Firms' Disclosure Policies and Capital Investment: Evidence from Regulation Fair Disclosure

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February 2019

We have benefited from helpful comments and suggestions from Anne Beatty, Anil Arya, Helen Zhang, Darren T. Roulstone and seminar participants at the Ohio State University, Singapore Management University, Southern Methodologist University, the University of Houston, the University of Melbourne and the 2017 JAAF conference.

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Abstract:

This study examines the association between voluntary disclosure and investment constraints via a regulatory change in disclosure−Regulation Fair Disclosure (Reg FD) − which pins down a point of time that firms have to change their disclosure policy. Reg FD prevents managers from releasing material information to only a selected group. In the post Reg FD period (Post-FD), some firms have chosen to replace selective disclosure with non-disclosure. We find that these silent firms' capital investments are more constrained post-FD, relative to firms that have chosen to replace selective disclosure with public disclosure. The association is stronger for firms that are ex-ante financially constrained, have greater growth opportunities, have less analyst following, and are harder to access the debt market. The results are robust to alternative model specifications and endogenous switching estimation approach. Our finding that disclosure policy is related to investment is relevant to both market participants and regulators when evaluating disclosure regulation.

Keywords Disclosure · Cost of Capital · Investment Constraints · Financial Constraints

JEL Classification: G18

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I. INTRODUCTION

This study examines the association between voluntary disclosure and investment constraints via a regulatory change in disclosure. If the information asymmetry between managers and the external capital markets is severe, the cost of external financing will be high, and the firm's capital investment, which are highly correlated with its internal cash flow and investment, will be likely restricted (Fazzari, Hubbard, Petersen, Blinder, & Poterba, 1988). Extensive research has documented the consequences of financial constraints on capital investment (e.g., Campello, Graham, & Harvey, 2010; Chaney, Sraer, & Thesmar, 2012; Fazzari et al., 1988; Tan, 2010). For example, Tan (2010) documents that financially constrained firms become cautious in capital spending, which creates long periods of underinvestment, whereas unconstrained firms are less affected. Consistently, Campello et al. (2010) confirms that constrained firms plan deeper cuts in technology spending, employment, and capital spending. Although the disclosure of material information can alleviate the severity of information problems between a firm and outside capital providers (Bushman & Smith, 2001; Healy & Palepu, 2001; Stein, 2003; Verrecchia, 1983)[1], few studies have directly examined whether a change in disclosure policy is associated with corresponding changes in investment. Examining such a question can be complex because disclosure policy and investment activities are often determined concurrently within a firm. In this study, we focus on an external shock to the disclosure environment that pins down a point of time

[1] Researchers document that greater disclosure is associated with tighter bid–ask spreads (Leuz & Verrecchia, 2000; Welker, 1995), lower costs of equity capital (Botosan, 1997; Botosan & Plumlee, 2002), and higher realized growth rates (Khurana, Pereira, & Martin, 2006).

when a change in a firm's disclosure policy occurs. The observations of this study will provide a good opportunity to examine the associated investment change.

We choose the regulatory change that externally affects a firm's disclosure environment: Reg FD, which took effect on October 23, 2000, and was designed to prohibit selective disclosure wherein firms disclose material information to selected capital market professionals, financial analysts, and institutional holders. While switching away from selective disclosure, firms face two choices in the post-FD period: public disclosure and silence (a change in disclosure policy). If full public disclosure is too costly for certain firms due to their competitive position and the value of their growth options (Albring, Banyi, Dhaliwal, & Pereira, 2015), these firms may choose to be silent. Wang (2007) documents that over half of the firms that rely more on the selective disclosure channel in the pre-FD period have preferred to keep silent in the post-FD period (new non-disclosers), while others have chosen to replace private guidance with public disclosure (new public disclosers). Thus, Reg FD indicates a specific point of time when firms had to make a change in their disclosure policy.

Many studies consider Reg FD's impact on firms' information environment and cost of equity (e.g., Duarte, Han, Harford, & Young, 2008; Gompers, Ishii, & Metrick, 2003; Petacchi, 2015) and document mixed evidence on the cost of equity for firms. After Reg FD, rating agencies and banks still have access to private information. Petacchi (2015) find that firms experiencing greater increase in information asymmetry after Reg FD further extended their debt financing. Thus, it is possible that the previously documented effect on the cost of equity may not be significant enough to have a meaningful influence on a firm's overall weighted average cost of capital, and consequently may not result in a change in investment. Hence, this study complements

prior literature by investigating directly whether a change in disclosure policy around Reg FD corresponds to a change in investment. We find that a change in disclosure policy from private disclosure to silence is associated with an increase in the sensitivity of a firm's investment to its internally generated cash flow, indicating that the investments of these silent firms are more constrained in the post-FD period.

To further disentangle the relation between a change in disclosure policy and capital investment, we conduct several cross-sectional tests considering other factors that may affect this relation such as ex-ante financial constraints, a firm's growth opportunity, its external information environment, and its access to an alternative financing channel.

With regard to ex-ante financial constraints, theory suggests that in the presence of information asymmetry, firms have to rely on collateral to borrow in the credit market. When a macroeconomic shock reduces collateral value, financially constrained firms would reduce investment more than the unconstrained ones, which suggests an increase in the importance of information asymmetry for the former firms (e.g., Beatty, Liao, & Weber, 2010; Whited & Wu, 2006). We employ a financial constraint index developed by Whited and Wu (2006) to partition firms into financially constrained and unconstrained groups respectively. The results show that, relative to new public disclosers, albeit in the financially constrained group only, new non-disclosers are associated with a larger increase in investment cash flow sensitivity. This effect does not exist for the financially unconstrained group.

Next, we investigate the influence of growth opportunity on the relation between disclosure policy and investment. As the information problem increases with investment potential, cash flow sensitivity should be higher for firms with more investment opportunities (Fazzari et al., 1988).

Consistent with this, only in the subsample of high-growth firms, the investment of new non-disclosers are more constrained relative to new public disclosers. No difference exists between these two groups in the subsample of low-growth firms.

Third, we also examine the impact of the external information environment. When the information asymmetry between insiders and outsiders is severe, external financing is more costly. We use a change in the number of analysts from the pre-FD to post-FD period as a proxy for the external information environment, and find that the increase in cash flow sensitivity for new non-disclosers is more pronounced in the subsample of firms that experience a decline in analyst coverage, but not in the subsample with an increase. These results suggest that investment constraints can be alleviated from an alternative information source.

Finally, we consider the importance of an alternative financing channel. Reg FD mainly affects the disclosure channel on the equity market. In the post-FD period, banks and rating agencies still have superior access to the private information of borrowers. Petacchi (2015) find that firms increase debt financing after Reg FD. We predict that only the new non-disclosers that have difficulty in issuing long-term debt suffer investment constraints, while those with access to the debt market do not experience investment restrictions. The results are consistent with our prediction.

In sum, these findings demonstrate that a switch from private disclosure channel to silence is associated with more investment constraints, and the association is attenuated by other firm characteristics. In further analyses, we attempt to draw some causal inference between a change in disclosure policy and investment constraints by employing an endogenous switching estimation, which addresses pre-FD private disclosers' choice of public disclosure versus silence in the post-

FD period. Following Wang (2007), we consider the determinants of disclosure choice in the first-stage selection model. Then we estimate the second-stage investment models respectively for firms that switched from selective disclosure to public disclosure, and firms that chose to be silent. The results are qualitatively similar to the main findings, which can shed some light on the impact of disclosure policy on investment constraints. However, we also acknowledge that due to the difficulty in identifying perfect instruments, we need to be cautious about the causal influence.

In addition, to address the concern that the observed investment cash flow sensitivity may be due to measurement errors in growth opportunity (Erickson & Whited, 2000), we employ an alternative model: cash to cash flow sensitivity. Only constrained firms display a systematic propensity to save cash out of cash flows since in the absence of financing constraints, the change in the cash balance should not be correlated with investment opportunities (Almeida, Campello, & Weisbach, 2004). The results are qualitatively the same as our main findings. Silent firms tend to hoard more cash in the post-FD period, which is a signal of investment constraints.

The study contributes to the literature along two dimensions. First, it complements the research on a firm's voluntary disclosure and the cost of equity. Leuz and Wysocki (2008) state that evidence on the cross-sectional relation between a firm's voluntary disclosure, accounting attributes, and cost of capital is still evolving, rendering it difficult to draw unambiguous conclusions about whether better information quality reduces the cost of capital (e.g., Botosan, 1997; Botosan & Plumlee, 2002; Healy, Hutton, & Palepu, 1999; Leuz & Verrecchia, 2000). In addition, prior research focuses on a specific financing channel, namely the cost of equity capital. If one financing channel is inefficient, then other channels such as debt, private financing, state subsidies, and intra-group capital transfers can function as substitutes. In equilibrium, there may

not be any difference in investment constraints at the firm level, but simply cross-sectional differences in financing patterns. Therefore, examining the effect of disclosure on investment is equivalent to examining its effect on the quantity of capital provided (as opposed to the price), which can shed light on the impact of disclosure regulation on the overall cost of capital, and circumvent the problems associated with the cost of capital literature (Frederickson & Hilary, 2006). Our finding that a change in disclosure policy is associated with a firm's investment constraints contributes new evidence to the research on overall cost of capital.

Second, this study extends research on financial transparency and investment. A growing field of research indicates that better accounting quality reduces information asymmetry and enhances investment efficiency (e.g., Biddle & Hilary, 2006; Biddle, Hilary, & Verdi, 2009; Khurana et al., 2006; Schleicher, Tahoun, & Walker, 2010; Shroff, Verdi, & Yu, 2013).[2] This study extends this line of research to voluntary disclosure while complementing the early studies. Khurana et al. (2006) use the analyst ratings of overall firm disclosures from 1984 to 1994. They find a positive relation between firm disclosure policy and the externally financed growth rate. One caveat of their study is that analyst ratings on firms' disclosure quality are only available for a small sample of large and heavily followed firms in an industry, and thus is subject to selection bias (Lang & Lundholm, 1993). Furthermore, these ratings were discontinued after 1995. However, management forecasts increased dramatically after the Private Securities Litigation Reform Act was implemented in 1995. Hence, our study fills the gap, and provides a more comprehensive understanding of the relation between disclosure and investment.

[2] Shroff et al. (2013) show that the mandatory adoption of International Financial Reporting Standards (IFRS) in European Union countries reduces investment to cash flow sensitivity in those countries, especially for small firms and firms operating in insider economies. Biddle and Hilary (2006) find that higher accrual quality reduces the sensitivity of firms' investment to internally generated cash flow.

The next section discusses the related literature and the research question. Section III discusses the variable construction and empirical models. Section IV describes the empirical findings, and Section V discusses additional tests and robustness checks. Section VI concludes the paper.

II. RELATED LITERATURE AND RESEARCH QUESTION

In the absence of information problems, managers engage in capital investment until the marginal return is zero. Internally generated cash flow should be irrelevant to investment decisions; management should make capital investment decisions based solely on the firm's growth opportunities. However, given information asymmetry (both adverse selection and moral hazard) between managers and outside capital suppliers, firms may face financing frictions that cause them to rely on internally generated funds to finance their investment (Fazzari et al., 1988). Myers and Majluf (1984) demonstrate that adverse selection leads to capital rationing or a higher cost of external financing. If a firm's manager has private information about the profitability of a new investment opportunity, then they will have a strong incentive to issue overvalued securities. Expecting this, investors will either require a price premium, or will employ capital rationing. Thus, adverse selection potentially reduces a firm's ability to finance new projects with external capital, and it has to use internal funds instead. Any shortage of internal cash flow in such a firm can lead to an underinvestment problem (Schleicher et al., 2010). Regarding moral hazard, Jensen and Meckling (1976) suggest that since external financing reduces the amount of equity held by managers, they would have more incentive to exploit investor wealth instead. For example, managers may pursue perquisite consumption and empire building rather than return excess capital to investors (e.g., Biddle & Hilary, 2006; Jensen, 1986). To counteract this, ex-ante, investors will

require a higher rate of return to compensate for the costly ex-post monitoring of managerial actions. Therefore, in both the moral hazard and adverse selection cases, if information asymmetry is severe, the cost of external financing will be high, and the firm's capital investment will be highly correlated with its internal cash flow. Thus, a firm's level and change in cash flow sensitivity of investment are related to the extent of the firm's information problem.

Extant theory posits that an expanded and credible disclosure policy serves to improve a firm's access to external capital by mitigating information asymmetry and agency conflicts (e.g., Bushman & Smith, 2001; Verrecchia, 1983). The quality of financial disclosure can enhance economic performance by reducing adverse selection, which attracts more funds into capital markets, and lowers the cost of capital. It can also ensure the efficient management of assets in place, enable better project selection, and reduce the expropriation of investor wealth by managers (Bushman & Smith, 2001). Empirical evidence is consistent with these theoretical predictions. Researchers document that greater disclosure is associated with tighter bid–ask spreads (Leuz & Verrecchia, 2000; Welker, 1995), a lower cost of equity (Botosan, 1997; Botosan & Plumlee, 2002), and a higher realized growth rate (Khurana et al., 2006). Therefore, a change in disclosure policy can affect a firm's information asymmetry, which can influence the firm's access to external capital markets.

Reg FD is an external shock to a firm's information environment. In the pre-FD period, firms had discretion in determining both the content of information, and the disclosure channel. In the post-FD period, firms have been deprived of the private disclosure channel, and can only decide whether to disclose, and how much to disclose. Hence, firms were forced to change their disclosure policy. Despite its benefits, public disclosure can be costly, particularly for firms in

competitive industries, or with valuable growth options. Public disclosure may reveal critical information to competitors, causing firms to lose competitive advantages, and face a more severe threat of entry (Admati & Pfleiderer, 2000). Additional disclosure can also lead to a decrease in the expected profits of insider trading, while a manager's residual moral hazard problem may increase (Baiman & Verrecchia, 1996).

Responding to differential costs in public disclosure, Wang (2007) documents that some private disclosers have chosen to replace private guidance with public disclosure (new public disclosers), while others have preferred to keep silent in the post-FD period (new non-disclosers). The author also finds that a change from the private disclosure to the non-disclosure policy leads to a deterioration of the information environment for these new non-disclosers. Relative to new public disclosers, these firms experience steeper decrease in analyst following, larger increase in forecast dispersion, and greater market reactions to their earnings releases in the post-FD period. Therefore, Reg FD pins down a specific time at which firms must make a disclosure choice between a public channel and silence, which provides a good setting to examine corresponding changes in their investment.

Related to the consequences of disclosure changes induced by Reg FD, many studies document mixed evidence of Reg FD on firms' cost of equity capital (e.g., Chen, Dhaliwal, & Xie, 2010; Duarte et al., 2008; Gomes, Gorton, & Madureira, 2007). Additionally, after Reg FD, rating agencies and banks still have access to firms' private information. Consistent with this, Petacchi (2015) finds that firms increase their debt issuance after Reg FD, especially those with greater information asymmetry. If one financing channel (equity) is inefficient, then other channels (e.g., debt, private financing, state subsidies, and intra-group capital transfers) can serve as substitutes.

In equilibrium, we may not observe any change in a firm's real operations, just cross-sectional differences in its financing pattern. Therefore, it is unclear, and hence interesting to examine whether Reg FD affects a firm's ultimate investment.

This study is closely related to research on the effect of accounting quality on investment efficiency. Biddle et al. (2009) show that firms with higher financial quality deviate less from predicted investment levels, and display less sensitivity to macroeconomic conditions. In addition, Beatty, Liao, et al. (2010) show that the impact of accounting quality can be alleviated through private information and direct monitoring from banks. Further, Shroff et al. (2013) document that the effect of accounting quality on investment constraints can be mitigated by firms' external information environment. Biddle et al. (2009) and Balakrishnan, Core, and Verdi (2014) employ an exogenous shock to firms' information environment—adoption of IFRS, and an increase in the value of a firm's real estate assets—and find that reporting quality can substitute for collateral in mitigating information asymmetry associated with underinvestment. However, few studies examine the effect of voluntary disclosure on firms' investment, except for the early study of Khurana et al. (2006). Thus, our study fills the gap, and aims to provide a more comprehensive understanding of the relation between disclosure and investment.

Following prior literature (e.g., Beatty, Liao, et al., 2010; Fazzari et al., 1988), we investigate changes in investment to cash flow sensitivities between new public disclosers and new non-discloser pre-FD versus post-FD. A difference-in-differences test of cash flow sensitivity between different disclosure groups (pre-FD versus post-FD) mitigates some concerns about confounding events around Reg FD.

III. RESEARCH DESIGN

3.1. Sample Selection

We have selected firms from the Center for Research in Security Prices, COMPUSTAT, and I/B/E/S, with data available from 1996 to 1999 for the pre-FD period, and from 2001 to 2003 for the post-FD period. We also use the First Call's Company Issued Guidelines (CIG) database for management forecasts. Institutional ownership data are from Thomas Reuters Institutional Holdings database (13F). We exclude firms in regulated and quasi-regulated industries,[3] and truncate the major variables at the 1% and 99% levels.[4] The sample period begins in 1996 because the Private Securities Litigation Reform Act, which provides broader safe harbor provisions for forward-looking voluntary disclosures, became effective in December 1995, and prior research finds that management-provided earnings guidance became pervasive in the mid-1990s (Brown & Pinello, 2011).

3.2. Deriving Private Earnings Guidance

To explore the impact of Reg FD on a firm's capital investment constraints related to disclosure policy changes, we first partition firms based on their disclosure behaviors around Reg FD. Following Wang (2007), to identify pre-FD private disclosers, we first extract a firm's total earnings guidance and derive private earnings guidance therefrom, teasing out factors that contribute to the predictability of earnings, including earnings volatility, incidence of losses, and number of earnings-related public disclosures. We then classify firms as private (public) disclosers

3We exclude Standard Industrial Classification (SIC) codes 6000–6999 (financial institutions), 4800–4999 (utilities), 4000–4499 (transportations), as well as 8000 and higher.

[4] Winsorization at the 1% and 99% level yields similar results.

depending on their stronger reliance on private (public) channels in the pre-FD period (1996–1999); we further divide private disclosers into post-FD new public disclosers (those who replace private guidance with public disclosure), and post-FD new non-disclosers (those who replace private guidance with silence in the post-FD period)[5] (see details in online Appendix)[6]. After restricting each firm-quarter to have available financial data for tests, we have 4,730 firm-quarters for new non-disclosers, and 2,640 for new public disclosers.

3.3. Investment to Cash Flow Sensitivity Test

We examine the association between firms' capital investment constraints and their change in disclosure policy around Reg FD by comparing investment to cash flow sensitivity before and after Reg FD. As mentioned, pre-FD private disclosers can choose to replace private guidance with public disclosure, or stop disclosing in the post-FD period. We apply a difference-in-differences design to alleviate the possibility of other confounding events around the time Reg FD was implemented. The sample only includes pre-FD private disclosers with information available for the whole sample period (from 1996 to 1999 for the pre-FD period, and from 2001 to 2003 for post-FD). The models are as follows:

$$INVESTMENT_{i,t} = \alpha_0 + \alpha_1 CFO_{i,t} + \alpha_2 FD_t + \alpha_3 CFO_{i,t} \times FD_t + \alpha_4 Tobin'sQ_{i,t-1}$$
$$+\alpha_5 LEVERAGE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \varepsilon \quad (1)$$

$$INVESTMENT_{i,t} = \alpha_0 + \alpha_1 CFO_{i,t} + \alpha_2 FD_t + \alpha_3 CFO_{i,t} \times FD_t + \alpha_4 Tobin'sQ_{i,t-1}$$

[5] The term post-FD new public disclosers is used interchangeably with new public disclosers, and post-FD new non-disclosers is used interchangeably with new non-disclosers.
[6] Table A.1 of the online Appendix provides the results of replicating Wang (2007)'s study.

$$+\alpha_5 LEVERAGE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 ROE_{i,t-1} + \alpha_8 TANGIBILITY_{i,t-1} +$$

$$\alpha_9 LAGCASH_{i,t-1} + \alpha_{10} COMPETITION_{i,t-1} + \alpha_{11} SALESGROWTH_{i,t-1} + \alpha_{12} RD_{i,t-1} +$$

$$\alpha_{13} DIV_{i,t-1} + \alpha_{14} FC_{i,t-1} + \varepsilon \quad (2)$$

Eq. (1) is the baseline model, and Eq. (2) contains additional control variables that may potentially affect firms' investment. We estimate Eq. (1) separately for new public disclosers and new non-disclosers across the whole sample period. We set *FD* equal to one for the post-FD period, and zero for the pre-FD period. Consistent with other research, we measure capital investment (*INVESTMENT*) as capital expenditure in the current quarter, scaled by net property, plant, and equipment (PPE).[7] Cash flow

(CFO) is computed as cash flow from operations scaled by net PPE.[8] To address our research question, we compare the coefficients of $CFO \times FD$ between two groups of disclosers (new public disclosers versus new non-disclosers). In contrast to new public disclosers, if new non-disclosers experience higher cash flow sensitivity pre-FD versus post-FD, then we would expect the coefficient of $CFO \times FD$ to be higher for new non-disclosers than for new public disclosers.

To disentangle the relation between a change in disclosure policy and a firm's cash flow sensitivity, we control for other factors that may potentially affect a firm's investment. In Eq. (1), we control for firm size, capital structure, and growth opportunity. *SIZE* is the natural logarithm of one plus total assets, and *LEVERAGE* is the ratio of long-term debt to total assets. Smaller firms and firms with higher leverage tend to have fewer investment (Beatty, Liao, et al., 2010). The

[7] Instead of using the level of capital expenditure as a proxy for investment, we use changes in capital expenditure as well as the sum of capital expenditure and research and development (R&D) expenses, and the results still hold.
[8] We also run a sensitivity test using *CF* (income before extraordinary items plus depreciation and amortization) scaled by net PPE, as Fazzari et al. (1988), and the results are robust to this measure.

variable *TOBINQ* represents a firm's growth opportunities, calculated as the market value of equity plus the book value of assets minus the book value of equity, scaled by the book value of assets. We expect a firm's investment to be positively related to its growth opportunities.

The extended model, Eq. (2), contains additional control variables. Firms with more tangible and liquid assets can sell these assets to fund new investment projects, if needed, and are thus less likely to experience financial constraints. Following Berger, Ofek, and Swary (1996) and Almeida and Campello (2007), we compute a firm-level proxy, *TANGIBILITY*[9], for expected value of assets in liquidation. Similarly, we control for the beginning period cash balance, *LAGCASH*. Prior research finds that cash balance tends to be positively associated with future investment opportunities (e.g., Kim, Mauer, & Sherman, 1998; Opler, Pinkowitz, Stulz, & Williamson, 1999). In addition, a firm's performance, *ROE*, may also affect its capital investment, where *ROE* is defined as net income divided by average equity. More profitable firms may invest more in the future. Besides profitability, a firm's competitive status and sales growth can also affect its investment. Thus, we include the quarterly industry Herfindahl index (*COMPETITION*) for a firm's three-digit SIC code, and a firm's quarterly sales growth (*SALESGROWTH*). We also control for a firm's financial condition (*DIV*) and other related uses of funds (*RD*). The variable *DIV* is an indicator variable that equals one if there is any cash dividend in a given quarter, and zero otherwise. Constrained firms are less likely to issue dividends. The variable *RD* is a firm's quarterly R&D expenditure scaled by total assets. Constrained firms must tradeoff among

[9] The variable *TANGIBILITY* is computed as per Berger et al. (1996) and Almeida and Campello (2007): 0.715×accounts receivable + 0.547×inventory + 0.535×PP&E + cash divided by total assets. Berger et al. (1996) gather data on the proceeds from discontinued operations reported by a sample of COMPUSTAT firms over the 1984 to 1993 period, and find that a dollar of book value yields, on average, 72 cents in exit value for total receivables, 55 cents for inventory, and 54 cents for fixed assets. Almeida and Campello (2007) document that pledgeable assets support more borrowing, which allows for further investment.

different uses of limited funds. Finally, we include the ex-ante financial constraint measure *FC* as developed by Whited and Wu (2006)[10]. Additional variable definitions are provided in Appendix A. Firms' fixed effects are included, and standard errors are clustered at firm and year–quarter levels.

IV. EMPIRICAL RESULTS

4.1. Descriptive Statistics

Table 1 provides comparable descriptive statistics for firms based on their disclosure policy, i.e., for new public disclosers and new non-disclosers. Panel A shows the industry distribution based on the Fama–French 10-industry classification. About 20% of the new non-disclosers are in the healthcare, medical equipment, and drug industries which have relatively higher proprietary costs associated with public disclosure. Meanwhile, over a third of new public disclosers operate in the business equipment and information technology industries, where managers need to attract more funds by lowering the cost of capital.

Panel B of Table 1 reports the comparative firm characteristics. Generally, compared to new non-disclosers, new public disclosers are larger in size (*SIZE*), and have better accounting performance (*ROE*). They also maintain lower tangible assets (*TANGIBILITY*), and release more cash dividends (*DIV*). New non-disclosers experience a larger decrease in investment post-FD. They also experience a higher increase in leverage (*LEVERAGE*) from the pre-FD to the post-FD period. In addition, new non-disclosers maintain higher cash balance (*LAGCASH*), which

[10] Section 4.4.2 provides a detailed description.

indicates that these firms may rely more on their internal cash flow to fund their investment opportunities.

[Insert Table 1 Here]

4.2. Main Results

Table 2 provides the results from the investment to cash flow sensitivity test between new non-disclosers and new public disclosers from pre-FD to post-FD for the baseline and extended models respectively. In columns (1 & 2) of the baseline model, the coefficient of *CFO* reflects investment to cash flow sensitivity in the pre-FD period, while the coefficient of $CFO \times FD$ reflects a change in cash flow sensitivity for the sample firms pre-FD versus post-FD. For new non-disclosers, the coefficient of *CFO* does not appear to be statistically significant, indicating that these firms may not have experienced financial constraints in the pre-FD period. However, the coefficient of $CFO \times FD$ is 0.007 and significant at the 5% level, which shows that a change in disclosure policy from selective disclosure to non-disclosure is associated with an increase in cash flow sensitivity for these firms. For new public disclosers, both the coefficients of *CFO* and $CFO \times FD$ are statistically insignificant, suggesting that a change from selective disclosure to public disclosure has no influence on these firms' capital investment. The difference in the coefficients of $CFO \times FD$ between these two groups is 0.009 at significant the 5% level. A one standard deviation increase in cash flow (0.6) will increase new non-disclosers' investment by 6% more than it would for new public disclosers. The extended model displays similar results to the baseline model.

Turning to the control variables in the extended model, we find that larger firms (*SIZE*), and firms with greater growth opportunities (*TOBINQ*) and better performance (*ROE*) have higher

investment levels, consistent with the findings in prior research. In contrast, financially constrained firms (*FC*) are associated with lower investment. Collectively, the evidence from Table 2 suggests that a change in disclosure policy from selective disclosure to non-disclosure corresponds to an increase in a firm's investment constraints.[11]

[Insert Table 2 Here]

4.3. Cross-Sectional Tests

4.3.1. Impact of Financial Constraints.

Theoretical works suggest that the adverse selection issue forces firms to leverage collateral to borrow capital from the credit market (Bernanke & Gertler, 1986; Carlstrom & Fuerst, 1997). When macroeconomic shocks reduce collateral value, financially constrained firms reduce investment more than the unconstrained ones (Whited & Wu, 2006). There is consistent empirical evidence that the investment to cash flow sensitivity measure behaves differently between financially constrained and unconstrained firms (e.g., Beatty, Scott Liao, & Weber, 2010). If the existence of ex-ante financial constraints suggests an increase in the importance of information asymmetry problems, then disclosure quality would have a greater influence for financially constrained firms. Frederickson and Hilary (2006) document that oil-dependent firms that had a higher level of disclosure quality prior to the negative oil price shock in 1986 experienced a smaller decrease in their non-oil segment capital investment. The authors find that financially constrained

[11] In sensitivity tests, we use other disclosure groups (public disclosers and non-disclosers) as control groups to further examine the relation between disclosure policy and investment to cash flow sensitivity. Untabulated results show no difference in investment constraints between public disclosers and new public disclosers pre-FD versus post-FD. However, relative to non-disclosers, new non-disclosers generally experience a higher increase in investment constraints. These firms rely on the private channel in the pre-FD period, and become silent in the post-FD period.

firms receive greater benefit from better disclosure quality. Therefore, we expect a disclosure policy that affects a firm's information environment to be more closely related to investment of ex-ante financially constrained firms. We employ the index developed by Whited and Wu (2006), which does a better job of sorting constrained firms than the other indexes do, and has been used in many subsequent studies (e.g., Beatty, Scott Liao, et al., 2010; Li, 2011)[12]. The index is computed as a function of a firm's cash flow, dividend policy, leverage, size, and sales growth, which are informative about the firm's external financial demands:

$$FC_{i,t} = -0.091 \times CF_t - 0.062 \times DIV_t + 0.021 \times LEVERAGE_t - 0.044 \times SIZE_t + 0.102 \times ISG_t - 0.035 \times SALESGROWTH_t \quad (3)$$

The variable *ISG* is sales growth in a firm's three-digit SIC code, and *CF* is the ratio of earnings before extraordinary items plus depreciation to total assets. The remaining variables are identical to those in the main regressions. We partition firms based on the *FC* index, and classify financially constrained firms as those with an *FC* index above the sample median. Firms with an *FC* index below the sample median are defined as financially unconstrained. We then conduct the same tests for financially constrained and unconstrained firms respectively.[13]

Table 3 presents the results for financially constrained (above the median) and unconstrained (below the median) firms. For financially constrained firms, the coefficient of $CFO \times FD$ for new-non disclosers is 0.009 and significant at the 5% level, which suggests that for financially constrained firms, a change in disclosure policy is significantly associated with an

[12] The index outperforms the one developed in Kaplan and Zingales (1997) in identifying financially constrained firms, and is consistent with firm characteristics associated with external finance constraints (Whited & Wu, 2006).
[13] We also rank the *FC* index into quartiles for all firms in the sample. Firms in the upper quartile of the *FC* index are defined as financially constrained, while the remaining firms are defined as unconstrained. The results are robust to this partition.

increase in a firm's cash flow sensitivity. In comparison, the investment of firms that switch to public disclosure is largely unchanged. The difference in the coefficients of $CFO \times FD$ between these two groups is 0.016 and significant at the 5% level. A one standard deviation increase in cash flow (0.60) will increase the investment of new non-disclosers by 11% more than it would for new public disclosers. However, ex-ante financially unconstrained firms do not exhibit significant differences in the coefficients of $CFO \times FD$ between different disclosure groups. In sum, these results indicate that the relation between disclosure policy and capital investment constraints is driven by financially constrained firms, which further strengthens our main findings in Table 2.

[Insert Table 3 Here]

4.3.2. Impact of Growth Opportunity.

We also consider the impact of growth opportunity on the relation between disclosure and investment constraints, since only firms with good investment opportunities need to invest enough to be constrained (Whited & Wu, 2006). Additionally, when information asymmetry between insiders and outsiders is high, costs associated with external financing are greater. As this problem increases with investment opportunities, cash flow sensitivity should be higher for firms with more investment opportunities (Fazzari et al., 1988). We expect the association between disclosure policy and investment constraints to be greater for firms with more growth opportunities. We partition firms based on Tobin's Q, and classify high-growth firms as those with Tobin's Q above

the sample median, and low-growth firms as those below the sample median.[14] We then rerun the tests for both the subsamples. The results are reported in Table 4 for low-growth firms (below the median) in columns (1 & 2), and for high-growth firms (above the median) in columns (3 & 4)[15]. We find that disclosure policy only matters for high-growth firms. Specifically, the coefficients of $CFO \times FD$ for new-non disclosers are positive, 0.01 and significant at 5% level, and the difference in the coefficients between these two disclosure groups is also positive and significant, which indicates that a change in disclosure policy is only related to investment of a firm with higher growth potential.

[Insert Table 4 Here]

4.3.3. Impact of External Information Environment.

We also consider the influence of the external information environment. When information asymmetry between insiders and outsiders is severe, external financing is costlier. Analyst coverage can mitigate to some extent the information problem. Healy and Palepu (2001) suggest that analysts, as information intermediaries, engage in private information production that improves the information environment and helps detect managers' misconduct. Consistent with this, Yu (2008) finds that firms that are followed by a large number of analysts engage less in earnings manipulation, and Dyck, Morse, and Zingales (2010) document that analysts are the most efficient external whistleblowers for corporate fraud. Therefore, analyst coverage could measure

[14] We also rank the Tobin's Q into quartiles for all firms in the sample. Firms in the upper quartile of the Tobin's Q are defined as high-growth, while the remaining firms are defined as low-growth. The results are robust to this partition.

[15] The median of *TOBINQ* for different disclosure groups is very similar (1.398 vs.1.396), so the sample distribution for this partition is quite equally divided.

to some extent the quality of external information environment. If analysts can substitute for management disclosure, then a non-disclosure policy may not be necessarily associated with a firm's investment. We use a change in analyst following around Reg FD as a proxy for the external information environment and rerun the tests.

Table 5 presents the results for the subsample of firms with decrease (increase) in analyst coverage in the post-FD period. We find that only when analyst coverage declines, the coefficient of $CFO \times FD$ for new non-disclosers is positive, 0.009 and significant at 5% level. When the number of analysts increase, the coefficient of $CFO \times FD$ is positive but insignificant. However, for new public disclosers, a change in analyst following has no association with their cash flow sensitivities. These results suggest that investment constraints associated with management disclosure can be mitigated by the information production from analysts.

[Insert Table 5 Here]

4.3.4. Impact of an Alternative Financing Channel.

Finally, we consider the importance of an alternative financing channel. Reg FD mainly affects the disclosure practice on the equity market. In the post-FD period, banks and rating agencies still have superior access to private information of borrowers. Petacchi (2015) find that firms increase debt financing after Reg FD. If silent firms can acquire enough funding from the debt market, then their investment should not be affected. We partition the sample firms based on the change in long-term debt issuance around Reg FD, and rerun the tests. Table 6 displays the results for the subsample of firms with a decrease (increase) in long-term debt issuance in the post-FD period. Only those new non-disclosers that have difficulties issuing new debt have a positive coefficient of , 0.009 and significant at 5% level, which suggests that these firms suffer investment

constraints, while those with access to the debt market do not experience investment restriction. In contrast, an alternative debt financing channel has no effect on the investment constraints for new public disclosers. The results suggest that our main findings are driven by new non-disclosers that are harder to access the debt market.

[Insert Table 6 Here]

V. FURTHER ANALYSES

5.1. Endogenous Switching Model

In the previous section, we compare cash flow sensitivity between new public disclosers and new non-disclosers to investigate the association between a change in disclosure policy and a firm's capital investment constraints. In further analysis, we attempt to draw some causal inference by addressing the endogeneity issue embedded in the choice of disclosure policy. In the post-FD period, firms had to switch away from the private disclosure channel. However, private disclosure firms face a choice: public disclosure versus silence. This choice is likely to be endogenously determined with investment decisions, thus potentially biasing ordinary lease square (OLS) coefficient estimates. To account for the endogeneity, and to shed some light on the causal effect of disclosure policy change, we use endogenous switching estimation that requires an exogenous instrument—a variable that is related to the firm's disclosure choice, but is not directly related to its investment decisions. Endogenous switching estimation allows the coefficients to differ in the treatment and control groups. We prefer it to the traditional Heckman approach as we are interested in both choice regimes, and intend to draw a conclusion for each.

$$
\begin{aligned}
PROB(NEWNON = 1) = {} & \alpha_{0+}\alpha_1 CFO_{i,t} + \alpha_2 FD_t + \alpha_3 CFO_{i,t} \times FD_t + \alpha_4 Tobin's\ Q_{i,t-1} \\
& + \alpha_5 LEVERAGE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 ROE_{i,t-1} + \alpha_8 TANGIBILITY_{i,t-1} \\
& + \alpha_9 LAGCASH_{i,t-1} + \alpha_{10} COMPETITION_{i,t-1} + \alpha_{11} SALESGROWTH_{i,t-1} \\
& + \alpha_{12} RD_{i,t-1} + \alpha_{13} DIV_{i,t-1} + \alpha_{14} FC_{i,t-1} + \alpha_{15} INSTITUTION\_IND\_D_{i,t-1} \\
& + \alpha_{16} FORECAST\_IND_{i,t-1} + \varepsilon
\end{aligned} \quad (4)
$$

The first-stage model captures the determinants of a firm's disclosure choice. The second-stage model estimates investment decisions separately for new public disclosers and new non-disclosers. We then use a full information maximum likelihood method, and estimate these models simultaneously.

The first-stage selection model includes factors that affect firms' disclosure choices. Firms with higher proprietary costs, as proxied by R&D expenditure (*RD*), are more likely to face more costs of public disclosure (Wang, 2007). For firms in competitive industries or with valuable growth options, public disclosure can adversely affect their competitive position and the value of their growth options (Albring et al., 2015). Thus, we include the quarterly industry Herfindahl index (*COMPETITION*) and a firm's quarterly sales growth (*SALESGROWTH*) in the selection model. Following Wang (2007), we further control for a firm's financial condition by including the dividend policy (*DIV*).

In addition, we include two instrumental variables, *INSTITUTION_IND_D* and *FORECAST_IND,* in the first-stage determinant model. Both instruments are measured at the industry–quarter level, excluding the firm's own value. The variable *INSTITUTION_IND_D* equals one if the industry average institutional ownership is above the sample median, and zero otherwise, while *FORECAST_IND* captures the industry median forecast frequency. Prior research shows that firms with higher disclosure levels are associated with higher institutional

ownership (e.g., Bushee & Noe, 2000). Both instruments proxy for a firm's external information environment, which can affect a firm's own disclosure decisions, but are unlikely to directly affect its investment policy. Therefore, these two variables can be potential candidates for instrumental variables in the determinant model. Next, we conduct the over-identification test to confirm the validity of the instruments. Finally, we also test and verify that the instrumental variable estimator differs significantly from the OLS estimator, and hence the instrumental variable approach is needed and appropriate.

Table 7 Panel A presents the results of the first-stage disclosure choice model between public disclosure and silence in the post-FD period. Larger firms and firms with greater growth opportunities are less likely to replace private guidance with silence. In contrast, firms with higher cash balances and leverage are more likely to withhold information, since they rely less on the equity market to raise capital. The two instrumental variables, the industry's institutional ownership and forecast frequency, are significantly negatively associated with the choice of silence, which suggests that industry practices significantly affect a firm's choice. Panel B presents the results of the second-stage investment outcome model, which are qualitatively similar to our main findings in Table 2. Specifically, in both the baseline and extended models, the coefficients of $CFO \times FD$ for new non-disclosers are positive, 0.009 and significant at 5% level, while those for new public disclosers are positive but not significant. The results suggest a causal link between disclosure change and a firm's investment constraints. However, we also acknowledge that the two instrumental variables as well as model specification may not be perfect, and thus may not address the endogeneity problem effectively, making it difficult to fully solve the endogeneity issue. Hence, we need to be cautious about the causal inference.

[Insert Table 7 Here]

5.2. Cash to Cash Flow Sensitivity Model

Our interpretation of the relation between disclosure and investment is based on the existence of financial constraints. There are concerns that the observed investment cash flow sensitivity may be due to measurement errors in growth opportunity (Alti, 2003). Almeida et al. (2004) suggest using a firm's propensity to save cash out of cash flows as an alternative measure of financial constraints. Because cash is a financial variable, it is hard to argue that the explanatory power of cash flows over cash policies could be attributed to forecast future investment demand. Only firms anticipating financial constraints in the future hoard cash today, because holding cash is costly due to the reduction in current valuable investment. Therefore, constrained firms must choose their optimal cash policy to balance the profitability of current and future investment. Financially unconstrained firms can take on all positive net present value projects. They have no use for cash, and face no costs for holding cash. Therefore, they should not display a systematic propensity to save cash out of cash flow. Thus, cash to cash flow sensitivity provides a measure of the importance of financial constraints. Numerous studies have employed this measure to capture the severity of a firm's financial constraints (e.g., Beatty, Scott Liao, et al., 2010; Carlstrom & Fuerst, 1997; Stone, Gup, & Lee, 2018).

If a change in disclosure policy from selective disclosure to non-disclosure is associated with a firm's financial constraints, then new non-disclosers would experience higher cash to cash flow sensitivity pre-FD versus post-FD, compared to new public disclosers. We therefore propose the following model as in Almeida et al. (2004).

$$\begin{aligned}\Delta CASH_{i,t} = {} & \alpha_{0+}\alpha_1 CFO_{i,t} + \alpha_2 FD_t + \alpha_3 CFO_{i,t} \times FD_t + \alpha_4 Tobin's\ Q_{i,t-1} \\ & + \alpha_5 LEVERAGE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 ROE_{i,t-1} + \alpha_8 TANGIBILITY_{i,t-1} \\ & + \alpha_9 LAGCASH_{i,t-1} + \alpha_{10} COMPETITION_{i,t-1} + \alpha_{11} SALESGROWTH_{i,t-1} \\ & + \alpha_{12} RD_{i,t-1} + \alpha_{13} DIV_{i,t-1} + \alpha_{14} FC_{i,t-1} + \varepsilon\end{aligned} \tag{5}$$

where $\Delta CASH$ is the change in the balance of cash and short-term marketable securities, scaled by lagged total assets. The remaining variables are the same as in the previous investment to cash flow sensitivity model. For detailed variable definitions, see .

Table 8 reports the cash to cash flow sensitivity tests for both the OLS and the endogenous switching models. Under the OLS estimation, for new non-disclosers, the coefficient of $CFO \times FD$ for new non-disclosers is 0.016 and significant at the 5% level, which shows that a change in disclosure policy from selective disclosure to non-disclosure is associated with an increase in these firms' cash to cash flow sensitivity. For new public disclosers, the coefficient of $CFO \times FD$ is statistically insignificant. The difference in the coefficients of $CFO \times FD$ between these two groups is positive, 0.024 and significant at the 5% level. A one standard deviation increase in cash flow (0.60) would increase the investment of new non-disclosers by 16% more than it would for new public disclosers. The results from endogenous switching model provides similar inference. These results are also consistent with the univariate test in Table 1 Panel B, wherein new non-disclosers significantly reduce cash dividends in the post-FD period compared to new public disclosers, which suggests that these firms need to cut shareholder payouts to hoard cash, a signal of more reliance on their internal cash. In sum, compared to new public disclosers, new non-disclosers have higher cash to cash flow sensitivity pre-FD versus post-FD, further supporting our main findings.

[Insert Table 8 Here]

VI. CONCLUSION

This study examines the relation between a change in disclosure policy and a firm's investment constraints. The results show that, unlike new public disclosers, firms choosing to be silent experience more investment constraints in the post-FD period. In addition, the association is stronger for firms that are ex-ante financially constrained, have greater growth opportunities, face a decrease in analyst following, and find it harder to raise debt. These findings suggest that a change in disclosure policy induced by Reg FD is associated with a firm's ultimate investment.

In further analyses, we attempt to employ endogenous switching estimation methods to draw some causal inference. The results confirm with our main findings implying a causal link between a change in disclosure policy and investment constraints. However, due to the limitation of instrumental variable approach, we need to be cautious about this causal inference. We also conduct cash to cash flow sensitivity test, and find consistent results with our main findings.

Our study sheds light on understanding the effect of a firm's disclosure policy on its overall cost of capital, and also extends prior studies on financial transparency and investment efficiency. Our finding that disclosure policy is related to investment is relevant to both market participants and regulators when evaluating disclosure regulation.

Appendix A: Variable Definitions

Variable	Definition
INVESTMENT	Capital expenditure (Compustat data *capxy*, adjusted for quarterly accumulation) scaled by net PPE (*ppentq*)
CFO	Cash flow from operations (*oancfy*, adjusted for quarterly accumulation) scaled by net PPE *(ppentq*)
CF	Income before extraordinary items (*ibcy*, adjusted for quarterly accumulation) plus depreciation and amortizations scaled by the prior period net PPE (*ppentq*)
$\Delta Cash$	Changes in cash and short-term marketable securities (*cheq*) scaled by total assets (*atq*) at the beginning of the period
Tobin's Q	Market value of assets divided by the book value of assets $((atq - ceqq + cshoq \times prccq)/atq)$ at the beginning of the quarter
LAGCASH	Cash balances (*cheq*) scaled by total assets at the beginning of the period
LEVERAGE	Ratio of long-term debt to total assets (*lltq/atq*) at the beginning of the quarter
SIZE	Natural logarithm of 1 plus total assets (*log*(*1+atq*))
ROE	Net income (*oiadpq*) divided by average equity (*ceqq*)
TANGIBILITY	Almedia and Campello's (2007) estimate: 0.715×accounts receivable (*rectq*) + 0.547×inventory (*invtq*) + 0.535×PPE (*ppentq*) + cash divided by total assets (*atq*)
FORECAST_IND	Median of firms' forecast frequency (sourced from I/B/E/S guidance) in the same industry–quarter
INSTITUTION_IND__D	Indicator variable equal to 1 if the industry average institutional ownership is above the sample median and 0 otherwise
RD	Quarterly R&D expenses (*xrdy* adjusted for quarterly accumulation) divided by total assets (*atq*)
COMPETITION	Herfindahl competition index for a firm's three-digit SIC code industry
ISG	Firm's three-digit SIC code industry quarterly sales growth
SALESGROWTH	Changes in quarterly sales (*saleq*), scaled by sales at the beginning of the period
DIV	Indicator variable equal to 1 if there is any cash dividend in a given quarter and 0 otherwise
FC	Financial constraints index, as in Whited and Wu (2006): $FC = -0.091 \times CF - 0.062 \times DIV + 0.021 \times LEVERAGE - 0.044 \times SIZE + 0.102 \times ISG - 0.035 \times SG$

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Table 1
Summary statistics

Panel A: Industry distribution

Fama–French 10-industry code	New public disclosers		New non-disclosers	
	Freq.	Percent	Freq.	Percent
Consumer Nondurables—Food, Tobacco	154	5.84	418	8.84
Consumer Durables—Cars, TV's	152	5.76	67	1.4
Manufacturing—Machinery, Trucks	571	21.65	987	20.89
Oil, Gas, and Coal Extraction	128	4.85	268	5.66
Business Equipment—Computers	965	37.5	969	20.51
Telephone and Television Transmission	0	0	40	0.83
Wholesale, Retail, and Some Services	232	8.79	377	7.93
Healthcare, Medical Equipment, and Drug	95	3.6	929	19.67
Other—Mines, Constr, BldMt, and Trans	343	13	675	14.28
Total	2640		4730	

Panel B: Descriptive statistics of major variables (mean)

	New public disclosers			New non-disclosers		
	Pre-FD	Post-FD	Difference (Post - Pre)	Pre-FD	Post-FD	Difference (Post - Pre)
INVESTMENT	0.08	0.06	-0.02***	0.09	0.05	-0.03***
CFO	0.06	0.07	0.01**	0.01	0.02	0.01**
ΔCASH	0.00	0.00	0.00	0.00	0.00	-0.01***
TOBINQ	2.00	1.61	-0.39***	2.11	1.76	-0.35***
LEVERAGE	0.27	0.29	0.02*	0.24	0.31	0.07***
SIZE	6.18	6.59	0.41***	4.96	5.08	0.12**
ROE	0.05	0.02	-0.03***	0.00	-0.03	-0.02***
TANGIBILITY	0.51	0.48	-0.04***	0.57	0.54	-0.03***
LAGCASH	0.14	0.14	0.00	0.23	0.22	-0.01
COMPETITION	0.06	0.06	0.00	0.04	0.04	0.00
SALESGROWTH	0.06	0.02	-0.04***	0.08	0.05	-0.03**
RD	0.02	0.01	-0.00*	0.03	0.02	0.00
DIV	0.37	0.34	-0.02	0.22	0.18	-0.04***
FC	-0.29	-0.30	-0.02***	-0.22	-0.23	0.00

This table provides descriptive statistics of major variables used in the study (pre-FD, 1996–1999; post-FD, 2001–2003). The symbols, ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions.

Table 2
Investment to cash flow sensitivity between new public disclosers and new non-disclosers

	Baseline Model		Extended Model	
	New non-disclosers estimate	New public disclosers estimate	New non-disclosers estimate	New public disclosers estimate
CFO	-0.002	0.001	-0.001	0.004
	(-0.731)	(0.243)	(-0.387)	(0.847)
FD	-0.028***	-0.020***	-0.026***	-0.021***
	(-5.950)	(-4.944)	(-6.059)	(-4.906)
CFO×FD	**0.007****	**-0.002**	**0.008****	**-0.004**
	(2.052)	(-0.453)	(2.313)	(-0.851)
TOBINQ	0.009***	0.013***	0.008***	0.014***
	(4.137)	(5.642)	(4.277)	(5.558)
LEVERAGE	-0.022**	-0.044***	-0.010	-0.033**
	(-2.281)	(-2.753)	(-0.980)	(-2.004)
SIZE	0.013***	0.003	0.011**	0.001
	(2.711)	(0.558)	(2.134)	(0.099)
ROE			0.015**	0.023**
			(2.238)	(2.262)
TANGIBILITY			0.029*	-0.055**
			(1.698)	(-2.019)
LAGCASH			0.074***	0.111***
			(5.096)	(3.209)
COMPETITION			-0.032	-0.051
			(-0.893)	(-1.277)
SALESGROWTH			0.003	-0.004
			(0.906)	(-0.793)
RD			-0.151	0.042
			(-1.606)	(0.369)
DIV			0.000	0.014**
			(0.020)	(2.099)
FC			-0.061*	-0.049**
			(-1.680)	(-2.033)
Observations	4,730	2,640	4,730	2,640
R^2	0.319	0.416	0.342	0.437
Differences in the coefficient of *CFO×FD* between new non-disclosers and new public disclosers				
	0.009**		0.012**	

This table displays the results of the investment to cash flow sensitivity tests (baseline model and extended model) over the sample period (pre-FD, 1996–1999; post-FD, 2001–2003). The dependent variable is *INVESTMENT* and *FD* is an indicator variable equal to one for the post-FD period and zero otherwise. Firm fixed effects are included and standard errors are clustered at both the firm and year–quarter levels. The t-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions.

Table 3
Impact of financial constraints on the effect of investment to cash flow sensitivity

	Subsample partitioned on firms' financial constraint (*FC* measure)			
	Below the median		Above the median	
	New non-disclosers estimate	New public disclosers estimate	New non-disclosers estimate	New public disclosers estimate
CFO	0.009	-0.001	-0.003	0.010
	(1.633)	(-0.224)	(-1.198)	(1.270)
FD	-0.019***	-0.019***	-0.030***	-0.019**
	(-3.573)	(-5.001)	(-4.545)	(-2.205)
CFO×FD	**0.004**	**-0.009**	**0.009****	**-0.007**
	(0.769)	(-0.853)	(2.313)	(-0.847)
TOBINQ	0.016***	0.010***	0.008***	0.018***
	(3.907)	(3.926)	(3.712)	(4.059)
LEVERAGE	-0.012	-0.023	-0.004	-0.071***
	(-0.568)	(-1.311)	(-0.434)	(-2.651)
SIZE	-0.005	-0.004	0.015**	-0.004
	(-0.518)	(-0.533)	(2.204)	(-0.336)
ROE	-0.004	0.018*	0.019***	0.025**
	(-0.219)	(1.712)	(3.092)	(2.091)
TANGIBILITY	-0.011	-0.017	0.035*	-0.177***
	(-0.472)	(-0.671)	(1.674)	(-2.781)
LAGCASH	0.049	0.063*	0.075***	0.192***
	(1.331)	(1.907)	(4.305)	(3.243)
COMPETITION	0.039	-0.041	-0.450*	0.080
	(0.928)	(-0.954)	(-1.736)	(1.605)
SALESGROWTH	0.005	-0.014**	0.008	0.007
	(0.991)	(-1.991)	(1.279)	(0.880)
RD	0.233*	0.318*	-0.143	-0.117
	(1.729)	(1.706)	(-1.351)	(-0.791)
DIV	-0.003	0.012**	0.008	0.027
	(-0.216)	(2.311)	(0.699)	(1.565)
FC	-0.094	-0.020	-0.091**	-0.110
	(-0.908)	(-0.566)	(-2.021)	(-1.504)
Observations	1,908	1,797	2,822	843
R^2	0.463	0.497	0.331	0.418
Differences in the coefficient of *CFO×FD* between new non-disclosers and new public disclosers				
	0.013		0.016**	

This table provides the results of the investment to cash flow sensitivity tests over the sample period (1996–1999 and 2001–2003) for financially unconstrained firms (below the median of FC measure) and constrained firms (above the median of FC measure). The dependent variable is *INVESTMENT* and *FD* is an indicator variable equal to one for the post-FD period and zero otherwise. Firm fixed effects are included and standard errors are clustered at both the firm and year–quarter levels. The t-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions.

Table 4
Impact of growth opportunity on the effect investment to cash flow sensitivity

	Subsample partitioned on firms' growth opportunity (*TOBINQ* measure)			
	Below the median		Above the median	
	New non-disclosers estimate	New public disclosers estimate	New non-disclosers estimate	New public disclosers estimate
CFO	0.007	0.004	-0.003	0.004
	(1.604)	(1.032)	(-0.826)	(0.568)
FD	-0.024***	-0.016***	-0.029***	-0.029***
	(-4.884)	(-3.518)	(-4.803)	(-4.328)
CFO×FD	**-0.001**	**-0.001**	**0.010****	**-0.005**
	(-0.401)	(-0.119)	(2.145)	(-0.635)
TOBINQ	0.019**	0.045***	0.007***	0.009***
	(2.245)	(3.844)	(3.544)	(3.862)
LEVERAGE	0.001	-0.035	-0.007	-0.045**
	(0.051)	(-1.445)	(-0.530)	(-2.319)
SIZE	0.003	0.015	0.019**	-0.005
	(0.528)	(1.550)	(2.494)	(-0.727)
ROE	0.008	0.029**	0.018***	0.016
	(0.581)	(2.246)	(2.802)	(1.310)
TANGIBILITY	0.002	-0.021	0.036*	-0.103**
	(0.078)	(-1.085)	(1.660)	(-2.326)
LAGCASH	0.114***	0.042	0.062***	0.128***
	(4.069)	(1.149)	(3.589)	(2.989)
COMPETITION	0.030	-0.023	-0.097	-0.079
	(0.516)	(-0.494)	(-1.201)	(-1.361)
SALESGROWTH	0.005	-0.014**	0.004	0.000
	(0.926)	(-2.552)	(0.921)	(0.042)
RD	-0.119	0.233	-0.135	-0.115
	(-0.537)	(1.327)	(-1.470)	(-0.828)
DIV	-0.013	0.014*	0.024*	0.008
	(-1.285)	(1.901)	(1.959)	(0.793)
FC	-0.051	0.019	-0.051	-0.094**
	(-1.510)	(0.794)	(-0.881)	(-2.368)
Observations	2,370	1,323	2,360	1,317
R^2	0.438	0.498	0.327	0.450
Differences in the coefficient of *CFO×FD* between new non-disclosers and new public disclosers	0.00		0.015***	

This table provides the results of the investment to cash flow sensitivity test for the OLS model over the sample period (pre-FD, 1996–1999; post-FD, 2001–2003) for low-growth firms (Below the median) and high-growth firms (Above the median). A firm is high growth if its Tobin's Q is above the median (i.e., larger magnitude). The dependent variable is *INVESTMENT* and *FD* is an indicator variable equal to one for the post-FD period and zero otherwise. Firm fixed effects are included and standard errors are clustered at both the firm and year–quarter levels. The t-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions.

Table 5
Impact of the change of analyst following after Reg-FD on investment to cash flow sensitivity

	Subsample partitioned on the change of analyst following			
	Increase in analyst following		Decrease in analyst following	
	New non-disclosers estimate	New public disclosers estimate	New non-disclosers estimate	New public disclosers estimate
CFO	0.004	0.006	-0.003	0.002
	(0.518)	(0.888)	(-1.060)	(0.368)
FD	-0.036***	-0.019**	-0.027***	-0.021***
	(-2.864)	(-2.645)	(-5.718)	(-3.824)
CFO×FD	**0.012**	**-0.017**	**0.009****	**-0.001**
	(1.295)	(-1.480)	(2.410)	(-0.113)
TOBINQ	0.010***	0.012***	0.008***	0.016***
	(3.015)	(2.908)	(3.502)	(5.261)
LEVERAGE	-0.016	-0.059*	-0.011	-0.005
	(-0.670)	(-1.840)	(-1.075)	(-0.309)
SIZE	0.026**	-0.008	0.004	0.017*
	(2.532)	(-1.294)	(0.727)	(1.999)
ROE	0.005	0.023	0.018**	0.023**
	(0.400)	(1.081)	(2.449)	(2.715)
TANGIBILITY	0.009	-0.022	0.046**	-0.063**
	(0.372)	(-0.640)	(2.067)	(-2.240)
LAGCASH	0.091**	0.100*	0.073***	0.106***
	(2.515)	(1.772)	(3.516)	(2.997)
COMPETITION	-0.020	0.016	-0.068	-0.092**
	(-0.338)	(0.342)	(-1.526)	(-2.181)
SALESGROWTH	0.003	-0.006	0.003	-0.002
	(0.484)	(-0.700)	(1.017)	(-0.320)
RD	-0.125	0.014	-0.110	0.130
	(-1.071)	(0.081)	(-1.076)	(0.713)
DIV	0.026	-0.004	-0.004	0.019**
	(1.108)	(-0.756)	(-0.440)	(2.489)
FC	-0.089	-0.067*	-0.053	-0.040
	(-1.420)	(-1.926)	(-1.502)	(-1.537)
Observations	956	1,003	3,774	1,637
R^2	0.300	0.402	0.360	0.482
Differences in the coefficient of *CFO×FD* between new non-disclosers and new public disclosers	0.03		0.01**	

This table provides the results of the investment to cash flow sensitivity tests over the sample period (pre-FD, 1996–1999; post-FD, 2001–2003) for firms with a change in analyst coverage around Reg FD. We compute the mean of the number of estimates one year before/after Reg-FD and use the change in the means to partition the sample into two sub-samples; that is, decrease in analyst following (i.e., less analyst following after FD) and increase in analyst following (i.e., more analyst following after FD). The dependent variable is *INVESTMENT* and *FD* is an indicator variable equal to one for the post-FD period and zero otherwise. Firm fixed effects are included and standard errors are clustered at both the firm and year–quarter levels. The t-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions.

Table 6
Impact of long-term debt issuance on the effect investment to cash flow sensitivity

	Subsample partitioned on the long-term debt issuance			
	Increase in long-term debt issuance		Decrease in long-term debt issuance	
	New non-disclosers estimate	New public disclosers estimate	New non-disclosers estimate	New public disclosers estimate
CFO	0.008	-0.003	-0.003	0.006
	(1.583)	(-0.257)	(-0.893)	(1.166)
FD	-0.023***	-0.013*	-0.028***	-0.025***
	(-4.411)	(-1.971)	(-4.833)	(-4.607)
CFO×FD	**0.007**	**-0.013**	**0.009****	**-0.005**
	(0.880)	(-0.875)	(2.236)	(-0.909)
TOBINQ	0.013***	0.012***	0.006**	0.014***
	(3.758)	(3.119)	(2.698)	(4.677)
LEVERAGE	0.007	-0.007	-0.020*	-0.044**
	(0.464)	(-0.317)	(-1.896)	(-2.230)
SIZE	0.017*	-0.004	0.006	0.003
	(1.861)	(-0.463)	(1.045)	(0.389)
ROE	0.009	0.050**	0.017*	0.018*
	(0.801)	(2.252)	(1.978)	(1.755)
TANGIBILITY	0.043**	-0.047	0.029	-0.061*
	(2.081)	(-1.354)	(1.289)	(-1.773)
LAGCASH	0.088***	0.119*	0.071***	0.114***
	(3.010)	(1.741)	(3.505)	(2.948)
COMPETITION	-0.047	-0.024	-0.039	-0.061
	(-0.835)	(-0.725)	(-0.796)	(-0.920)
SALESGROWTH	0.006	0.001	0.003	-0.007
	(1.014)	(0.138)	(0.616)	(-1.321)
RD	-0.122	-0.037	-0.150	0.100
	(-0.781)	(-0.171)	(-1.447)	(0.739)
DIV	-0.001	0.019**	0.002	0.012
	(-0.173)	(2.607)	(0.175)	(1.309)
FC	-0.068	-0.001	-0.056	-0.080**
	(-1.104)	(-0.045)	(-1.665)	(-2.743)
Observations	1,784	897	2,946	1,743
R^2	0.393	0.499	0.318	0.417
Differences in the coefficient of *CFO×FD* between new non-disclosers and new public disclosers				
	0.02		0.01***	

This table provides the results of the investment to cash flow sensitivity tests over the sample period (pre-FD, 1996–1999; post-FD, 2001–2003) for firms with a change in long-term debt issuance. We compute differences in the long-term debt issuance one year before/after Reg-FD and use the amount change to partition the sample into two sub-samples; that is, a decrease in long-term debt issuance (i.e., less long-term debt issuance after FD) and an increase in long-term debt issuance (i.e., more long-term debt issuance after FD). The dependent variable is *INVESTMENT* and *FD* is an indicator variable equal to one for the post-FD period and zero otherwise. Firm fixed effects are included and standard errors are clustered at both the firm and year–quarter levels. The t-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions.

Table 7

Panel A: Determinants of the disclosure choice model between public disclosure and silence

	Prob (Newnon = 1)	Marginal effect
CFO	-0.114	-0.02
	(-0.90)	
FD	0.052	0.01
	(0.59)	
CFO×FD	0.073	0.01
	(0.46)	
TOBINQ	-0.130**	-0.03
	(-2.12)	
LEVERAGE	1.366***	0.27
	(2.81)	
SIZE	-0.363***	-0.07
	(-3.75)	
ROE	-0.312	-0.06
	(-1.07)	
TANGIBILITY	0.184	0.04
	(0.23)	
LAGCASH	1.248*	0.24
	(1.97)	
COMPETITION	1.839	0.36
	(1.34)	
SALESGROWTH	0.314***	0.06
	(3.69)	
RD	-0.706	-0.14
	(-0.21)	
DIV	0.212	0.04
	(0.72)	
FC	1.974***	0.38
	(2.58)	
INSTITUTION_IND_D	-0.413**	-0.08
	(-2.09)	
FORECAST_IND	-0.380***	-0.07
	(-2.56)	
Constant	3.239***	
	(4.60)	
Observations	7,370	
Pseudo-R^2	0.12	

Underidentification test	Weak identification test	Overidentification test
χ^2 = 7.75 with p-value = 0.02	F-stat. = 39 with p-value < 0.001	χ^2 = 0.74 with p-value = 0.39

This table displays the results based on the endogenous switching model. The pre-FD sample period is 1996–1999 and the post-FD sample period is 2001–2003. Panel A shows the results from the first-stage determinant model of disclosure choice. The dependent variable Newnon is an indicator variable equal to one if firms selected silence in the post-FD period and zero if they chose public disclosure. Standard errors are clustered at the firm and year–quarter levels and z-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable

Table 7
Panel B: Investment to cash flow sensitivity between new public disclosers and new non-disclosers

	Baseline Model		Extended Model	
	New non-disclosers estimate	New public disclosers estimate	New non-disclosers estimate	New public disclosers estimate
CFO	-0.005	-0.001	-0.002	-0.000
	(-0.779)	(-0.178)	(-0.378)	(-0.039)
FD	-0.025***	-0.019***	-0.026***	-0.021***
	(-5.147)	(-3.922)	(-4.869)	(-3.170)
CFO×FD	**0.009****	**0.002**	**0.009****	**0.001**
	(2.266)	(0.348)	(2.361)	(0.107)
TOBINQ	0.010***	0.008***	0.009*	0.006
	(3.195)	(2.896)	(1.954)	(1.478)
LEVERAGE	-0.040	-0.057**	-0.027	-0.037
	(-1.268)	(-2.374)	(-0.688)	(-0.795)
SIZE	0.000	-0.004	-0.000	-0.005
	(0.029)	(-0.439)	(-0.032)	(-0.358)
ROE			0.011	0.020
			(1.081)	(1.319)
TANGIBILITY			0.010	-0.036
			(0.570)	(-1.458)
LAGCASH			0.066	0.073
			(1.598)	(1.255)
COMPETITION			-0.005	-0.002
			(-0.077)	(-0.031)
SALESGROWTH			0.005	-0.001
			(0.534)	(-0.056)
RD			-0.161**	-0.117
			(-2.303)	(-0.912)
DIV			-0.012*	-0.019***
			(-1.662)	(-3.085)
FC			-0.073	-0.042
			(-1.195)	(-0.896)
Observations	4,730	2,640	4,730	2,640
Differences in the coefficient of *CFO×FD* between new non-disclosers and new public disclosers				
	0.011**		0.01**	

Panel B displays the results from the second-stage investment outcome model. The dependent variable is *INVESTMENT* and *FD* is an indicator variable equal to one for the post-FD period and zero otherwise. Firm fixed effects are included and standard errors are clustered at both the firm and year–quarter levels. The t-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions.

Table 8
Cash to cash flow sensitivity between new public disclosers and new non-disclosers

	OLS model		Endogenous switching model	
	New non-disclosers estimate	New public disclosers estimate	New non-disclosers estimate	New public disclosers estimate
CFO	0.024***	0.040***	0.019**	0.038***
	(3.173)	(5.198)	(2.206)	(4.597)
FD	0.002	-0.000	-0.001	0.003
	(0.394)	(-0.048)	(-0.108)	(1.103)
CFO×FD	**0.016****	**-0.008**	**0.017****	**-0.001**
	(2.329)	(-0.523)	(2.357)	(-0.056)
TOBINQ	0.006*	0.008**	0.007	0.006**
	(1.723)	(2.285)	(1.436)	(2.527)
LEVERAGE	0.012	-0.005	-0.004	0.016
	(0.919)	(-0.254)	(-0.084)	(1.633)
SIZE	0.022***	0.014**	0.009	0.001
	(3.883)	(2.370)	(0.476)	(0.293)
ROE	0.010	-0.005	0.008	0.006
	(1.216)	(-0.429)	(0.557)	(0.608)
TANGIBILITY	0.261***	0.140***	0.123***	0.081***
	(4.958)	(3.619)	(4.094)	(5.839)
COMPETITION	-0.053	-0.040	-0.039	0.004
	(-1.121)	(-1.052)	(-0.511)	(0.224)
SALESGROWTH	0.007	0.004	0.008	0.006
	(1.079)	(0.572)	(0.691)	(0.806)
RD	-0.114	-0.344	-0.127*	-0.034
	(-1.092)	(-1.149)	(-1.737)	(-0.378)
DIV	0.010	-0.006	0.000	-0.001
	(1.018)	(-0.841)	(0.030)	(-0.184)
FC	-0.009	-0.018	-0.024	-0.009
	(-0.180)	(-0.503)	(-0.400)	(-0.231)
Intercept	-0.274***	-0.198***	-0.110***	-0.065*
	(-4.468)	(-8.064)	(-7.084)	(-1.666)
Observations	4,730	2,640	4,730	2,640
R^2	0.148	0.152		
Differences in the coefficient of *CFO×FD* between new non-disclosers and new public disclosers	0.024**		0.018**	

This table provides the results of the cash to cash flow sensitivity test for both the OLS and endogenous switching models over the sample period (pre-FD, 1996–1999; post-FD, 2001–2003). The dependent variable is *INVESTMENT* and *FD* is an indicator variable equal to one for the post-FD period and zero otherwise. Firm fixed effects are included and standard errors are clustered at both the firm and year–quarter levels. The t-statistics are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Refer to Appendix A for variable definitions