to the total value of all offerings over this period as an instrument for SEO underwriter quality (*avgB_Under*). If the broker choice is random, broker quality is that of an average underwriter. If some SEOs choose their brokers to certify the quality of the offering, their brokers should have higher than average quality. We do not expect average broker quality to influence investor demand for a firm's stock, which should ensure the error term in the regression predicting the likelihood of exercising the overallotment option is uncorrelated with *avgB_Under*. The drawback of our instrument is that it has only temporal variation. However, given a large spread of equity issues over our sample period, this should not drastically reduce the power of the instrument.

Table 6 reports results from OLS regressions explaining the offering size (Model 1), underwriter quality (Model 2), and 2SLS probit model results of predicting the likelihood of

exercising the overallotment option (Model 3). Larcker and Rusticus (2010) show that IV estimates are preferable to OLS estimates for “semi-endogenous” instruments, i.e. instruments less correlated with the error term in the structural equation, if the instruments are moderately or highly correlated with the endogenous regressors. They show that the reduction in bias increases with the R -square from first step regression (Larcker and Rusticus, 2010, eq. 9). The R -squares are 75.13% for Model 1 and 34.07% for Model 2. This suggests the correlation between the error term in the structural equation and the instruments is much smaller compared to the correlation of the endogenous variables $\ln Proceeds$ and B_Under . The results show that our instruments are (at least) less endogenous compared to $\ln Proceeds$ and B_Under and 2SLS estimates are preferable to OLS. An (untabulated) Wald exogeneity test statistic is 38.92 with a p -value of 0.000, which confirms the endogeneity of at least one of the instrumented variables.

Controlling for the variables in equation (10), issue proceeds are negatively related to firm age ($Age = -0.005$). This is consistent with the prediction that younger firms issue relatively more equity. Underwriter quality relates positively to average broker quality ($avgB_Under = 28.068$) but not to firm age. The results from the 2SLS probit model are qualitatively similar to Table 5. Improvements in private information quality decrease the likelihood of higher than anticipated investor demand as information asymmetry *among* investor groups increases. Higher standard errors from 2SLS estimation eliminate the relation between changes in public signal quality in the year before the issue and the likelihood of exercising the overallotment option.

5.1.2 Underwriting fee

We predict that firms with higher public signal precision pay lower underwriting fees. Table 7 shows results from a tobit regression of equation (11). We multiply all coefficients

and standard errors by 10^3 . Issuers with higher changes in public information quality over the 3-year pre-issue period pay lower underwriting fees ($\Delta PUB\ 3year = -0.043$). Higher precision of private signals before the issue increases the underwriting fees ($\Delta PRIV\ 3year = 0.042$). This reinforces our previous results that higher quality private information increases information asymmetry among investors, adversely affecting net issue benefits. We find no relation between analyst forecast bias and broker characteristics and underwriter compensation. Large underwriting syndicates increase total underwriting fees relative to gross offering proceeds ($\#Lead = 0.492$). Bigger firms with lower leverage pay smaller fees ($\ln MV = -0.668$ and $\ln LEV = -0.355$). Underwriters require smaller compensation for NYSE/AMEX listed issuers ($Exchange = 0.68$). Better quality analyst following reduces underwriting fees ($A_QEPS = 0.005 \times 10^{-1}$) but issuers may need to compensate more for coverage by more experienced analysts ($A_exp = 0.089$). Consistent with results in previous studies, there are economies of scale, with a negative coefficient on offering size ($\ln Proceeds = -1.08$). Using an instrumental variables approach, the Wald test statistic is 4.34 with a p -value of 0.114, which suggests issue proceeds and broker quality are exogenous relative to underwriting fees. Overall, we find that firms that improve the quality of their financial communication succeed in lowering the cost of raising external capital.

5.2 Robustness analysis

We replicate the analysis in Tables 5, 6 and 7 using squared error in mean forecast, forecast dispersion and number of forecast as proxies for public and private information quality. A reduction in forecast error and dispersion should lower net issue costs. We expect SE and D to relate negatively to the likelihood of exercising the overallotment option but influence the underwriting fee positively. An increase in the number of forecasts should increase the likelihood of exercising the overallotment option and lower underwriting fee.

Table 8 reports results from a probit model (Model 1) and a 2SLS probit model (Model 2) predicting the likelihood of exercising the overallotment option, and a tobit model explaining variation in underwriting fees (Model 3).³⁴ SEOs with higher forecast dispersion are less likely to exercise the overallotment option ($D = -0.194$). This corroborates results from Table 5. Using 2SLS produces no significant relation between SE , D and N and the likelihood of exercising the overallotment option. Higher analyst coverage lower the underwriting fee paid by the issuer ($N = -0.031$). However, firms pay on average higher fees to attract higher coverage ($\Delta N \text{ } 3year = 0.026$). Overall, results from Table 8 support our main conclusions.

6. Further research

This paper does not address the evidence on favorable target prices and stock recommendations before equity issues, their effects on the firm's information environment and consequently on issue proceeds and the cost of raising capital. Target prices and stock recommendations derive from EPS forecasts but only infrequently accompany analysts' research reports. For example, Brav and Lehavy (2003) report selective use of analyst research outputs, as target prices are present in only two thirds of analyst reports. The August 2009 update of the First Call database shows the number of stock recommendations are only 31% of earnings forecasts. We conjecture that information contained in target prices and stock recommendations only marginally influences the firm's information environment. Compared to earnings forecasts, target prices and stock recommendations may target different investor groups that are less important from the issuer's perspective (e.g. small individual investors). Target prices and stock recommendations may also serve different

³⁴ We multiply all coefficients from the tobit regression (Model 3) by 10^3 .

purposes from earnings forecasts. For example, they may serve to attract media attention as stock recommendations and target prices are easy to interpret.

Rangan (1998), Teoh, Welch, and Wong (1998), DuCharme, Malatesta, and Sefcik (2004) and Kim and Park (2005) report that issuers' discretionary accruals increase before equity issues. However, Shivakumar (2000) finds that the market rationally anticipates earnings management before the offering and undoes its effect at the offering announcement. He argues that test misspecification explains findings in Rangan (1998) and Teoh et al. (1998). Burgstahler and Eames (2003) find that analysts anticipate earnings management to avoid losses and small earnings decreases. We believe changes in the quality of the firm's information environment to be of first-order importance relative to the firm's accounting choices. Firms likely mask aggressive earnings management before equity issues by decreasing the quality of their financial communication, which increases information asymmetry. This reduces the risk of investors recognizing opportunistic managerial behavior to hype the stock. If investors recognize opportunistic managerial behavior, they discount the information in stock prices, undoing the effect of earnings management. In addition, firms that opportunistically manage their earnings face higher risk of offering failure, as investors shun new issues, and a market penalty in the form of a lower post-issue stock price and higher litigation risk (DuCharme et al., 2004).

Firms can selectively disclose information before equity issues, favoring positive news to attract investor interest and encourage issue participation. If misleading or selective information before the offering harms investors, the company can be sued under the Securities and Exchange Act 1934, Section 10b-5 and the Securities Act 1993, Section 11. DuCharme et al. (2004) find that litigations follow 1.79% of 4,908 equity issues over 1988–

2000, lower than the average 2.4% of all NYSE/Nasdaq and AMEX listed firms sued by shareholders each year over 1997–2000.³⁵

We leave questions on the influence of other (than EPS) analyst research outputs and earnings management on the quality of the firm's information environment and the net issue proceeds to further research. Further research can also apply contextual analysis to investigate the information content and type (good vs. bad news) of information disclosed by companies before equity issues. .

7. Conclusions

This paper offers insights into changes in the firm's information environment around capital market transactions. We find that seasoned equity issuers improve the quality of public information around SEOs. This incentivizes analysts to acquire private information, which increases the precision of their private signals and the private information content of analyst reports. Analysts contribute to the improvement in the firm's information environment around equity issues and issue more objective earnings forecasts. Consistent with the previous literature, we find increasing bias only after the offering.

Controlling for firm, analyst and broker characteristics, we find that improvements in public information quality influence net flotation costs. The likelihood of exercising the overallotment option increases, which raises the issue proceeds beyond the prospectus amount. However, higher private signal precision leads to higher information asymmetry between informed and uninformed investors. Uninformed investors face a risk of wealth expropriation when trading with informed investors after the offering, which reduces the demand for seasoned equity. We find issuers that improve the quality of public communication pay lower underwriting fees, which signals lower offering risk. Higher

³⁵ From Litigation Activity Indices at http://securities.stanford.edu/litigation_activity.html.

private information precision increases underwriting fees as uninformed investors are more reluctant to purchase new shares. Our results are robust to controlling for endogeneity in the choice of the underwriter and offering size.

In a taxonomy of the accounting literature on firm disclosure, Verrecchia (2001, 97–98) recommends “information asymmetry reduction as a vehicle to integrate the efficiency of disclosure choice, the incentives to disclose, and the endogeneity of the capital market process as it involves the interactions among individual and diverse investors”. Our study joins the fledgling research that links these elements. The importance of information quality cannot be exaggerated as it plays a key role in the capital allocation process, allowing investors to appraise and later monitor their investments. Poor information quality results in heterogeneous expectations about future firm prospects and resultant high value uncertainty, which increases the cost of equity capital.

References:

- Abarbanell, J.S., Lanen, W.N., Verrecchia, R.E.I., 1995. Analysts' forecasts as proxies for investor beliefs in empirical research. *Journal of Accounting and Economics* 20, 31-60.
- Abarbanell, J.S., Lehavy, R., 2003. Biased forecasts or biased earnings? The role of reported earnings in explaining apparent bias and over/underreaction in analysts' earnings forecasts. *Journal of Accounting and Economics* 36, 105–146.
- Agarwal, R., 2000. Stabilization activities by underwriters after Initial Public Offerings, *Journal of Finance* 55, 1075-1103.
- Ali, A., 1996. Bias in analysts' earnings forecasts as an explanation for the long-run underperformance of stocks following equity offerings. Working paper, University of Arizona.
- Altinkilic, O., Balashov, V.S., Hansen, R.S., 2009. Evidence that analysts are not important information-intermediaries. Working paper, University of Pittsburgh.
- Altinkilic, O., Hansen, R.S., 2000. Are there economies of scale in underwriting fees? Evidence from rising external financing costs. *Review of Financial Studies* 13, 191–218.
- Bamber, L.S., Barron, O.E., Stober, T.L., 1997. Trading volume and different aspects of disagreement coincident with earnings announcements. *The Accounting Review* 72, 575–97.
- Bamber, L.S., Barron, O.E., Stober, T.L., 1999. Differential interpretations and trading volume. *Journal of Financial and Quantitative Analysis* 34, 369-386.
- Barron, O.E., Kile, C.O., O'Keefe, T.B., 1998. MD&A quality as measured by the SEC and analysts' earnings forecasts. *Contemporary Accounting Research* 16, 75–109.
- Barron, O.E., Byard, D., Kim, O., 2002. Changes in analysts' information around earnings announcements. *The Accounting Review* 77, 821-846.

- Barron, O.E., Kim, O., Lim, S., Stevens, D., 1998. Using analysts' forecasts to measure properties of analysts' information environment. *The Accounting Review* 73, 421-433.
- Botosan, C., Plumlee, M., Xie, Y., 2004. The role of private information precision in determining cost of equity capital. *Review of Accounting Studies* 9, 233-59.
- Bowen, R.M., Chen, X., Cheng, Q., 2008. Analyst coverage and the cost of raising equity capital: Evidence from underpricing of Seasoned Equity Offerings, *Contemporary Accounting Research* 25, 657 – 700.
- Bradley, D.J., Bradford D.J., Ritter, J.R., 2003. The quiet period goes out with a bang. *Journal of Finance* 58, 1-36.
- Bradshaw, M.T., 2004. How do analysts use their earnings forecasts in generating stock recommendations? *The Accounting Review* 79, 25-50.
- Bradshaw, M.T., Richardson, S.A., Sloan, R.G., 2006. The relation between corporate financing activities, analysts' forecasts and stock returns. *Journal of Accounting and Economics* 42, 53-85.
- Brav, A., Lehavy, R., 2003. An empirical analysis of analysts' target prices: short term informativeness and long term dynamics. *Journal of Finance* 58, 1933-1967.
- Burgstahler, D.C., Eames, M.J., 2003. Earnings management to avoid losses and small decreases: Are analysts fooled? *Contemporary Accounting Research* 20, 253-94.
- Butler, A.W., Grullon, G., Weston, J.P., 2005. Stock market liquidity and the cost of issuing equity. *Journal of Financial and Quantitative Analysis* 40, 331-348.
- Byard, D., Shaw, K., 2003. Corporate disclosure quality and properties of analysts' information environment. *Journal of Accounting, Auditing, and Finance* 18, 355-378.
- Carter, R.B., Manaster, S., 1990. Initial Public Offerings and underwriter reputation. *Journal of Finance* 45, 1045-1068.

- Chaplinsky, S., Hansen, R.S., 1993. Partial anticipation, the flow of information and the economic impact of corporate debt sales. *Review of Financial Studies* 6, 1863–1889.
- Chemmanur, T., Fulghieri, P., 1994. Investment bank reputation, information production, and financial intermediation. *Journal of Finance* 49, 57–79.
- Chen, H., Ritter, J.R., 2000. The seven percent solution. *Journal of Finance* 55, 1105–1132.
- Cheng, Y., Liu, M.H., Qian, J., 2006. Buy-side analysts, sell-side analysts, and investment decisions of money managers. *Journal of Financial and Quantitative Analysis* 41, 51–83.
- Diamond, D. 1985. Optimal release of information by firms. *Journal of Finance* 40, 1071–1094.
- Diether, K.B., Malloy, Ch.J., Scherbina, A., 2002. Differences of opinion and the cross section of stock returns, *Journal of Finance* 57, 2113–2141.
- DuCharme, L.L., Malatesta, P.H., Sefcik, S.E., 2004. Earnings management, stock issues, and shareholder lawsuits. *Journal of Financial Economics* 71, 27–49.
- Easley, D., Hvidkjaer, S., O’Hara, M., 2002. Is information risk a determinant of asset returns? *Journal of Finance* 57, 2185–2221.
- Eckbo, B.E., Masulis, R.W., 1992. Adverse selection and the rights offer paradox. *Journal of Financial Economics* 32, 293–332.
- Ellis, K., Michaely, R., O’Hara, M., 2000. When the underwriter is the market maker: an examination of trading in the IPO aftermarket. *Journal of Finance* 55, 1039–1074.
- Fang, L., 2005. Investment bank reputation and the price and quality of underwriting services. *Journal of Finance* 60, 2729–2761.
- Francis, J., Soffer, L., 1997. The relative informativeness of analysts’ stock recommendations and earnings forecast revisions. *Journal of Accounting Research* 35, 193–201.

- Frankel, R., McNichols, M., Wilson, P., 1995. Discretionary disclosure and external financing. *Accounting Review* 70, 135–150.
- Gu, Z., Wu, J.S., 2003. Earnings skewness and analyst forecast bias. *Journal of Accounting and Economics* 35, 5–29.
- Habib, M., Ljungqvist, A., 2001. Underpricing and the entrepreneurial wealth losses in IPOs: theory and evidence. *Review of Financial Studies* 14, 433–458.
- Hansen, R.S., Fuller, B.R., Janjigian, V., 1987. The over-allotment option and equity financing flotation costs: an empirical investigation. *Financial Management* 17, 24–34.
- Healy, P.M., Hutton, A.P., Palepu, K., 1999. Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research* 16, 485–520.
- Hong, H., Kubik, J.D., Solomon, A., 2000. Security analysts' career concerns and herding of earnings forecasts, *RAND Journal of Economics* 31, 121–144.
- Jackson, A., 2005. Trade generation, reputation, and sell-side analysts. *Journal of Finance* 60, 673–717.
- Jegadeesh, N., Weinstein, M., Welch, I., 1993. An empirical investigation of IPO returns and subsequent equity offerings. *Journal of Financial Economics* 34, 153–175.
- Jenkinson, T., Jones, H., 2007. The economics of IPO stabilization, syndicates and naked shorts. *European Financial Management* 13, 616–642.
- Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance and takeovers. *American Economic Review* 76, 323–329.
- Jensen, M.C., 2005. Agency costs of overvalued equity. *Financial Management* 34, 5–19.
- Johnson, S., 1995. Dividend payout and the valuation effects of bond announcements. *Journal of Financial and Quantitative Analysis* 30, 407–423.

- Johnson, T., 2004. Forecast dispersion and the cross-section of expected returns. *Journal of Finance* 59, 1957–1978.
- Jung, K., Kim, Y., Stulz, R., 1996. Timing, investment opportunities, managerial discretion, and the security issue decision. *Journal of Financial Economics* 42, 159–185.
- Kim, O., Verrecchia, R.E., 1991. Trading volume and price reactions to public announcements. *Journal of Accounting Research* 29, 302–321.
- Kim, O., Verrecchia, R.E., 1994. Market liquidity and volume around earnings announcements. *Journal of Accounting and Economics* 17, 41–67.
- Kim, O., Verrecchia, R.E., 1997. Pre-announcement and event-period private information. *Journal of Accounting and Economics* 24, 395–419.
- Kim, Y., Park, M.S., 2005. Pricing of seasoned equity offers and earnings management. *Journal of Financial and Quantitative Analysis* 40, 435–463.
- Korajczyk, R.A., Lucas, D.J., McDonald, R.L., 1992. Equity issues with time-varying asymmetric information. *Journal of Financial and Quantitative Analysis* 27, 397–417.
- Krigman, L., Shaw, W.H., Womack, K.L., 2001. Why do firms switch underwriters. *Journal of Financial Economics* 60, 245–284.
- Lang, M., Lundholm, R., 2000. Voluntary disclosure and equity offerings: reducing information asymmetry or hyping the stock? *Contemporary Accounting Research* 17, 623–662.
- Larcker, D.F., Rusticus, T.O., 2010. On the use of instrumental variables in accounting research. *Journal of Accounting and Economics* 49, 186–205.
- Lee, G., Masulis, R.W., 2009. Seasoned equity offerings: Quality of accounting information and expected flotation costs. *Journal of Financial Economics* 92, 443–469.
- Leuz, C., Verrecchia, R.E., 2000. The economic consequences of increased disclosure. *Journal of Accounting Research* 38, 91–124.

- Lewellen, K., 2006. Risk, reputation, and IPO price support. *Journal of Finance* 61, 613–653.
- Lim, T., 2001. Rationality and analysts' forecast bias. *Journal of Finance* 56, 369–385.
- Lin, H., McNichols, M.F., 1998. Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics* 25, 101–127.
- Loughran, T., Ritter, J.R., 1995. The new issues puzzle. *Journal of Finance* 50, 23–51.
- Lyandres, E., Sun, L., Zhang, L., 2008. The new issues puzzle: testing the investment-based explanation. *Review of Financial Studies* 21, 2825–2855.
- Malmendier, U., Shanthikumar, D.M., 2009 Do security analysts speak in two tongues? NBER Working Paper No. W13124.
- Michaely, R., Womack, K., 1999. Conflict of interest and the credibility of analyst underwriter recommendations. *Review of Financial Studies* 12, 653–686.
- Mikhail, M., Walther, B., Willis, R., 1997. Do security analysts improve their performance with experience? *Journal of Accounting Research* 35, 131–157.
- Mikkelson, W., Partch, M., 1986. Valuation effects of security offerings and the issuance process. *Journal of Financial Economics* 15, 31–60.
- Myers, S.C., Majluf, N.S., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187–221.
- Rangan, S. 1998. Earnings Management and the Performance of Seasoned Equity Offerings. *Journal of Financial Economics* 50, 101–122.
- Ritter, J.R., 1998, Initial public offerings. *Contemporary Finance Digest* 2, 5–30.
- Shivakumar, L., 2000. Do firms mislead investor by overstating earnings before seasoned equity offerings? *Journal of Accounting and Economics* 29, 339–371.
- Smith, C., 1977. Alternative methods for raising capital: rights versus underwritten offerings. *Journal of Financial Economics* 5, 273–307.

- Stulz, R. 1990. Managerial discretion and optimal financing policies. *Journal of Financial Economics* 26, 3–27.
- Teoh, S.H., Welch, I., Wong, T.J., 1998. Earnings management and the long-run performance of seasoned equity offerings. *Journal of Financial Economics* 50, 63–100.
- Verrecchia, R.E., 2001. Essays on disclosure. *Journal of Accounting Economics* 32, 97–180.
- Zhang, D., 2004. Why do IPO underwriters allocate extra shares when they expect to buy them back? *Journal of Financial and Quantitative Analysis* 39, 571–594.

Figure 1. Annual sample distribution of equity issues.

The figure shows the annual number of equity issues for a sample of 4,292 equity offerings from January 1982 to June 2007.

Figure 2. Evolution of public and private information quality and the ratio of public to total information quality for three years before and after the equity issue.

Figure 2a shows the evolution of median quarterly log quality of public information (*PUB*) for three years before and after the equity issue. Figure 2b replicates the analysis for the log quality of private information (*PRIV*). Figure 2c shows results for the ratio of public to the sum of public and private information quality (*Rho*). The sample is 4,292 equity offerings from January 1982 to June 2007.

Figure 3. Evolution of squared error in mean forecast, forecast dispersion and the number of forecast issued for three years before and after the equity issue.

Figure 3a shows the evolution of median quarterly squared error in mean forecast (SE) for three years before and after the equity issue. Figure 3b replicates the analysis for analyst forecast dispersion (D). Figure 3c shows results for the mean number of EPS forecasts issued during the quarter (N). The sample is 4,292 equity offerings from January 1982 to June 2007.

Figure 4. Evolution of median analyst forecast bias for three years before and after equity issues.

The figure shows the evolution of median quarterly analyst EPS forecast bias for three years before and after equity issues. Analyst forecast bias is the mean difference between actual EPS and the individual analyst forecast issued during a quarter scaled by the end-of-previous quarter stock price. The sample is 4,292 equity offerings from January 1982 to June 2007.

Figure 5. Annual distribution of mean equity issue proceeds, underwriting fees and the proportion of firms that exercise the overallotment option.

Figure 5 shows mean equity issue proceeds, a sum of proceeds and oversold equity from the overallotment option and underwriting fees in \$. There are 1,117 SEOs with overallotment options and 1,091 equity issues with non-missing information on the underwriting fee. The sample period is January 1983 to June 2007.

Table 1. Descriptive statistics for the sample of 4,292 equity issues from January 1982 to June 2007.

Panel A shows mean (*Mean*) and median (*Median*) quarterly values of log public (*PUB*) and log private (*PRIV*) information precision and analyst forecast bias (*FB*) for three years before and after the issue. *Rho* is the ratio of public to the sum of public and private information quality. *SE* is squared error in mean forecast. *D* is analyst forecast dispersion. *N* is the number of EPS forecasts. *No.* is the number of observations and *STD* is the standard deviation. *Q1* and *Q3* are the lower and upper quartiles. *t* and *p* are *t*-statistics and *p*-values. We winsorize actual and forecast EPS at 1% level. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively. Panel B reports differences in the information quality measures and analyst forecast bias after- relative to before the issue. *t (cluster)* is the *t*-statistic based on firm-clustered standard errors. *Wilcoxon rank-sum* is the non-parametric Wilcoxon rank-sum test for the median difference. Panel C shows the Pearson correlation coefficients between the variables with *p*-values in parentheses.

Panel A. Quality of the firm's information environment before equity issue								
	No.	Mean	Median	STD	Q1	Q3	t	p
Before SEO 37925								
ln PUB		3.362***	3.438	3.162	1.726	5.197	207.070	0.000
ln PRIV		2.005***	2.294	3.760	−0.286	4.586	103.860	0.000
Rho		0.577***	0.538	32.704	0.412	0.694	3.430	0.001
FB		−1.69%***	−0.09%	11.35%	−1.41%	0.46%	−29.060	0.000
SE		1.020***	0.012	11.574	0.002	0.082	17.160	0.000
D		0.071***	0.002	0.817	0.000	0.013	17.020	0.000
N		9.511***	7.000	8.555	4.000	11.000	216.520	0.000
After SEO 54732								
ln PUB		3.200***	3.306	3.128	1.590	5.033	239.340	0.000
ln PRIV		1.814***	2.171	3.860	−0.472	4.476	109.920	0.000
Rho		1.531**	0.531	181.088	0.388	0.685	1.980	0.048
FB		−2.32%***	−0.19%	22.75%	−1.60%	0.35%	−23.880	0.000
SE		1.072***	0.014	10.654	0.002	0.092	23.550	0.000
D		0.063***	0.003	0.744	0.000	0.014	19.870	0.000
N		10.284***	7.000	8.775	5.000	13.000	274.180	0.000
Panel B. Differences in the quality of the firm' information environments: after vs. before the issue								
	No.	Mean difference	t (cluster)	p	Median difference	Wilcoxon rank-sum	p	
92657								
ln PUB		−0.162***	−5.430	0.000	−0.132***	70.124	0.000	
ln PRIV		−0.192***	−4.910	0.000	−0.123***	34.720	0.000	
Rho		0.954	1.200	0.228	−0.007***	34.979	0.000	
FB		−0.006***	−3.420	0.001	−0.001***	172.437	0.000	
SE		−0.052	−0.700	0.485	−0.002***	41.422	0.000	
D		0.008	1.570	0.117	0.000***	33.780	0.000	
N		−0.773***	−13.380	0.000	0.000***	472.629	0.000	
Panel C. Correlations								
		ln PUB		ln PRIV		Rho		
ln PRIV		0.599***						
		(0.000)						
Rho		−0.002		−0.003				
		(0.487)		(0.364)				
FB		0.155***		0.220***		0.001		
		(0.000)		(0.000)		(0.736)		

Table 2. Annual mean and median *PUB*, *PRIV* and *Rho*.

The table shows annual mean and median log public (*PUB*) and log private (*PRIV*) information quality, the ratio of public to the sum of public and private information (*Rho*), and analyst forecast bias (*FB*) for three years before and after capital issues. *difference* is the difference between annual values. The annual numbers are based on quarterly values within a year. *No.* is the number of observations, *t* and *p* are the *t*-test and *p*-value for the significance of mean changes and χ^2 and *p* are the χ^2 -test and associated *p*-value for the significance of median changes. We winsorize actual and forecast EPS at 1% level. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Period	-3	-2	-1	1	2	3
<i>No.</i>	10241	12264	15420	19838	18476	16418
<i>ln PUB mean</i>	3.278	3.354	3.424	3.312	3.166	3.102
<i>Mean difference</i>		0.076*	0.070*	-0.112***	-0.145***	-0.065**
<i>t</i>		1.830	1.810	-3.270	-4.540	-1.960
<i>p</i>		0.068	0.070	0.001	0.000	0.050
<i>ln PUB median</i>	3.302	3.430	3.504	3.409	3.247	3.228
<i>Median difference</i>		0.128***	0.074**	-0.094***	-0.162***	-0.019*
χ^2		8.410	6.149	13.369	37.836	2.880
<i>p</i>		0.004	0.013	0.000	0.000	0.090
<i>ln PRIV mean</i>	1.827	2.007	2.122	1.924	1.722	1.782
<i>Mean difference</i>		0.181***	0.115**	-0.198***	-0.202***	0.060
<i>t</i>		3.510	2.560	-4.960	-5.110	1.450
<i>p</i>		0.001	0.011	0.000	0.000	0.148
<i>ln PRIV median</i>	2.134	2.291	2.399	2.260	2.075	2.146
<i>Median difference</i>		0.157***	0.107**	-0.139***	-0.185***	0.071
χ^2		9.292	4.224	13.059	22.415	2.039
<i>p</i>		0.002	0.040	0.000	0.000	0.153
<i>Rho mean</i>	0.637	0.619	0.503	0.439	0.496	4.014
<i>Mean difference</i>		-0.019	-0.116	-0.064	0.057	3.518
<i>t</i>		-0.030	-1.150	-0.320	0.280	1.370
<i>p</i>		0.976	0.251	0.752	0.780	0.171
<i>Rho median</i>	0.533	0.537	0.543	0.536	0.531	0.526
<i>Median difference</i>		0.003	0.006***	-0.007***	-0.005***	-0.005*
χ^2		1.781	10.001	14.785	9.125	2.726
<i>p</i>		0.182	0.002	0.000	0.003	0.099
<i>FB mean</i>	-2.28%	-2.11%	-0.97%	-1.72%	-2.69%	-2.63%
<i>Mean difference</i>		0.16%	1.14%***	-0.75%***	-0.97%***	0.06%
<i>t</i>		0.970	8.610	-6.360	-4.080	0.220
<i>p</i>		0.332	0.000	0.000	0.000	0.828
<i>FB median</i>	-0.22%	-0.17%	0.06%	-0.10%	-0.24%	-0.26%
<i>Median difference</i>		0.05%**	0.23%***	-0.16%***	-0.14%***	-0.02%
χ^2		6.117	245.903	188.962	110.732	0.077
<i>p</i>		0.013	0.000	0.000	0.000	0.781

Table 3. Portfolio analysis based on ex ante public information quality tercile sorts.

The table shows mean (*Mean*) and median (*Median*) values from tercile sorts (*Portfolios* 1–3) on public information quality twelve quarters before the issue (*Ex ante PUB*). *PUB* is log public information quality, *PRIV* is log private information quality, *Rho* is the ratio of public to the sum of public and private information quality and *FB* is the analyst *EPS* forecast bias. ΔPUB , $\Delta PRIV$ and ΔRho are changes in *PUB*, *PRIV* and *Rho* from quarters -12 to -1 . *No.* is the number of observations. *STD* is the standard deviation. *t* and *p* are the *t*-statistic and its *p*-value. *Wilcoxon signed-rank* is the non-parametric Wilcoxon signed-rank test for the median. We winsorize actual and forecast EPS at 1% level. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

	<i>No.</i>	<i>Mean</i>	<i>Median</i>	<i>STD</i>	<i>t</i>	<i>p</i>	<i>Wilcoxon signed rank</i>	<i>p</i>
<i>Portfolio 1: Low ex ante public information quality</i>								
<i>Ex ante PUB</i>		0.381***	1.088***	3.192	3.910	0.000	145837.5	0.000
$\ln PUB$		1.941***	2.040***	3.085	20.610	0.000	217028.5	0.000
$\ln PRIV$		0.632***	0.817***	3.610	5.730	0.000	70043.5	0.000
<i>Rho</i>	1073	-0.108	0.510***	21.338	-0.170	0.869	199623.5	0.000
ΔPUB		1.561***	1.101***	4.437	11.520	0.000	166529.5	0.000
$\Delta PRIV$		1.833***	1.806***	4.394	13.670	0.000	132325.5	0.000
ΔRho		-4.912	0.153***	134.419	-1.200	0.232	47208.5	0.000
<i>FB</i>		-1.43%***	0.08%***	0.074	-6.290	0.000	-31543.5	0.002
<i>Portfolio 2: Medium ex ante public information quality</i>								
<i>Ex ante PUB</i>		3.564***	3.540***	0.641	182.150	0.000	287564.0	0.000
$\ln PUB$		3.402***	3.334***	2.320	48.010	0.000	280233.0	0.000
$\ln PRIV$		1.983***	2.218***	3.186	20.380	0.000	183951.0	0.000
<i>Rho</i>	1072	0.645***	0.556***	4.536	4.660	0.000	229670.0	0.000
ΔPUB		-0.162**	-0.095**	2.337	-2.270	0.023	-21265.0	0.036
$\Delta PRIV$		0.129	0.089	3.795	1.120	0.265	12530.0	0.217
ΔRho		-0.286	-0.102***	9.036	-1.040	0.301	-85621.0	0.000
<i>FB</i>		-1.64%**	0.05%**	0.224	-2.400	0.016	-20937.0	0.039
<i>Portfolio 3: High ex ante public information quality</i>								
<i>Ex ante PUB</i>		6.493***	6.201***	1.469	144.770	0.000	287564.0	0.000
$\ln PUB$		4.852***	4.998***	3.129	50.770	0.000	281238.0	0.000
$\ln PRIV$		3.486***	3.913***	3.571	31.960	0.000	234616.0	0.000
<i>Rho</i>	1072	0.623***	0.552***	3.889	5.250	0.000	243393.0	0.000
ΔPUB		-1.641***	-1.454***	3.193	-16.830	0.000	-183740.0	0.000
$\Delta PRIV$		-1.479***	-1.202***	4.042	-11.980	0.000	-108044.0	0.000
ΔRho		0.024	-0.019**	3.886	0.200	0.842	-20136.0	0.047
<i>FB</i>		-0.52%**	0.10%***	0.086	-2.000	0.046	35460.5	0.001

Table 4. Descriptive statistics for variables related to net offering benefits.

The table shows mean (*Mean*) and median (*Median*) values of variables related to net offering proceeds. The sample is 1,117 SEOs having the overallotment option and 1,091 SEOs with non-missing information on the underwriting fee. *No.* is the number of observations, *STD* is standard deviation. *PUB* is log public information precision; *PRIV* is log private information precision. *Rho* is the ratio of public to the sum of public and private information quality and *FB* is analyst EPS forecast bias. *Proceeds* are issue proceeds net of the oversold amount from the overallotment option in \$m. *MV* is total market capitalization in \$m, *B/M* is the B/M ratio, and *LEV* is leverage, which is the ratio of debt to total assets, all in log form. *INV/A* is change in property plant and equipment plus the annual change in inventories scaled by lagged value of assets. *Price STD* is the daily stock price standard deviation over the previous 12 months. *ROA* is return on assets. *TR* is share turnover, which is the number of shares traded to all shares outstanding. *pBHAR* is the difference between the firm's and the market's six-month buy-and-hold return before the issue. *Exchange* equals 1 if the stock lists on Nasdaq and zero otherwise. *Hot* is the hot issue period during the bubble 1997–2000. *Issue type* equals 1 for primary offerings. *B_Under* are the proceeds from all equity issues underwritten by the broker over the previous 30 months to total equity issues over the period. *#Lead* is the number of lead underwriters. *A_exp* is the number of years an analyst is present on IBES. *A_QEPS* is the previous year-end analyst EPS accuracy ranking based on mean analyst error of all forecasts issued in the year. Success rate is the proportion of SEOs where the overallotment option is exercised. *Oversold* are the proceeds from the overallotment option, and *Underwriting fee* is the underwriting fee, both in \$m. *Underwriting fee/Proceeds* is the ratio of the underwriting fee to gross issue proceeds. We measure accounting variables (*B/M*, *INV/A*, *LEV* and *ROA*) in December allowing for a six month reporting gap. Market variables (*pBHAR*, *Price STD*, *MV* and *TR*) are measured one month before the issue. Analyst characteristics are relative to the EPS forecast issue date. We winsorize actual and forecast EPS, *MV*, *B/M*, *LEV*, *INV/A* and *ROA*, at 1% level.

	<i>No.</i>	<i>Mean</i>	<i>Median</i>	<i>STD</i>	<i>Q1</i>	<i>Q3</i>	<i>t</i>	<i>p</i>
<i>ln PUB</i>	1117	3.427***	3.436	3.273	1.908	5.203	34.990	0.000
<i>ln PRIV</i>		2.081***	2.233	3.573	−0.290	4.541	19.470	0.000
<i>Rho</i>		0.076	0.549	20.775	0.435	0.724	0.120	0.903
<i>FB</i>		−0.005***	0.001	0.043	−0.006	0.007	−4.050	0.000
<i>Proceeds (\$mil)</i>		192.300***	105.488	305.661	56.925	207.000	21.030	0.000
<i>ln MV</i>		6.721***	6.598	1.303	5.822	7.520	172.460	0.000
<i>ln B/M</i>		−0.785***	−0.662	0.870	−1.287	−0.158	−30.150	0.000
<i>ln LEV</i>		−0.724***	−0.523	0.615	−0.948	−0.307	−39.350	0.000
<i>INV/A</i>		0.073***	0.065	0.300	−0.022	0.195	8.130	0.000
<i>Price STD</i>		5.591***	3.923	6.309	2.257	6.454	29.610	0.000
<i>ROA</i>		−0.003	0.032	0.155	0.004	0.064	−0.610	0.540
<i>TR</i>		0.093***	0.064	0.128	0.037	0.113	24.370	0.000
<i>pBHAR</i>		0.725***	0.331	1.436	0.043	0.871	16.870	0.000
<i>Exchange</i>		0.507***	1.000	0.500	0.000	1.000	33.860	0.000
<i>Hot</i>		0.192***	0.000	0.394	0.000	0.000	16.310	0.000
<i>Issue type</i>		0.746***	1.000	0.436	0.000	1.000	57.210	0.000
<i>B_Under</i>		0.063***	0.057	0.055	0.003	0.107	38.100	0.000
<i>#Lead</i>		1.270***	1.000	0.615	1.000	1.000	69.020	0.000
<i>A_exp</i>		5.482***	5.333	2.458	3.667	6.875	74.540	0.000
<i>A_QEPS</i>		1702***	1612	718	1143	2165	79.260	0.000
<i>Success rate</i>		0.751***	1.000	0.433	1.000	1.000	58.040	0.000
<i>Oversold (\$mil)</i>	1091	20.368***	8.400	73.093	0.463	20.250	9.310	0.000
<i>Underwriting fee (\$mil)</i>		1.300***	0.873	1.427	0.525	1.530	30.090	0.000
<i>Underwriting fee/Proceeds</i>		0.009***	0.009	0.003	0.007	0.011	96.350	0.000

Table 5. The likelihood of exercising the overallotment option.

The table reports coefficients (*Estimate*) from a probit model predicting the likelihood of the underwriter exercising the overallotment option. *Predicted sign* shows the predicted sign of the relation. *ME* is the marginal effect, *SE* are robust standard errors and *p* is *p*-value based on *z*-statistic. *PUB* is log public information quality; *PRIV* is log private information quality. ΔPUB 3year and $\Delta PRIV$ 3year are changes in $\ln PUB$ and $\ln PRIV$ over three-years before issue. ΔPUB 1year and $\Delta PRIV$ 1year are the median changes in $\ln PUB$ and $\ln PRIV$ over one year before the issue. *FB* is the analyst *EPS* forecast bias. *#Lead* is the number of lead underwriters. *pBHAR* is the difference between the firm's and the market's six-month buy-and-hold return before the issue. *Price STD* is the daily stock price standard deviation over the previous 12 months. *MV* is total market capitalization in \$m and *B/M* is the B/M ratio, both in log form. *INV/A* is the change in property plant and equipment plus the annual change in inventories scaled by lagged value of assets. *ROA* is return on assets. *Exchange* equals 1 if the stock lists on Nasdaq and zero otherwise. *Hot* is the bubble period 1997–2000. *Issue type* equals 1 for primary offerings. *A_exp* is the number of years an analyst is present on IBES. *A_QEPS* is the previous year-end analyst *EPS* accuracy ranking based on mean analyst error of all forecasts issued in the year. *B_Under* are the proceeds from all equity issues underwritten by the broker over the previous 30 months to total equity issues over the period. *Proceeds* are log issue proceeds in \$m. *Industry dummies* are twelve industry dummies based on Kenneth's French definitions. We measure accounting variables (*B/M*, *INV/A* and *ROA*) in December allowing for a six month reporting gap. Market variables (*pBHAR*, *Price STD* and *MV*) are measured one month before the issue. Analyst characteristics are relative to the *EPS* forecast issue date. We winsorize actual and forecast *EPS*, *MV*, *B/M*, *INV/A* and *ROA*, at 1% level. *No.* is the number of observations. χ^2 is the χ^2 test for model specification and *p* its *p*-value, *pseudo R*² is the pseudo R-square. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

	<i>Predicted sign</i>	<i>Estimate</i>	<i>ME</i>	<i>SE</i>	<i>p</i>
<i>Intercept</i>		0.386		0.339	0.254
ΔPUB 1year	+	0.028*	0.84%	0.017	0.094
$\Delta PRIV$ 1year	–	–0.034**	–1.04%	0.015	0.021
ΔPUB 3year	+	–0.009	–0.27%	0.016	0.579
$\Delta PRIV$ 3year	–	0.017	0.53%	0.014	0.215
$\ln PUB$	+	0.014	0.43%	0.022	0.515
$\ln PRIV$	–	0.015	0.45%	0.020	0.469
<i>FB</i>	+	–0.686	–20.77%	1.024	0.503
<i>#Lead</i>	+	0.035	1.05%	0.076	0.646
<i>pBHAR</i>	+	–0.004	–0.12%	0.033	0.904
<i>Price STD</i>	–	0.002	0.05%	0.010	0.857
$\ln MV$	+	–0.357***	–10.80%	0.078	0.000
$\ln B/M$	–	0.007	0.20%	0.064	0.918
<i>INV/A</i>	+	0.248	7.50%	0.185	0.180
<i>ROA</i>	+	–0.135	–4.10%	0.315	0.667
<i>Exchange</i>	+	0.119	3.60%	0.116	0.305
<i>Hot</i>	+	0.631***	16.19%	0.140	0.000
<i>Issue type</i>	+	0.074	2.27%	0.110	0.501
<i>A_exp</i>	+	0.010	0.29%	0.019	0.610
<i>A_QEPS</i>	–	0.000**	–0.01%	0.000	0.011
<i>B_Under</i>	+	1.179	35.69%	0.861	0.171
$\ln Proceeds$	+	0.487***	14.76%	0.098	0.000
<i>Industry dummies</i>			<i>Unreported</i>		
<i>No.</i>	1117				
χ^2	84.960				
<i>p</i>	0.000				
<i>pseudo R</i> ²	7.66%				

Table 6. Likelihood of exercising the overallotment option: instrumental variables approach

The table reports coefficients (*Estimate*) from OLS regressions modeling issue proceeds (*Proceeds*), *Model 1*, broker quality (*B_Under*), *Model 2*, and 2SLS model predicting the likelihood of the underwriter exercising the overallotment option, *Model 3*. *p* is the *p*-value. *Proceeds* are log issue proceeds in \$. *B_Under* is the ratio of proceeds from all equity issues underwritten by the broker over the previous 30 months to total equity issues over the period. *PUB* is log public information quality, *PRIV* is log private information quality, ΔPUB 3year and $\Delta PRIV$ 3year are the changes in $\ln PUB$ and $\ln PRIV$ over the three years before issue. ΔPUB 1year and $\Delta PRIV$ 1year are the median changes in $\ln PUB$ and $\ln PRIV$ over one year before the issue. *FB* is analyst *EPS* forecast bias. *#Lead* is the number of lead underwriters. *pBHAR* is the difference between the firm's and the market's six-month buy-and-hold return before the issue. *Price STD* is the daily stock price standard deviation over the previous 12 months. *MV* is total market capitalization in \$m and *B/M* is the B/M ratio, both in log form. *INV/A* is the change in property plant and equipment plus the annual change in inventories scaled by lagged value of assets. *ROA* is return on assets. *Exchange* equals 1 if the stock lists on Nasdaq and zero otherwise. *Hot* is the bubble period 1997–2000. *Issue type* equals 1 for primary offerings. *A_exp* is the number of years an analyst is present on IBES. *A_QEPS* is the previous year-end analyst EPS accuracy ranking based on mean analyst error of all forecasts issued in the year. *Age* is the difference between firm's IPO date and the issue date. *avgB_Under* are the average proceeds of all offerings from 36 to 6 months before the issue to the total value of all offerings over this period. *Industry dummies* are twelve industry dummies based on Kenneth's French definitions. We measure accounting variables (*B/M*, *INV/A* and *ROA*) in December allowing for a six month reporting gap. Market variables (*pBHAR*, *Price STD* and *MV*) are measured one month before the issue. Analyst characteristics are relative to the EPS forecast issue date. We winsorize actual and forecast EPS, *MV*, *B/M*, *INV/A* and *ROA*, at 1% level. *No.* is the number of observations. F/χ^2 is the *F*- and χ^2 -test for model specification and *p* its *p*-value. R^2 / *pseudo R*² is the R-square and pseudo R-square. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

	Model 1 (<i>ln Proceeds</i>)		Model 2 (<i>B_Under</i>)		Model 3 (2SLS)	
	<i>Estimate</i>	<i>p</i>	<i>Estimate</i>	<i>p</i>	<i>Estimate</i>	<i>p</i>
<i>Intercept</i>	0.515***	0.000	−0.046***	0.000	1.027	0.200
ΔPUB 1year	0.000	0.974	0.000	0.657	0.029	0.244
$\Delta PRIV$ 1year	−0.001	0.837	−0.001	0.247	−0.046**	0.019
ΔPUB 3year	0.000	0.983	0.000	0.841	−0.003	0.871
$\Delta PRIV$ 3year	0.003	0.589	0.000	0.461	0.017	0.355
$\ln PUB$	0.003	0.712	−0.001	0.335	0.010	0.732
$\ln PRIV$	−0.002	0.767	0.001	0.258	0.029	0.285
<i>FB</i>	−0.478	0.197	0.086**	0.012	−0.736	0.605
<i>#Lead</i>	0.120***	0.000	0.002	0.328	0.179	0.343
<i>pBHAR</i>	−0.008	0.524	−0.001	0.249	−0.029	0.539
<i>Price STD</i>	0.013***	0.000	0.000	0.886	0.020	0.372
$\ln MV$	0.616***	0.000	0.011***	0.000	0.559	0.498
$\ln B/M$	0.079***	0.000	0.003	0.221	0.162	0.176
<i>INV/A</i>	−0.058	0.317	−0.003	0.582	0.199	0.359
<i>ROA</i>	−0.127	0.257	−0.010	0.329	−0.430	0.299
<i>Exchange</i>	−0.124***	0.003	−0.006*	0.099	−0.135	0.496
<i>Hot</i>	0.079*	0.073	−0.003	0.459	0.582***	0.004
<i>Issue type</i>	−0.160***	0.000	0.003	0.430	−0.120	0.653
<i>A_exp</i>	0.020***	0.002	0.000	0.530	0.029	0.405
<i>A_QEPS</i>	0.000***	0.004	0.000	0.907	0.000	0.472
<i>B_Under</i>					−9.336***	0.000
$\ln Proceeds$					−0.808	0.553
<i>Age</i>	−0.005**	0.012	0.000	0.791		
<i>avgB_Under</i>	−0.655	0.973	28.068***	0.000		
<i>Industry effect</i>	Unreported		Unreported		Unreported	
<i>No.</i>	1117		1117		1117	
F/χ^2	102.330		17.500		59.770	
<i>p</i>	0.000		0.000		0.002	
R^2 / <i>pseudo R</i> ²	75.13%		34.07%			

Table 7. Determinants of the underwriting fee.

The table reports coefficients (*Estimate*) from a tobit model explaining variation in the ratio of the underwriting fee to gross issue proceeds. *SE* are standard errors, and *p* the *p*-value. *PUB* is log public information quality, *PRIV* is log private information quality, ΔPUB 3year and $\Delta PRIV$ 3year are the changes in $\ln PUB$ and $\ln PRIV$ over three years before issue. ΔPUB 1year and $\Delta PRIV$ 1year are the median changes in $\ln PUB$ and $\ln PRIV$ over the year before the issue. *FB* is analyst *EPS* forecast bias. *#Lead* is the number of lead underwriters. *pBHAR* is difference between the firm's and the market's six-month buy-and-hold return before the issue. *Price STD* is daily stock price standard deviation over the previous 12 months. *MV* is market capitalization in \$m and *B/M* is the B/M ratio, both in log form. *INV/A* is the change in property plant and equipment plus the annual change in inventories scaled by lagged value of assets. *ROA* is return on assets, *LEV* is the log leverage ratio, *TR* the share turnover rate. *Exchange* equals 1 if the stock lists on Nasdaq and zero otherwise. *Hot* is the bubble period 1997–2000. *Issue type* equals 1 for primary offerings. *A_exp* is the number of years an analyst is present on IBES. *A_QEPS* is the previous year-end analyst EPS accuracy ranking based on mean analyst error of all forecasts issued in the year. *B_Under* is the ratio of proceeds from all equity issues underwritten by the broker over the previous 30 months to total equity issues over the period. *Proceeds* is log issue proceeds in \$m. *Industry dummies* are twelve industry dummies based on Kenneth's French definitions. We measure accounting variables (*B/M*, *INV/A*, *LEV* and *ROA*) in December allowing for a six month reporting gap. Market variables (*pBHAR*, *Price STD*, *MV* and *TR*) are measured one month before the issue. Analyst characteristics are relative to the EPS forecast issue date. We winsorize actual and forecast EPS, *MV*, *B/M*, *LEV*, *INV/A* and *ROA*, at 1% level. *No.* is the number of observations. χ^2 is the χ^2 test for model specification and *p* its *p*-value, *pseudo R*² is the pseudo R-square. All coefficients and standard errors are multiplied by 1000. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

	<i>Estimate</i>	<i>SE</i>	<i>p</i>
<i>Intercept</i>	16.168***	0.517	0.000
ΔPUB 1year	0.018	0.022	0.416
$\Delta PRIV$ 1year	-0.018	0.022	0.422
ΔPUB 3year	-0.043*	0.023	0.066
$\Delta PRIV$ 3year	0.042**	0.021	0.048
<i>PUB</i>	0.043	0.033	0.193
<i>PRIV</i>	-0.045	0.031	0.151
<i>FB</i>	-1.559	1.578	0.323
<i>#Lead</i>	0.492***	0.124	0.000
<i>pBHAR</i>	-0.004	0.055	0.940
<i>Price STD</i>	-0.009	0.014	0.520
$\ln MV$	-0.668***	0.105	0.000
$\ln B/M$	-0.140	0.093	0.135
<i>INV/A</i>	-0.009	0.242	0.971
<i>ROA</i>	0.003	0.466	0.996
$\ln LEV$	-0.355***	0.129	0.006
<i>TR</i>	-0.184	0.591	0.755
<i>Exchange</i>	0.680***	0.175	0.000
<i>HOT</i>	-0.253	0.175	0.149
<i>Issue type</i>	-0.263	0.162	0.104
<i>A_exp</i>	0.089***	0.028	0.002
<i>A_QEPS</i>	0.000***	0.000	0.000
<i>B_Under</i>	-1.131	1.257	0.368
$\ln Proceeds$	-1.080***	0.129	0.000
<i>Industry dummies</i>		<i>Unreported</i>	
<i>No.</i>	1091		
χ^2	866.710		
<i>p</i>	0.000		
<i>pseudo R</i> ²	9.11%		

Table 8. Robustness analysis: *SE*, *D* and *N* information quality measures.

The table reports coefficients (*Estimate*) from a maximum likelihood (*Model 1*) and 2SLS regression (*Model 2*) predicting the likelihood of the underwriter exercising the overallotment option, and tobit model results explaining variation in the ratio of the underwriting fee to gross issue proceeds (*Model 3*). *p* is the *p*-value. *SE* is squared error in mean forecast. *D* is analyst forecast dispersions. *N* is the number of forecasts issued. ΔSE 3year, ΔD 3year and ΔN 3year are the changes in the *SE*, *D* and *N* over three years before issue. *FB* is analyst EPS forecast bias. *#Lead* is the number of lead underwriters. *pBHAR* is the difference between the firm's and the market's six-month buy-and-hold return before the issue. *Price STD* is daily stock price standard deviation over the previous 12 months. *MV* is market capitalization in \$m and *B/M* is the B/M ratio, both in log form. *INV/A* is the change in property plant and equipment plus the annual change in inventories scaled by lagged value of assets. *ROA* is return on assets, *LEV* is the log leverage ratio, *TR* the share turnover rate. *Exchange* equals 1 if the stock lists on Nasdaq and zero otherwise. *Hot* is the bubble period 1997–2000. *Issue type* equals 1 for primary offerings. *A_exp* is the number of years an analyst is present on IBES. *A_QEPS* is the previous year-end analyst EPS accuracy ranking based on mean analyst error of all forecasts issued in the year. *B_Under* is the ratio of proceeds from all equity issues underwritten by the broker over the previous 30 months to total equity issues over the period. *Proceeds* is log issue proceeds in \$m. *Industry dummies* are twelve industry dummies based on Kenneth's French definitions. We measure accounting variables (*B/M*, *INV/A*, *LEV* and *ROA*) in December allowing for a six month reporting gap. Market variables (*pBHAR*, *Price STD*, *MV* and *TR*) are measured one month before the issue. Analyst characteristics are relative to the EPS forecast issue date. We winsorize actual and forecast EPS, *MV*, *B/M*, *LEV*, *INV/A*, *ROA*, at 1% level. *No.* is the number of observations. χ^2 is the χ^2 test for model specification and *p* its *p*-value, *pseudo R*² is the pseudo R-square. Tobit model coefficients are multiplied by 1000. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

	<i>Model 1</i> (Probit, ML)		<i>Model 2</i> (Probit, 2SLS)		<i>Model 3</i> (Tobit)	
	<i>Estimate</i>	<i>p</i>	<i>Estimate</i>	<i>p</i>	<i>Estimate</i>	<i>p</i>
<i>Intercept</i>	0.525	0.134	1.089	0.173	15.968***	0.000
ΔSE 3year	0.002	0.673	0.001	0.908	0.000	0.981
ΔD 3year	0.133	0.132	0.176	0.236	−0.065	0.670
ΔN 3year	−0.001	0.889	−0.002	0.837	0.026**	0.031
<i>SE</i>	−0.002	0.867	0.002	0.843	−0.006	0.636
<i>D</i>	−0.194*	0.077	−0.194	0.262	0.069	0.694
<i>N</i>	0.004	0.616	0.009	0.374	−0.031**	0.020
<i>FB</i>	−1.406	0.273	−0.397	0.784	−2.682	0.118
<i>#Lead</i>	0.021	0.786	0.127	0.479	0.493***	0.000
<i>pBHAR</i>	−0.002	0.955	−0.024	0.597	−0.006	0.906
<i>Price STD</i>	−0.001	0.913	0.012	0.570	−0.012	0.391
ln <i>MV</i>	−0.384***	0.000	0.317	0.681	−0.594***	0.000
ln <i>B/M</i>	−0.008	0.905	0.109	0.322	−0.087	0.351
<i>INV/A</i>	0.234	0.201	0.209	0.312	−0.053	0.826
<i>ROA</i>	−0.100	0.745	−0.344	0.378	−0.020	0.966
ln <i>LEV</i>					−0.331***	0.010
<i>TR</i>					−0.105	0.857
<i>Exchange</i>	0.117	0.313	−0.092	0.616	0.657***	0.000
<i>HOT</i>	0.622***	0.000	0.556***	0.004	−0.284	0.103
<i>Issue type</i>	0.064	0.561	−0.074	0.770	−0.259	0.110
<i>A_exp</i>	0.010	0.608	0.025	0.471	0.087***	0.002
<i>A_QEPS</i>	0.000***	0.007	0.000	0.259	0.000***	0.000
<i>B_Under</i>	1.312	0.125	−9.063***	0.000	−0.990	0.431
ln <i>Proceeds</i>	0.515***	0.000	−0.461	0.719	−1.070***	0.000
<i>Industry dummies</i>	<i>Unreported</i>		<i>Unreported</i>		<i>Unreported</i>	
<i>No.</i>	1117		1117		1091	
χ^2	86.450		57.330		868.210	
<i>p</i>	0.000		0.004		0.000	
<i>pseudo R</i> ²	7.49%				9.13%	