Regulation Fair Disclosure: How It Affected Disclosure Policies and Information Environments of Firms that Formerly Provided More Private Guidance

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Abstract

Policymakers designed Regulation Fair Disclosure (Reg FD hereafter) to stop managers from selectively disclosing material information to some but not all market participants. Prior research on how Reg FD affected firms' post-FD disclosure policies and information environments has yielded mixed results. This study provides sharper tests of the effects of Reg FD by focusing on the primary targets of the regulation – firms who provided more private guidance before Reg FD. Consistent with hypotheses derived from the theoretical King, Pownall, and Waymire (1990) framework, I show that pre-FD private disclosers with higher potential transaction cost savings from public disclosure and lower proprietary information costs are more likely to replace private guidance with *new public disclosures* after Reg FD. Further analysis reveals that these new public disclosures are sufficiently informative to prevent impairment of these firms' information environments. In contrast, pre-FD private disclosers with lower potential transaction cost savings from public disclosure and higher proprietary information costs are more likely to replace private disclosure with *nondisclosure*. This evidence that firms change their disclosure policies in a manner predicted by theory can help policymakers anticipate which firms are more likely to be adversely affected by new regulations. I also provide evidence on the extent to which firms' information environments were adversely affected by Reg FD. I find that over half of the pre-FD private disclosers replace private disclosure with *nondisclosure*, and I show that these firms experience a significant deterioration in their information environments.

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I. Introduction

Policymakers designed Regulation Fair Disclosure (Reg FD hereafter) to stop managers from selectively disclosing material information to some but not all market participants. A flurry of recent studies examine Reg FD's *average effects* on firms' disclosure policies and information environments (Bailey et al. 2003; Heflin et al. 2003; Irani and Karamanou 2003; Shane et al. 2001; Gararowski and Sinha 2002; Mohanram and Sunder 2002; Straser 2002; Agrawal and Chadha 2003; Carnaghan and Sivakumar 2003). However, these studies yield mixed results, possibly because the broad average effects they document mask cross-sectional differences in Reg FD's effects. Because Reg FD strengthens prohibitions on private disclosures, I expect Reg FD to have more impact on firms who relied more heavily on private disclosures prior to Reg FD. I draw on theoretical predictions from the King, Pownall, and Waymire (1990) (KPW hereafter) framework to identify the determinants of cross-sectional differences in the effects of Reg FD on the disclosure policies and the resulting information environments of firms that relied more on private disclosures through analysts prior to Reg FD (pre-FD private discloser hereafter[1]).

The Securities Exchange Act of 1934 and the 1984 Insider Trading Sanction Act prohibited insider trading based on material nonpublic information. Nonetheless, many firms offered private earnings guidance to analysts, claiming that this "background" information just helped analysts complete the informational "mosaic" (Opdyke et al. 2000). Regulators concluded that such guidance created unequal access to information among investors (Levitt 1998). In an

[1] Public, private, and nondisclosure decisions are not mutually exclusive. A firm can pursue a mixed disclosure policy. In this paper, I define a firm as a public or private discloser if, on average, the firm discloses earnings-related information mostly through public channels or mostly through private disclosures to analysts. I define a firm as a nondiscloser if the firm withholds most earnings-related information before its formal earnings announcement.

effort to level the playing field for all investors, the Securities Exchange Commission (SEC) enacted Reg FD in October 2000 (SEC 2000). Reg FD requires that when public companies intentionally disclose material nonpublic information to select analysts or other professional investors, they must also make that information available to the public simultaneously.[2]

Reg FD has triggered much debate since its proposal in December 1999. The Commission received more than 6,000 comment letters (SEC 2000). Most letters from individual investors and the media favored the proposal because they believed Reg FD would level the playing field (SEC 2000). In contrast, large brokerage firms generally opposed the proposal because they believed that Reg FD would reduce the flow of information into the market. Even within the Commission, there was dissent, and the final vote split 3 to 1 (Unger 2001).

The SEC is interested in determining how Reg FD has affected the flow of information in the market, particularly whether Reg FD has led to unexpected negative consequences. One year after the effective date of Reg FD, SEC Commissioner Unger collected feedback from companies, the investment community, and the media. She concluded that Reg FD increased the equality of access to information, but that it was still *unclear* how the regulation affected the flow of information in the market. She recommended that the Commission further analyze precisely how firms' financial disclosures changed after Reg FD (Unger 2001).

Surveys by financial intermediaries, trade associations, and accounting firms reveal differences of opinion as to how Reg FD affected companies' disclosures. The Association for Investment Management and Research (AIMR) survey shows that 57% of responding analysts and portfolio managers believe that disclosures of material information available to them declined after Reg FD, while 14% believe the opposite (AIMR 2001a). PricewaterhouseCoopers'

[2]For non-intentional disclosure, the company must publicly disclose the information promptly – within the later of: 1) 24 hours or 2) the commencement of the next day's trading on the New York Stock Exchange.

survey of fast-growth technology firms finds that 31% of the responding firms say that they are disclosing more information, while 23% say that they are disclosing less (PricewaterhouseCoopers 2001). These surveys also reveal differing opinions on how Reg FD has affected the *quality* of companies' information. For example, another AIMR survey shows that 51% of responding analysts feel that companies release lower quality information to the public after Reg FD, while 23% see no changes in the information environment (AIMR 2001b).

Recent academic studies on the *average effects* of Reg FD on management's public disclosures and other indicators of firms' information environments yield mixed results. On management's public disclosures, most studies find that the average *quantity* of public disclosures increases after Reg FD (Bailey et al. 2003; Heflin et al. 2003; Gararowski and Sinha 2002; Carnaghan and Sivakumar 2003), although Straser (2002) finds that the number of conference calls and company-sponsored meetings for select analysts and institutional investors decreases in a sample of S&P 500 firms.

It is difficult to interpret prior evidence on changes in market reactions to earnings announcements after Reg FD. Most studies find that return volatility around earnings announcement dates decreases after Reg FD (Bailey et al. 2003; Heflin et al. 2001, 2003; Eleswarapu et al. 2004; Shane et al. 2001), but Bailey et al. (2003) attribute the lower post-FD return volatility to a confounding contemporaneous event – the decimalization adopted by the major stock exchanges[3] – not Reg FD.

Regarding analyst forecasts properties, although most studies suggest that analyst forecasts become less accurate and/or more dispersed after Reg FD (Bailey et al. 2003; Irani and

[3] The SEC enacted Reg FD on Oct.23rd, 2000. Around this time the NYSE, AMEX and NASDAQ transitioned from the fractional system where the smallest price increment is $1/16 ($0.0625), to the finer decimal system that allows investors to trade with a minimum price increment of $0.01. Allowing smaller price increments reduces price and return volatilities. The NYSE and the AMEX started a four-stage process of decimalization on August 28, 2000. They completed their decimal pricing program on January 29, 2001. The NASDAQ began its decimalization on March 12, 2001 and completed it on April 9, 2001.

Karamanou 2003; Shane et al. 2001; Mohanram and Sunder 2002; Agrawal and Chadha 2003), Heflin et al. (2003) conclude that neither the accuracy nor the dispersion of analyst forecasts changes after Reg FD. Irani and Karamanou (2003) also find that average analyst following decreases after Reg FD.

Collectively, these results present a puzzle – firms issue a larger number of public disclosures after Reg FD, yet the preponderance of evidence from analysts' forecasts points to deterioration in firms' information environments. Are these post-FD public disclosures uninformative? Or do the broad average results documented in prior research mask cross-sectional differences? To address these questions, I focus on cross-sectional differences in the disclosure policies and the resulting information environments of those firms most affected by Reg FD – the pre-FD private disclosers.

Drawing on the KPW framework, I hypothesize that changes in the disclosure policies of pre-FD private disclosers depend on: 1) potential transaction cost savings from public disclosure, and 2) the magnitude of proprietary information costs. Consistent with this hypothesis, I find that firms who have little to gain and much to lose from public disclosure (i.e., low potential transaction cost savings and high proprietary information costs) on average replace pre-FD private disclosure with nondisclosure and become *post-FD new nondisclosers*. As a result, these firms' information environments deteriorate significantly. On the other hand, firms who have more to gain and less to lose from public disclosure (i.e., high potential transaction cost savings and low proprietary information costs) on average replace pre-FD private disclosure with new public disclosure and become *post-FD new public disclosers*. Importantly, I find that these firms' post-FD new public disclosures are informative enough to prevent deterioration in their information environments.

This study makes several contributions to the literature. The cross-sectional differences I document help explain the puzzle arising from prior research as to why we would observe – *on average* – a larger quantity of public disclosures yet an impaired information environment after Reg FD. Specifically, my results suggest that the post-FD new public disclosers (who have higher potential transaction cost savings and lower proprietary information costs) tend to drive the "increased quantity of public disclosures" results documented in prior research. My evidence that these firms' public disclosures are sufficiently informative to prevent impairment of their information environments suggests that the puzzle cannot be explained by a flurry of post-FD public disclosures that are simply uninformative. To the contrary, my results suggest that the "impaired information environment" documented in prior research is largely attributable to a different group of firms (who have lower potential transaction cost savings and higher proprietary information costs) – the post-FD new nondisclosers.

From a policy perspective, evidence that firms change their disclosure policies in a manner predicted by theory can help policymakers better *anticipate* how new regulations will affect different firms' disclosure policies. More specifically, documentation of cross-sectional differences in the effects of Reg FD on firms' disclosure policies directly responds to SEC Commissioner Unger's (2001) call for further evidence on how Reg FD affects its target firms. My evidence that the post-FD information environment deteriorates for post-FD new nondisclosers but not for post-FD new public disclosers helps identify which firms suffer unintended dysfunctional consequences from Reg FD – namely, firms who have low potential transaction cost savings and high proprietary information costs, and thus become post-FD new nondisclosers. I find that over half of the pre-FD private disclosers replace private disclosure with *nondisclosure* and these firms suffer: 1) a 25% increase in price reactions to their earnings

announcements, 2) a 37% decrease in analyst following, and 3) a 24% increase in analyst forecast errors. Policymakers armed with a better understanding of the cross-sectional differences in firms' responses to disclosure regulation, particularly the unintended dysfunctional consequences for firms' information environments, can better decide how to improve existing and future disclosure regulations.

I organize the rest of the paper as follows. Section II develops testable hypotheses. Section III discusses the research design. Section IV describes the sample and provides descriptive statistics. Section V presents the results, and section VI concludes.

II. Hypothesis Development

In this section, I first introduce the King, Pownall, and Waymire (1990) framework of managers' incentives to disclose earnings-related information. I then draw on this framework to hypothesize determinants of cross-sectional differences in firms' disclosure policies after Reg FD. Finally, I hypothesize that cross-sectional differences in firms' post-FD disclosure policies lead to cross-sectional differences in the changes in their resulting information environments.

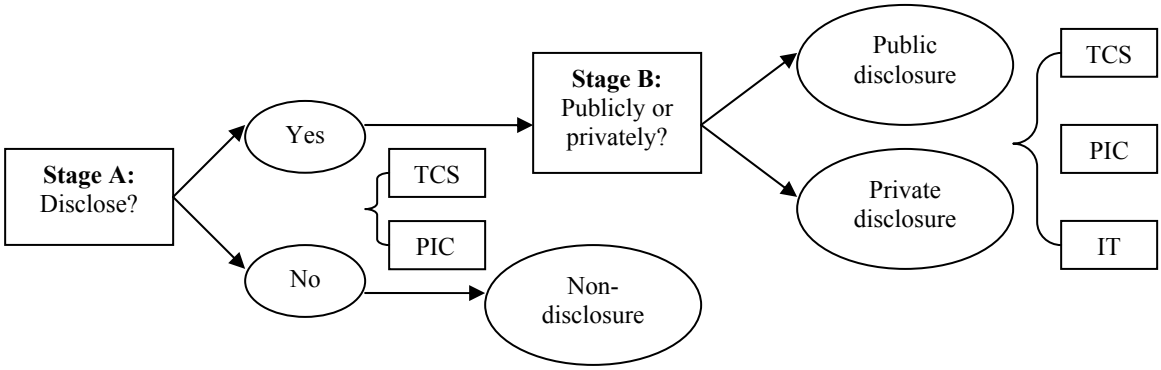
The King, Pownall, Waymire (1990) Framework

King, Pownall, and Waymire (1990) develop an economic framework of managers' incentives to issue earnings forecasts and similar disclosure,[4] based on the expectation adjustment hypothesis proposed by Ajinkya and Gift (1984). This framework, illustrated in Figure 1, provides a theoretical foundation for expecting cross-sectional differences in firms' disclosure policies. In stage A, managers decide whether to disclose any earnings-related information (either publicly or privately). KPW argue that managers are more likely to disclose (either publicly or privately) if: 1) the firm's investors would reap higher transaction cost savings

[4] In this paper, I consider voluntary disclosures on earnings, cash flows, EBITDA, and earnings before goodwill as earnings-related disclosures (First Call, 1999). These are equivalent to what KPW refer to as management earnings forecasts and similar disclosures.

from disclosure, and 2) the firm would suffer lower proprietary information costs from disclosing the information. In stage B, managers of firms that choose to disclose determine whether to disclose publicly or privately through analysts. KPW predict that managers are more likely to disclose *privately* than publicly if: 1) public disclosure would lead to lower potential transaction cost savings for the investors, 2) public disclosure would lead to higher proprietary information costs, and 3) the firm's earnings-related information has higher information transfer values for its analysts.[5]

Figure 1: Management decisions on disclosure of earnings-related information[6]



TCS: transaction cost savings
PIC: proprietary information costs
IT: information transfer

Determinants of cross-sectional differences in the changes in disclosure policies

The KPW framework suggests determinants of *cross-sectional differences* in the changes in pre-FD private disclosers' disclosure policies after Reg FD. When Reg FD removes the private disclosure option, pre-FD private disclosers find themselves back at stage A: deciding between 1) public disclosure and 2) nondisclosure. The KPW framework indicates that the

[5] One firm's (especially an industry leader's) private disclosure of earnings-related information can provide an *information transfer* that helps an analyst predict the earnings of *other* firms in the same industry. As a payback, the analyst requires lower trading gains from the disclosing firm. Trading gains refer to the fees that the analyst extracts by trading on his/her own account or selling earnings forecasts and recommendations to portfolio managers and individual investors (King et al. 1990).

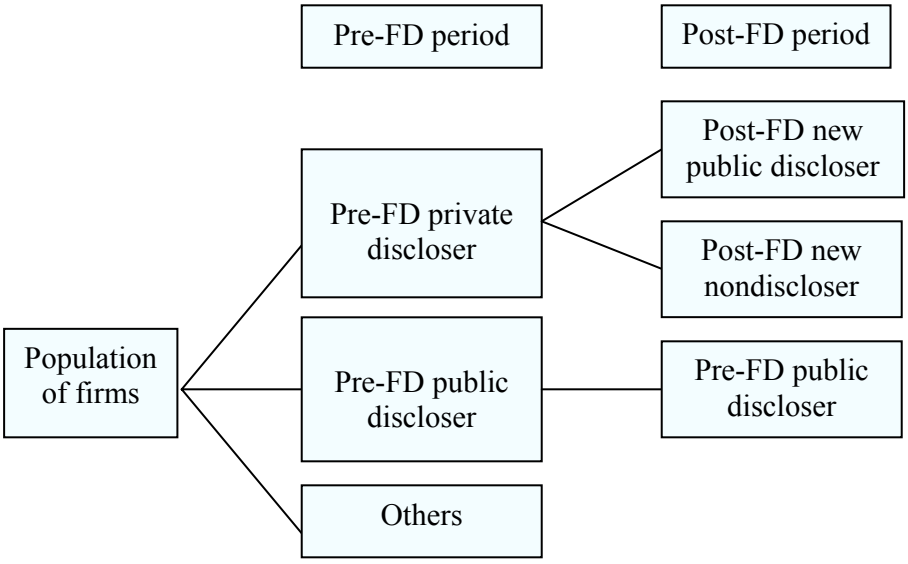
[6] Stage C of the KPW framework explains determinants of managers' choice of the form, horizon, and timing of *public* disclosures. Stage C decisions are beyond the scope of this study.

probability that a pre-FD private discloser chooses nondisclosure (i.e., becomes a post-FD new nondiscloser) is: 1) negatively associated with potential transaction costs savings from public disclosure, and 2) positively associated with the magnitude of the firm's proprietary information costs.

> **H1:** After Reg FD, the probability that a pre-FD private discloser becomes a post-FD new nondiscloser is: 1) negatively associated with potential transaction costs savings from public disclosure, and 2) positively associated with the magnitude of the firm's proprietary information costs.

Figure 2 illustrates how I classify firms based on their disclosure policies in the pre- and post-FD periods. The Appendix details the method I use for the classification.

Figure 2: Classification of Firms in the Pre- and Post-FD Periods



Consequences of cross-sectional differences in the changes in firms' disclosure policies: Differences in the changes in firms' information environments

I hypothesize that cross-sectional differences in the changes in firms' disclosure policies will lead to cross-sectional differences in the changes in their information environments. To control for over-time changes in the economic environment that are unrelated to Reg FD (e.g., decimalization), I use *pre-FD public disclosers* as a benchmark. As the label suggests, pre-FD

public disclosers typically disclose earnings-related information more publicly rather than privately, even before Reg FD. Thus, Reg FD should have minimal impact on these firms' information environments.

I contrast changes in the information environments of pre-FD public disclosers with changes in the information environments of pre-FD private disclosers. Figure 2 shows that pre-FD private disclosers fall into two groups after Reg FD: 1) post-FD new nondiscloser or 2) post-FD new public discloser. Post-FD new nondisclosers' information environments are likely to deteriorate because they are prohibited from private disclosure and decide not to replace pre-FD private disclosure with new public disclosure. In contrast, post-FD new public disclosers replace private disclosure with increased public disclosure after Reg FD, presumably to reduce or prevent impairment in their information environments.[7] Thus, I expect post-FD new nondisclosers to suffer more impairment to their information environments than either pre-FD public disclosers or post-FD new public disclosers.

I use four proxies for the changes in the quality of firms' information environments: changes in the magnitude of price reactions to earnings announcements, changes in the number of analysts following the firm, changes in the magnitude of errors in analysts' forecasts, and changes in the dispersion in analysts' forecasts.

The magnitude of price reactions to the firm's earnings announcements is inversely related to the quality of information available before earnings announcements. In a two-period rational expectations model, Kim and Verrecchia (1991) demonstrate that the magnitude of price reaction to a public announcement decreases with the precision of *preannouncement* (public and

[7] Changes in post-FD new public disclosers' information environments will depend on how the quality of their new (post-FD) public disclosures compares to their pre-FD private disclosures. However, as long as these firms' post-FD new public disclosures have some information content, their post-FD information environments should deteriorate less than those of the post-FD new nondisclosers.

private) information. I expect Reg FD to have little effect on pre-FD public disclosers. Thus, I do not expect these firms to experience significant change in the magnitude of price reactions to their earnings announcements after Reg FD. Because post-FD new nondisclosers suffer more deterioration in their preannouncement information, I expect post-FD new nondisclosers to experience greater increases in the magnitude of price reactions to their earnings announcements than either pre-FD public disclosers or post-FD new public disclosers.[8]

> **H2a**: Post-FD new nondisclosers experience larger increases in the magnitude of price reactions to earnings announcements after Reg FD than: 1) pre-FD public disclosers, and 2) post-FD new public disclosers.

An alternative measure of the firm's information environment is the number of analysts following the firm. Lang and Lundholm (1996) find that decreases in disclosure quality lead to subsequent decreases in analyst following. If Reg FD has little effect on the disclosure quality of pre-FD public disclosers, then these firms should not experience significant changes in analyst following. In contrast, analysts are most likely to drop the firms with the greatest decrease in disclosure quality – the pre-FD private disclosers who become post-FD new nondisclosers. Thus, I expect post-FD new nondisclosers to suffer larger decreases in analyst following than either pre-FD public disclosers or post-FD new public disclosers.

> **H2b**: Post-FD new nondisclosers have larger decreases in analyst following after Reg FD than: 1) pre-FD public disclosers, and 2) post-FD new public disclosers.

[8] Francis et al. (2002) find that absolute abnormal returns for the three days centered on earnings announcements have increased over time. They attribute this finding to increases in concurrent information disclosed in earnings announcement press releases. Because I compare the *cross-sectional differences* in the *changes* in price reactions to earnings announcements, the trend that Francis et al. (2002) document should not affect my inferences. By focusing on cross-sectional differences, this research design also abstracts from the effects of decimalization (and any other market or economy-wide changes that affect all firms) on price reactions to earnings announcements as documented in Bailey et al. (2003).

Lang and Lundholm (1996) show that disclosure quality is positively associated with analyst forecast accuracy and negatively associated with analyst forecast dispersion. If Reg FD has little impact on the disclosure quality of pre-FD public disclosers, then I expect no significant change in their analyst forecast errors or forecast dispersion. In contrast, I expect the firms with the most impaired information environments – the post-FD new nondisclosers – to have larger increases in analyst forecast errors and forecast dispersion than either pre-FD public disclosers or post-FD new public disclosers.

H2c: Post-FD new nondisclosers have larger increases in analyst forecast errors after Reg FD than: 1) pre-FD public disclosers, and 2) post-FD new public disclosers.

H2d: Post-FD new nondisclosers have larger increases in analyst forecast dispersion after Reg FD than: 1) pre-FD public disclosers, and 2) post-FD new public disclosers.

III. Research Design

Testing determinants of cross-sectional differences in changes in pre-FD private disclosers' disclosure policies after Reg FD

To examine cross-sectional differences in the way pre-FD private disclosers respond to Reg FD, I first identify pre-FD private disclosers based on Wang's (2004) modification of Matsumoto's (2002) earnings guidance model. Matsumoto (2002) uses seasonal changes in earnings and cumulative returns over the year to develop an "expected" analyst forecast of earnings. She defines total earnings guidance (the sum of public and private earnings guidance) as the difference between the actual and the expected analyst forecast. Wang (2004) extracts *private earnings guidance* from Matsumoto's (2002) measure of total earnings guidance by controlling for the number of public disclosures and other factors that affect the variability of analysts' forecasts but are unrelated to private earnings guidance. Wang (2004) then ranks firms

based on the magnitude of private earnings guidance and classifies firms in the top 40% of the distribution of private earnings guidance scores as pre-FD private disclosers. Extending Wang (2004), I classify pre-FD private disclosers as either: 1) post-FD new nondisclosers, or 2) post-FD new public disclosers, based on changes in their public disclosure frequency in the post-FD period. The Appendix details the entire classification procedure.

H1 predicts that pre-FD private disclosers with lower potential transaction cost savings and higher proprietary information costs are more likely to become post-FD new nondisclosers. To test H1, I estimate Equation 1 below to examine the determinants of pre-FD private disclosers' disclosure policies in the post-FD period. Specifically, I model the probability that a pre-FD private discloser becomes a *post-FD new nondiscloser* (PostFD_ND = 1) as a function of a proxy for potential transaction cost savings from public disclosure and a proxy for the firm's proprietary information costs, after controlling for other determinants of disclosure policies, including litigation risk, issuance of equity and debt, and firm size.

$$\Pr(PostFD\_ND = 1) = \beta_0 + \underset{(-)}{\beta_1 PIN_{pre}} + \underset{(+)}{\beta_2 R\&D_{pre}} + \underset{(-)}{\beta_3 LITIGATION_{pre}} + \underset{(-)}{\beta_4 ISSUANCE_{pre}} + \underset{(-)}{\beta_5 SIZE_{pre}} + \varepsilon \quad (1)$$

where:

PostFD_ND = 1 for pre-FD private disclosers classified as post-FD new nondisclosers in the period 2001-2003,
= 0 for pre-FD private disclosers classified as post-FD new public disclosers in the period 2001-2003;

PIN_{pre} = the probability of informed trading, averaged over 1996-1999. I calculate PIN following Easley et al. (1997) and Brown et al. (2004), using data from the Trade and Quote (TAQ) database;

$R\&D_{pre}$ = R&D expenditures scaled by total assets, averaged over 1996-1999;

$LITIGATION_{pre}$ = 1 if a firm in a high litigation risk industry has an earnings decrease of more than 20% for at least one year during 1996-1999, and 0 otherwise;

$ISSUANCE_{pre}$ = cumulative proceeds from external equity and debt issuance during 1996-1999, scaled by total assets averaged over the same period;

$SIZE_{pre}$ = the natural logarithm of market value of equity, averaged over 1996-1999.

I measure all the determinants of disclosure policies in the *pre-FD* period to better capture how they *motivate* firms to change their disclosure policies in response to Reg FD. KPW (1990) point out that transaction costs generally arise from information asymmetry, where some traders are more informed than others. They argue that one of the major reasons that managers issue public disclosure is to help "level the informational playing field" by reducing high levels of predisclosure information asymmetry, and thus transaction costs. I use the probability of informed trading (PIN_{pre}) in the pre-FD period to proxy for potential transaction cost savings that firms can reap by reducing information asymmetry through public disclosure. Intuitively, PIN uses information conveyed by the frequency and imbalance of trades to measure the probability that particular trade orders come from informed investors (Easley et al. 1998). The higher the pre-FD PIN, the greater the potential transaction cost savings from replacing private disclosure with public disclosure after Reg FD.[9] H1 predicts that firms with *lower* potential transaction cost savings are more likely to choose *nondisclosure.* I expect the coefficient on PIN_{pre} to be negative.

KPW (1990) suggest four alternative empirical proxies for proprietary information costs: 1) the number of patents that the firm applies for, 2) the frequency of litigation over corporate patent rights, 3) the level of R&D expenditures, and 4) measures of competitiveness in the firm's product market. There are no publicly available data on the first two proxies. Measures of competitiveness in the firm's product market (such as the Herfindahl-Hirschman Index) are industry-level measures that do not capture intra-industry variations in proprietary information costs. Therefore, I use the level of R&D expenditures ($R\&D_{pre}$) in the pre-FD period as the measure of proprietary information costs. The higher the R&D expenditures, the higher the

[9] Bid-ask spread is another proxy for the transaction costs that firms can potentially save their investors by reducing information asymmetry through public disclosure. Coller and Yohn (1997) show that managers of firms with higher bid-ask spreads are more likely to issue public earnings forecasts to reduce the bid-ask spread, and hence, reduce investors' transaction costs. In sensitivity analysis, I find that using bid-ask spread in the pre-FD period as an alternative measure for potential transaction cost savings does not affect my inferences.

firm's proprietary information costs. H1 predicts that firms with higher proprietary information costs are more likely to choose nondisclosure. I expect the coefficient on $R\&D_{pre}$ to be positive.

I control for litigation costs because firms in industries with higher litigation risk who also have bad earnings news are more likely to disclose voluntarily (Skinner 1994, 1997; Kasznik and Lev 1995; Baginski et al. 2002). I measure litigation costs through an indicator variable ($LITIGATION_{pre}$) that equals one if a firm is in a high litigation risk industry *and* suffers an earnings decrease of more than 20% for at least one year during the 1996-1999 pre-FD period (Francis et al. 1994), and zero otherwise.[10] I expect firms with lower litigation risk to be more likely to choose nondisclosure. I expect the coefficient on $LITIGATION_{pre}$ to be negative.

Frankel et al. (1995) find that firms who access capital markets during an extended period also issue more public disclosures over the same extended period.[11] I control for firms' over-time external financing activities ($ISSUANCE_{pre}$), measured as the cumulative proceeds from equity offering and public debt issuance over the 1996-1999 pre-FD period, scaled by total assets averaged over the same period (Frankel et al. 1995).[12] I expect firms with lower external financing activities to be more likely to choose nondisclosure, so I expect the coefficient on $ISSUANCE_{pre}$ to be negative.

I control for firm size because larger firms issue more public disclosures (Lang and Lundholm 1993; Kasznik and Lev 1995). I measure firm size as the natural logarithm of market value of equity ($SIZE_{pre}$), averaged over the 1996-1999 pre-FD period. I expect smaller firms to

[10] I classify high litigation risk industries as SIC codes 2833-2836 (biotechnology), 3570-3577 and 7370-7374 (computers), 3600-3674 (electronics), 5200-5961(retailing), and 8731-8734 (R&D service) (Francis et al. 1994; Kasznik and Lev 1995; Baginski et al. 2002; Matsumoto 2002).

[11] Lang and Lundholm (2000) also find that firms engaging in seasoned equity offerings issue more voluntary disclosures shortly (6 months) before the offering. However, I am interested in explaining cross-sectional differences in disclosure policies over a three-year post-FD period. Short-term voluntary disclosure behavior is not my focus.

[12] Frankel et al. (1995) find that cumulative offering proceeds scaled by total assets is highly correlated ($\rho = 88\%$) with the frequency of offering. Thus, it is not surprising that using the total frequency of external financing as an alternative measure of accessing capital markets does not affect my inferences.

be more likely to choose nondisclosure after Reg FD, so I expect the coefficient on $SIZE_{pre}$ to be negative.[13]

Testing consequences of cross-sectional differences in the changes in disclosure policies: Differences in changes in firms' information environments

H2a through H2d predict that the information environment deteriorates more for post-FD new nondisclosers than for: 1) pre-FD public disclosers, and 2) post-FD new public disclosers. I examine four measures of changes in firms' information environments:

- Changes in the magnitude of price reactions to earnings announcements,
- Changes in the number of analysts following the firm,
- Changes in the magnitude of analyst forecast errors, and
- Changes in analyst forecast dispersion.

For each measure, I estimate a regression model of the form:

$$\Delta INFO\_ENV = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \gamma' Controls + \mu \qquad (2)$$

where:

$\Delta INFO\_ENV$ = changes in information environment measures;
PostFD_NewNon = 1 for pre-FD private disclosers who became post-FD new nondisclosers after Reg FD, and 0 otherwise;
PostFD_NewPublic = 1 for pre-FD private disclosers who became post-FD new public disclosers after Reg FD, and 0 otherwise;
Controls = controls for other (nondisclosure) factors that could affect changes in the information environment measures;
μ = error term.

In Equation 2, δ_0 measures the change in the information environments of pre-FD public disclosers. δ_1 measures the *differences* in the change in information environments between post-

[13] By measuring all the determinants of firms' post-FD disclosure policies during the pre-FD period, Equation 1 can help researchers and policymakers anticipate, *ex ante*, firms' disclosure policies after regulation. However, measuring the control variables in the pre-FD period requires the assumption that the firm's litigation risk and tendency to access capital markets persist in the post-FD period. Sensitivity analyses using post-FD values of the control variables yield identical inferences, except that the coefficient on ISSUANCE becomes significantly negative (in contrast to the insignificant coefficient reported in Table 3).

FD new nondisclosers and pre-FD public disclosers. δ_2 measures the *differences* in the change in information environments between post-FD new public disclosers and pre-FD public disclosers. The difference between δ_1 and δ_2 (δ_1- δ_2) reflects the differences in the change in information environments between post-FD new nondisclosers and post-FD new public disclosers.

Changes in the magnitude of price reactions to earnings announcements

For each firm I estimate abnormal returns using a market model.[14] I calculate the mean absolute cumulative abnormal returns from two days before to one day after each earnings announcement (ACAR) for quarters in the pre-FD period, and separately for quarters in the post-FD period. I then compute changes in average ACAR between the post-FD period and the pre-FD period ($\Delta\overline{ACAR}_{post-pre}$). Equation 3 tests for cross-sectional differences in changes in the magnitude of price reactions to earnings announcements. I expect post-FD new nondisclosers to have larger increases in the magnitude of price reactions to their earnings announcements than pre-FD public disclosers ($\delta_1 > 0$) and post-FD new public disclosers ($\delta_1 - \delta_2 > 0$).

$$\Delta\overline{ACAR}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3 \Delta StdEPS_{post-pre} + \delta_4 \Delta Losses_{post-pre} + \mu \quad (3)$$

(+) (?) (+) (+)

Equation 3 controls for two other (nondisclosure) factors that could affect changes in the magnitude of price reactions to earnings announcements. First, I control for changes in earnings volatility because more volatile earnings reduce earnings predictability, which in turn leads to larger price reactions to earnings announcements (Heflin et al. 2003). I measure changes in earnings volatility as the standard deviation of quarterly earnings per share in the post-FD period minus the standard deviation of quarterly earnings per share in the pre-FD period ($\Delta StdEPS_{post-pre}$). I expect $\Delta StdEPS_{post-pre}$ to be positively associated with $\Delta\overline{ACAR}_{post-pre}$. Second, I control for

[14] I estimate the market model parameters using a value-weighted market return over a 200-day period ending 31 trading days before the earnings announcement. The abnormal return is the actual return on each day minus the expected return estimated by applying the market model parameters.

changes in the incidence of losses because the market has difficulty predicting earnings of loss firms (Basu et al. 1996; Heflin et al. 2003). I measure changes in the incidence of losses as the difference in the proportion of loss quarters between the post-FD period and the pre-FD period ($\Delta Losses_{post-pre}$). I expect $\Delta Losses_{post-pre}$ to be positively associated with $\Delta\overline{ACAR}_{post-pre}$.

Changes in the number of analysts following the firm

Equation 4 tests for cross-sectional differences in changes in analyst following, measured as the difference in the mean number of analysts providing annual earnings forecasts for the firm between the post-FD period and the pre-FD period ($\Delta\overline{AF}_{post-pre}$). I expect post-FD new nondisclosers to experience larger decreases in analyst following than pre-FD public disclosers ($\delta_1 < 0$) and post-FD new public disclosers ($\delta_1 - \delta_2 < 0$). Equation 4 also controls for changes in the incidence of losses ($\Delta Losses_{post-pre}$) because McNichols and O'Brien (1997) suggest that analysts are more likely to drop firms whose performance deteriorates. Thus, I expect the coefficient on $\Delta Losses_{post-pre}$ to be negative.

$$\Delta\overline{AF}_{post-pre} = \delta_0 + \underset{(-)}{\delta_1} PostFD\_NewNon + \underset{(?)}{\delta_2} PostFD\_NewPublic + \underset{(-)}{\delta_3}\Delta Losses_{post-pre} + \mu \qquad (4)$$

Changes in analyst forecast errors

I measure analyst forecast errors as the natural logarithm of the absolute value of the difference between actual earnings per share and the mean analyst forecast,[15] scaled by share price at the end of the year. I measure change in analyst forecast errors as the difference between logged absolute forecast errors averaged over the post-FD period and logged absolute forecast errors averaged over the pre-FD period ($\Delta\overline{\ln|FE|}_{post-pre}$). Equation 5 tests for cross-sectional

[15] Using the I/B/E/S Detail History file, I construct the mean analyst forecast from the most recent annual EPS forecast each analyst provides. I also use the actual EPS reported in I/B/E/S for consistency. I take the natural logarithm of the absolute analyst forecast error because the variable is highly skewed and kurtotic.

differences in changes in analyst forecast errors. I expect post-FD new nondisclosers to have larger increases in analyst forecast errors than pre-FD public disclosers ($\delta_1 > 0$) and post-FD new public disclosers ($\delta_1 - \delta_2 > 0$).

Equation 5 controls for changes in earnings volatility because more volatile earnings reduce earnings predictability, which in turn leads to less accurate analyst forecasts (Butler and Lang 1991; Das et al. 1998). Equation 5 also controls for changes in the incidence of losses because analysts have more difficulty predicting earnings of loss firms (Basu et al. 1996). Thus, I expect the coefficients on $\Delta StdEPS_{post\text{-}pre}$ and $\Delta Losses_{post-pre}$ to be positive.

$$\Delta\overline{\ln|FE|}_{post-pre} = \delta_0 + \underset{(+)}{\delta_1} PostFD\_NewNon + \underset{(?)}{\delta_2} PostFD\_NewPublic + \underset{(+)}{\delta_3}\Delta StdEPS_{post-pre} + \underset{(+)}{\delta_4}\Delta Losses_{post-pre} + \mu \quad (5)$$

Changes in analyst forecast dispersion

I measure analyst forecast dispersion as the natural logarithm of the standard deviation of individual analysts' forecasts, scaled by share price at the end of the year.[16] I measure changes in analyst forecast dispersion as the difference between the logged standard deviation of analyst forecasts averaged over the post-FD period and the logged standard deviation of analyst forecasts averaged over the pre-FD period ($\Delta\overline{\ln Disp}_{post-pre}$).

$$\Delta\overline{\ln Disp}_{post-pre} = \delta_0 + \underset{(+)}{\delta_1} PostFD\_NewNon + \underset{(?)}{\delta_2} PostFD\_NewPublic + \underset{(+)}{\delta_3}\Delta StdEPS_{post-pre} + \underset{(+)}{\delta_4}\Delta Losses_{post-pre} + \mu \quad (6)$$

Equation 6 tests for cross-sectional differences in changes in analyst forecast dispersion. I expect post-FD new nondisclosers to have more dispersed analyst forecasts than pre-FD public disclosers ($\delta_1 > 0$) and post-FD new public disclosers ($\delta_1 - \delta_2 > 0$). I control for changes in earnings volatility and changes in the incidence of losses between the post-FD and the pre-FD

[16] I construct the standard deviation of analyst forecasts from the most recent annual EPS forecast each analyst provides for each fiscal year. I take the natural logarithm of the standard deviation of analyst forecasts because the distribution of this variable is highly skewed and kurtotic.

periods because earnings volatility and losses are associated with higher forecast dispersion (Lang and Lundholm 1996; Heflin et al. 2003). Thus, I expect the coefficients on $\Delta StdEPS_{post\text{-}pre}$ and $\Delta Losses_{post-pre}$ to be positive.

Figure 3 summarizes the coefficient comparisons of interest and their predicted signs.

Figure 3: Comparison groups, coefficients of interest, and predicted signs

Comparison Groups	**Coefficient(s) of Interest**	**Predicted Sign** $\Delta\overline{ACAR}_{post-pre}$	**Predicted Sign** $\Delta\overline{AF}_{post-pre}$	**Predicted Sign** $\Delta\overline{\ln \lvert FE \rvert}_{post-pre}$	**Predicted Sign** $\Delta\overline{\ln Disp}_{post-pre}$
Post-FD New nondisclosers vs. Pre-FD Public disclosers	δ_1	+	-	+	+
Post-FD New nondisclosers vs. Post-FD New public disclosers	$\delta_1 - \delta_2$	+	-	+	+
Post-FD New public disclosers vs. Pre-FD Public disclosers	δ_2	?	?	?	?

IV. Sample and Descriptive Statistics

Sample

Sample firms come from the intersection of COMPUSTAT, CRSP, and I/B/E/S. The sample period begins in 1996, because: 1) the Private Securities Litigation Reform Act that provided broader safe harbor provisions for forward-looking voluntary disclosures became effective in December 1995, and 2) prior research concludes that management-provided earnings guidance became pervasive in the mid-nineties (Brown 2001; Shane et al. 2001). Reg FD became effective in October 2000, and the post-FD sample period concludes at the end of 2003. I define 1996-1999 as the pre-FD period, and 2001-2003 as the post-FD period.[17]

[17] Using a longer time period to examine the effects of Reg FD reduces potential measurement error in information environment proxies. This longer-term perspective also complements prior research which (by necessity) examined just a short post-FD period, ranging from 68 trading days (Straser 2002) to four quarters after Reg FD became effective (Mohanram and Sunder 2002).

The Appendix explains how I apply Wang's (2004) classification of firms as public or private disclosers to identify 360 pre-FD private disclosers and 441 pre-FD public disclosers that continue operating in the post-FD period. Pre-FD private disclosers must change their disclosure policies to comply with Reg FD's proscription against private disclosures to analysts. These firms find themselves back at stage A of the KPW model: choosing between replacing private disclosure with 1) public disclosure, or 2) nondisclosure. If a pre-FD private discloser's quarterly average number of public disclosures increases by more than 30% in the post-FD period, I classify the firm as a post-FD new public discloser. If a pre-FD private discloser does not replace private disclosure with new public disclosure and its quarterly average number of public disclosures remains the same or decreases in the post-FD period, I classify it as a post-FD new nondiscloser.

Of the 360 pre-FD private disclosers, 155 (43.1%) firms become post-FD new public disclosers and 201 (55.8%) firms become post-FD new nondisclosers. Only four firms are not classified into either post-FD group because they do not meet the criteria for either group. From a policy perspective, it is noteworthy that of the pre-FD private disclosers who are the primary targets of Reg FD – *more than half replace private disclosure with nondisclosure.* Thus, the unintended dysfunctional consequences of Reg FD are potentially severe.

First Call's Company Issued Guidelines database provides information on the number of voluntary earnings-related public disclosures each company issues. Table 1 shows that, on average, pre-FD public disclosers issue 0.45 voluntary earnings-related disclosures per quarter in the pre-FD period, and 1.13 in the post-FD period. In contrast, post-FD new public disclosers issue an average of 0.21 voluntary earnings-related disclosures per quarter in the pre-FD period, and 0.99 in the post-FD period. Finally, post-FD new nondisclosers on average issue 0.19

voluntary earnings-related disclosures per quarter in the pre-FD period, and 0.04 in the post-FD period. The difference in changes in public disclosure frequency between post-FD new nondisclosers and post-FD new public disclosers are by construction (i.e., driven by the way I define these two groups). However, the cross-sectional variation in the changes in public disclosure frequency documented in Table 1 suggests that limiting analysis to changes in the quantity of disclosures averaged across the entire population of firms will mask important cross-sectional differences in the way firms change their disclosure policies after Reg FD.

Insert Table 1 here

V. Results

Determinants of cross-sectional differences in changes in pre-FD private disclosers' disclosure policies after Reg FD

Of the 356 firms classified as post-FD new nondisclosers or post-FD new public disclosers, 343 have data on all the variables necessary to test the predictions about the determinants of cross-sectional differences in the way pre-FD private disclosers change their disclosure policies after Reg FD. Table 2 presents descriptive statistics on these variables. Table 2 shows that the average probability of informed trading (PIN_{pre}) is 18.15%, and the average R&D expenditures ($R\&D_{pre}$) are 7.13% of total assets. About 32.07% of the sample firms are in high litigation risk industries *and* have an earnings decrease of greater than 20% for at least one year in the pre-FD period. As for external financing activities ($ISSUANCE_{pre}$), the cumulative proceeds from external equity and debt offerings during the pre-FD period are about 26.55% of the average total assets in the same period.

Insert Table 2 here

Results of the logit analysis of the determinants of pre-FD private disclosers' post-FD disclosure policies appear in Table 3. Consistent with my predictions based on the KPW framework, I find that the likelihood that pre-FD private disclosers replace private disclosure with nondisclosure after Reg FD is significantly negatively associated with PIN_{pre} and positively associated with $R\&D_{pre}$ ($p = 0.0002$ and $p = 0.0132$, respectively). These findings support my hypothesis that pre-FD private disclosers with lower potential transaction cost savings and higher proprietary information costs are more likely to become post-FD new nondisclosers. I also find that smaller firms are more likely to become post-FD new nondisclosers ($p < 0.0001$). However, the coefficients on $LITIGATION_{pre}$ and $ISSUANCE_{pre}$ are not significant.

Insert Table 3 here

Cross-sectional differences in the effects of Reg FD on firms' information environments

Table 4 reports descriptive statistics for the variables I use to test cross-sectional differences in the effects of Reg FD on firms' information environments. On average, the four-day absolute cumulative abnormal returns around earnings announcements increase by 0.51% after Reg FD for the sample as a whole.[18] Mean analyst following decreases by about one after Reg FD for the sample as a whole. Both analyst forecast errors and forecast dispersion increase after Reg FD for the sample as a whole.[19] The standard deviation of earnings per share and the incidence of losses also increase after Reg FD, so it is important to control for these increases in the difficulty of predicting earnings in testing for changes in information environments.

Insert Table 4 here

[18] Most prior research has found that price reactions to earnings announcements decline shortly after Reg FD (Bailey et al. 2003; Heflin et al. 2003; Eleswarapu et al. 2004; Shane et al. 2001). When I shorten my sample period to three quarters before and three quarters after Reg FD, which is more comparable to the short sample periods used in most prior research, I also find a decrease in price reactions to earnings announcements.

[19] Despite my longer sample period, these results are similar to prior research which generally concludes that analyst following declines, and analyst forecast error and dispersion increase after Reg FD (Bailey et al. 2003; Irani and Karamanou 2003; Shane et al. 2001; Mohanram and Sunder 2002; Agrawal and Chadha 2003).

Table 5 Panel A reports univariate analyses of the changes in information environment measures *within* each group of firms. Post-FD new nondisclosers suffer significant impairment in their post-FD information environments. Specifically, post-FD new nondisclosers experience a significant increase (of 25.18%) in the magnitude of price reactions to their earnings announcements (ACAR) and a steep decrease (of 36.67%) in analyst following (#AF). In contrast, post-FD new public disclosers have no significant changes in ACAR or analyst following. Finally, pre-FD public disclosers do not experience a significant change in ACAR, but like post-FD new nondisclosers their analyst following decreases (although only by 6.34%). All three groups of firms experience significant increases in absolute analyst forecast errors and forecast dispersion after Reg FD, but this could be attributable to the increased difficulty of predicting earnings in the post-FD period.

Panels B through D in Table 5 present univariate analyses of the *differences* in the changes in information environment measures across different groups of firms. Panels B and C show that, consistent with H2, post-FD new nondisclosers have significantly larger increases in ACAR, steeper decreases in analyst following, and larger increases in absolute analyst forecast errors than pre-FD public disclosers (Panel B) and post-FD new public disclosers (Panel C). However, differences in the changes in analyst forecast dispersion between post-FD new nondisclosers and the other two groups are insignificant.

Panel D shows that there is no significant difference in the changes in information environment measures between post-FD new public disclosers and pre-FD public disclosers except that analyst following declines more for pre-FD public disclosers. Panel D's results are particularly interesting because they suggest that post-FD new public disclosers replace private

disclosure with new public disclosure that is sufficiently informative to prevent deterioration in their information environments.

I consider the analyses of $\Delta\overline{ACAR}_{post-pre}$ and $\Delta\overline{AF}_{post-pre}$ as the most reliable indicators of changes in firms' information environments. I consider the evidence on analyst forecast errors and forecast dispersion as supplemental because these analyses are limited to firms who have analyst coverage (and at least two analysts to compute forecast dispersion) in the post-FD period. Panel E of Table 5 illustrates the attrition in the samples for the analyst forecast errors and forecast dispersion tests, compared to the sample I use to analyze changes in analyst following. Panel E shows that for the analyst forecast errors analysis, 33.74% of post-FD new nondisclosers drop out, but only 4.61% of post-FD new public disclosers and 9.76% of pre-FD public disclosers drop out. Attrition is more extreme for the forecast dispersion analysis: 42.94% of post-FD new nondisclosers drop out, but only 9.21% of post-FD new public disclosers and 14.88% of pre-FD public disclosers drop out. These results suggest that research looking at the broad averages across firms with analyst coverage likely underestimates the magnitude of the deterioration in firms' overall information environments due to the disproportionately high attrition rate of post-FD new nondisclosers (approaching 50% in the forecast dispersion analysis).

Insert Table 5 here

Results of the multiple regressions appear in Table 6. Panel A reports the results on cross-sectional differences in changes in the magnitude of price reactions to earnings announcements ($\Delta\overline{ACAR}_{post-pre}$). The intercept ($\delta_0$) is insignificant (p = 0.7259), suggesting that pre-FD public disclosers experience no significant changes in the magnitude of price reactions to their earnings announcements after controlling for changes in earnings volatility and changes in the incidence of losses. This result is consistent with my maintained hypothesis that Reg FD should have little

effect on firms that primarily used public disclosure before Reg FD. The coefficient on PostFD_NewNon (δ_1) and the difference in the coefficients on PostFD_NewNon and PostFD_NewPublic ($\delta_1 - \delta_2$) are significantly positive ($p \leq 0.0005$), indicating that post-FD new nondisclosers experience larger increases in the magnitude of price reactions to their earnings announcements than pre-FD public disclosers and post-FD new public disclosers, consistent with H2a. The coefficient on PostFD_NewPublic (δ_2) is insignificant ($p = 0.5932$), indicating no difference in changes in the magnitude of price reactions to earnings announcements between post-FD new public disclosers and pre-FD public disclosers. This finding is important because it suggests that post-FD new public disclosers replace pre-FD private disclosure with sufficiently informative public disclosure after Reg FD to prevent deterioration of their information environments. Finally, as expected, changes in the magnitude of price reactions to earnings announcements increase with both $\Delta StdEPS_{post\text{-}pre}$ and $\Delta Losses_{post-pre}$ ($p < 0.0005$).

Panel B of Table 6 reports the results on the cross-sectional differences in changes in analyst following. The intercept (δ_0) is insignificant, indicating that pre-FD public disclosers experience no significant change in analyst following, after controlling for changes in the incidence of losses. The coefficient on PostFD_NewNon (δ_1) and the difference in the coefficients on PostFD_NewNon and PostFD_NewPublic ($\delta_1 - \delta_2$) are significantly negative ($p \leq 0.0005$), indicating that post-FD new nondisclosers have larger decreases in analyst following than both pre-FD public disclosers and post-FD new public disclosers, consistent with H2b. The coefficient on PostFD_NewPublic (δ_2) is positive and significant ($p < 0.02$), indicating that post-FD new public disclosers enjoy an increase in analyst following relative to pre-FD public disclosers. Finally, as expected, the coefficient on $\Delta Losses_{post-pre}$ is negative ($p = 0.0001$).

Panel C presents the results on the cross-sectional differences in changes in analyst forecast errors. The intercept (δ_0) indicates no significant change in analyst forecast errors for pre-FD public disclosers ($p = 0.1956$), after controlling for changes in earnings volatility and changes in the incidence of losses. The coefficient on PostFD_NewNon (δ_1) and the difference in the coefficients on PostFD_NewNon and PostFD_NewPublic ($\delta_1 - \delta_2$) are positive ($p = 0.0674$ and $p = 0.0055$, respectively), suggesting that post-FD new nondisclosers have larger increases in analyst forecast errors than both pre-FD public disclosers and post-FD new public disclosers. The coefficient on PostFD_NewPublic (δ_2) is negative but marginally significant ($p = 0.1032$). Finally, as expected, changes in analyst forecast errors increase with both $\Delta StdEPS_{post\text{-}pre}$ and $\Delta Losses_{post-pre}$ ($p < 0.0001$).

Panel D presents the results on the cross-sectional differences in changes in analyst forecast dispersion. The positive intercept (δ_0) indicates that pre-FD public disclosers experience significant increases in analyst forecast dispersion even after controlling for changes in earnings volatility and changes in the incidence of losses ($p < 0.0001$). The coefficients on PostFD_NewNon (δ_1), PostFD_NewPublic (δ_2), and the difference in the two coefficients ($\delta_1 - \delta_2$) are all insignificant ($p = 0.6162$, $p = 0.1950$, and $p = 0.1296$ respectively), indicating that all three groups of firms have similar increasees in analyst forecast dispersion after Reg FD. However, these results must be interpreted cautiously, because as Panel E of Table 5 shows, there is significant and disproportionate attrition in the analysis of forecast dispersion, with over 40% of the post-FD new nondisclosers dropping out of the analysis. As expected, changes in analyst forecast dispersion increase with both $\Delta StdEPS_{post\text{-}pre}$ and $\Delta Losses_{post-pre}$ ($p < 0.001$).

Insert Table 6 here

Overall, the findings are consistent with my hypotheses on the cross-sectional differences in the effects of Reg FD on the disclosure policies and information environments of the firms most affected by Reg FD – the pre-FD private disclosers. I find that pre-FD private disclosers with lower potential transaction cost savings and higher proprietary information costs are more likely to replace private disclosure with nondisclosure and become post-FD new nondisclosers. My results further show that this stifling effect significantly impairs these firms' information environments. Post-FD new nondisclosers suffer larger increases in the magnitude of price reactions to earnings announcements, larger decreases in analyst following, and larger increases in analyst forecast errors than both pre-FD public disclosers and post-FD new public disclosers.

In contrast, I do not find significant deterioration in the information environments of pre-FD public disclosers or those pre-FD private disclosers who choose to replace private disclosure with new public disclosure. Evidence that Reg FD has minimal effects on the information environments of pre-FD public disclosers supports my maintained hypothesis that Reg FD should have little effect on firms who generally chose public disclosure prior to Reg FD. Evidence that Reg FD also has minimal effect on the information environments of post-FD new public disclosers is of particular interest because it suggests that post-FD new public disclosers replace private disclosure with new public disclosure that is sufficiently informative to prevent deterioration of their information environments.

VI. Conclusions

This study examines cross-sectional differences in the effects of Reg FD on firms' disclosure policies and the resulting information environments. Unlike prior research that investigates how Reg FD affects the *overall population* of firms, this study provides sharper tests

of the regulation's effects by focusing on how Reg FD affected its primary targets – pre-FD private disclosers.

Consistent with hypotheses derived from the theoretical King, Pownall, and Waymire (1990) framework, I show that pre-FD private disclosers with lower potential transaction cost savings from public disclosure and higher proprietary information costs are more likely to replace private disclosure with nondisclosure after Reg FD (i.e., become post-FD new nondisclosers). On the other hand, pre-FD private disclosers with higher potential transaction cost savings from public disclosure and lower proprietary information costs are more likely to replace private disclosure with new public disclosure after Reg FD (i.e., become post-FD new public disclosers). This new empirical evidence shows that cross-sectional differences in firms' responses to disclosure regulation are consistent with theory. That is, when adjusting to a new regulation, firms change their disclosure policies in a manner that is predicted by theory. Such evidence can help policymakers better anticipate how new regulations will affect different firms' disclosure choices.

The study's results also help explain a puzzle arising from prior research: Why would we observe – *on average* – a larger quantity of public disclosures, yet an impaired information environment after Reg FD? Are the new public disclosures uninformative? Or are there significant cross-sectional differences in firms' responses to Reg FD, such that different subsets of firms are driving these two different results?

My results support the latter explanation that the broad average results reported in prior research mask significant cross-sectional differences in firms' responses to Reg FD. Specifically, my results suggest that post-FD new public disclosers (who have higher potential transaction cost savings and lower proprietary information costs) tend to drive the "increased quantity of

public disclosures" results documented in prior research. My evidence that these firms' post-FD new public disclosures are sufficiently informative to prevent impairment of their information environments suggests that the puzzle cannot be explained by a flurry of post-FD public disclosures that are simply uninformative. To the contrary, my results suggest that the "impaired information environment" documented in prior research is largely attributable to a separate group of firms who have lower potential transaction cost savings and higher proprietary information costs (and as a result they become post-FD new nondisclosers).

In addition to providing evidence on which firms' information environments deteriorated after Reg FD, this study also provides evidence on the magnitude of the deterioration. First, evidence that *more than half of these pre-FD private disclosers choose to replace private disclosure with nondisclosure* provides policymakers with important information on the pervasiveness of the unintended dysfunctional consequences of Reg FD. Second, evidence that post-FD new nondisclosers on average experience a 25% increase in the magnitude of price reactions to their earnings announcements, a 37% drop in analyst following, a 24% increase in analyst forecast errors, and a 17% increase in the dispersion of analysts' forecasts, illustrates the significance of the impairment in these firms' information environments. Armed with a better understanding of the circumstances under which unintended dysfunctional consequences occur, and the magnitude of these consequences, policymakers can better decide how to improve existing and future disclosure requirements.

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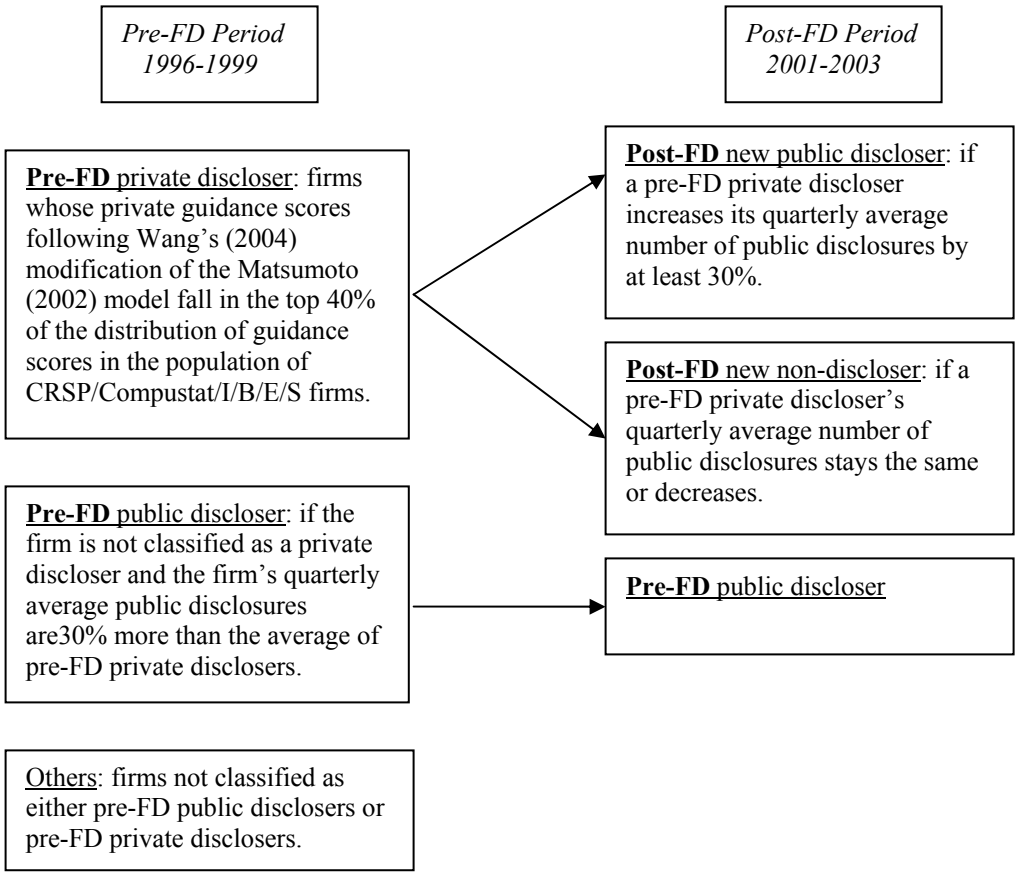
Appendix

Classification of Private and Public Disclosers

Figure A1 illustrates how I classify firms as pre-FD public disclosers or pre-FD private disclosers in the pre-FD period, and the subsequent classification of pre-FD private disclosers into post-FD new public disclosers and post-FD new nondisclosers in the post-FD period.

Figure A1: Pre-FD private disclosers, pre-FD public disclosers, post-FD new public disclosers, and post-FD new nondisclosers



Empirical proxy for pre-FD private disclosers

I identify pre-FD private disclosers following Wang's (2004) modification of Matsumoto's (2002) earnings guidance model. Matsumoto's model includes four steps. Equation A1 estimates the expected seasonal change in analyst forecasts for firm i in industry j during

quarter q of year t ($\Delta EPS_{ijtq} = EPS_{ijt,q} - EPS_{ijt-1,q}$), as a function of: 1) the seasonal change in the prior quarter's earnings per share ($EPS_{ijt,q-1} - EPS_{ijt-1,q-1}$), and 2) firm-specific daily excess returns cumulated from three days after the year t-1 quarter q's earnings announcement to 20 days before the year t quarter q's earnings announcement ($CRET_{ijtq}$). Matsumoto (2002) includes $CRET_{ijtq}$ to control for additional information (other than earnings guidance) that analysts use to forecast earnings.[20] To estimate parameters for firm i in year t, Mastumoto (2002) estimates Equation A1 separately for each firm-year. She estimates Equation A1 using all firm-quarters in year t from firm i's four-digit SIC code industry j, excluding firm i's data:[21]

$$\Delta EPS_{ijtq} / price_{ijt-1,q} = \alpha_{ijt} + \beta_{1ijt}\left(\Delta EPS_{ijtq-1} / price_{ijt-1,q-1}\right) + \beta_{2ijt} CRET_{ijtq} + \varepsilon_{ijt} \qquad \text{(A1)}$$

In Equation A2, Matsumoto (2002) applies the parameter estimates derived for the prior firm-year (t-1) in Equation A1 to determine the expected change in firm i's analyst forecasts ($E[\Delta EPS_{ijtq}]$) in the current quarter. Her Equation A3 adds the expected change in analyst forecasts from Equation A2 to firm i's actual earnings per share from the same quarter in the prior year (t-1) to yield the expected analyst forecast of firm i's earnings per share for the current quarter ($E[F_{ijtq}]$). In Equation A4, Matsumoto (2002) defines total earnings guidance (from both public *and* private disclosures) as the unexpected analyst forecast (UEF_{ijtq}), which is the difference between the actual analyst forecast (F_{ijtq}) and the expected analyst forecast of earnings per share for the current quarter.

[20] To avoid overstating guidance, it is necessary to control for information other than guidance and prior period earnings that analysts use in forecasting upcoming earnings. This is why Matsumoto (2002) controls for CRET. To the extent that CRET also controls for earnings guidance issued in the return accumulation period, however, this guidance will be impounded in the expected forecast, which will understate total earnings guidance. If *private* earnings guidance is not fully and immediately impounded into prices, then Wang's (2004) measure of private earnings guidance will be less subject to measurement error (relative to measures of public or total earnings guidance). In any event, underestimating guidance will if anything reduce the power of my tests.

[21] Following Matsumoto (2002), I estimate Equation A1 using firm-years with ten or more firm-quarters of data in the same four-digit SIC code.

$$E\left[\Delta EPS_{ijtq}\right] = \left[\hat{\alpha}_{ijt-1} + \hat{\beta}_{1ijt-1}(\Delta EPS_{ijtq-1} / price_{ijt-1,q-1}) + \hat{\beta}_{2ijt-1} CRET_{iitq}\right] \times price_{ijt-1,q} \quad \text{(A2)}$$

$$E\left[F_{ijtq}\right] = EPS_{ijt-1,q} + E\left[\Delta EPS_{ijtq}\right] \quad \text{(A3)}$$

$$UEF_{ijtq} = F_{ijtq} - E\left[F_{ijtq}\right] \quad \text{(A4)}$$

To estimate the portion of total earnings guidance that occurs privately through analysts, Wang (2004) regresses the absolute unexpected forecasts (|UEF|) in quarter q of year t on factors other than private earnings guidance that affect |UEF|. These factors include earnings volatility, incidence of losses, and the number of earnings-related public disclosures issued for each quarter. She measures earnings volatility as the standard deviation of quarterly earnings per share during the previous three years (*StdEPS*). She measures the incidence of losses through an indicator variable that equals one if a firm reports a loss in the current quarter and zero otherwise. She controls for earnings volatility and the incidence of losses because these factors reduce the predictability of earnings and hence increase the variability in analysts' forecasts (Butler and Lang 1991; Basu et al. 1996; Das et al. 1998). Finally, to abstract from the portion of total earnings guidance attributable to public earnings guidance, she controls for the number of public disclosures of earnings-related information (*#PublicDisclosure*) issued for each quarter.

$$\left|UEF_{iq}\right| = \gamma_i + \gamma_1 StdEPS_{iq} + \gamma_2 LOSS_{iq} + \gamma_3 \#PublicDisclosure_{iq} + \mu_{iq} \quad \text{(A5)}$$

Wang (2004) defines the unexplained portion of |UEF| (the absolute value of the sum of the firm-specific intercept and the error term) as private earnings guidance to analysts of firm i in quarter q. She then computes the annual average of private earnings guidance for each firm and ranks the firms within each year from 1996 to 1999. In each year, the firm with the least amount of private earnings guidance receives a score of one, and so forth, so that higher scores indicate more private earnings guidance. She classifies a firm as a private discloser if the firm's annual rank is in the top 40% of the distribution in each of the firm's available years.

Empirical proxy for pre-FD public disclosers

Following Wang (2004), I identify pre-FD public disclosers from the rest of the sample firms (i.e., from the set of non-private disclosers) during the pre-FD period. I collect earnings-related public disclosures from First Call's Company Issued Guidelines (CIG) database. As shown in Figure A1, I classify a firm as a pre-FD public discloser if: 1) it is not a private discloser, 2) its quarterly average number of public disclosures is 30% more than the average of pre-FD private disclosers before Reg FD, and 3) it continues to operate in the post-FD period. I assume pre-FD public disclosers remain public disclosers in the post-FD period. Evidence in Table 1 of the paper supports this assumption, because pre-FD public disclosers issue even more public disclosures after Reg FD than before, on average.

Empirical proxies for post-FD new public disclosers and post-FD new nondisclosers

If a pre-FD private discloser's quarterly average number of public disclosures increases by more than 30% in the post-FD period, I classify the firm as a post-FD new public discloser. I classify a pre-FD private discloser as a post-FD new nondiscloser if it does not replace private disclosure with new public disclosure and so its quarterly average number of public disclosures remains the same or decreases in the post-FD period.

Table 1
Descriptive Statistics on Quarterly Average Number of Public Disclosures during Pre- and Post-FD Periods

Firm types	N	Pre-FD period (Mean)	Post-FD period (Mean)	Differences	t-statistics[d]	p-value
Pre-FD public disclosers[a]	441	0.4469	1.1313	0.6844	12.90	<0.0001
Post-FD new public disclosers[b]	155	0.2069	0.9860	0.7791	13.38	<0.0001
Post-FD new nondisclosers[c]	201	0.1872	0.0417	-0.1455	-11.72	<0.0001

[a] Pre-FD public disclosers are firms: 1) who are not classified as pre-FD private disclosers following Wang's (2004) method, 2) whose quarterly average number of public disclosures is 30% more than that of pre-FD private disclosers before Reg FD, and 3) who continue to operate in the post-FD period.

[b] Post-FD new public disclosers are pre-FD private disclosers that increase their quarterly average number of public disclosures by more than 30% after Reg FD.

[c] Post-FD new nondisclosers are pre-FD private disclosers whose quarterly average number of public disclosures remains the same or decreases after Reg FD.

[d] t-test is a two-tailed paired test of the difference in quarterly average number of public disclosures between the pre-FD period and the post-FD period for each group of firms.

Table 2
Descriptive Statistics on Determinants of Cross-sectional Differences in Pre-FD Private Disclosers' Post-FD Disclosure Policies (H1)

Variable[a]	*Mean*	*Standard Deviation*	*Lower Quartile*	*Median*	*Upper Quartile*
PIN_{pre}	0.1815	0.0437	0.1490	0.1805	0.2145
$R\&D_{pre}$	0.0713	0.1222	0	0.0091	0.1120
$LITIGATION_{pre}$	0.3207	0.4674	0	0	1.0000
$ISSUANCE_{pre}$	0.2655	0.4885	0	0.0624	0.0343
$SIZE_{pre}$	5.6180	1.7062	4.3654	5.3467	6.6931

[a] Variable definitions: PIN_{pre} is the probability of informed trading, averaged over 1996-1999; $R\&D_{pre}$ is R&D expenditures scaled by total assets, averaged over 1996-1999; $LITIGATION_{pre}$ = 1 if a firm is in a high litigation risk industry and has an earnings decrease of more than 20% for at least one year during 1996-1999, and 0 otherwise; $ISSUANCE_{pre}$ is cumulative proceeds from external equity and debt issuance during 1996-1999, scaled by average total assets over the same period; $SIZE_{pre}$ is the natural logarithm of market value of equity, averaged over 1996-1999.

Table 3
Logit Analysis of Determinants of Cross-sectional Differences in Pre-FD Private Disclosers' Post-FD Disclosure Policies

$$\Pr(PostFD\_ND = 1) = \beta_0 + \beta_1 PIN_{pre} + \beta_2 R\&D_{pre} + \beta_3 LITIGATION_{pre} + \beta_4 ISSUANCE_{pre} + \beta_5 SIZE_{pre} + \varepsilon$$

Variable[a] (N=343)	Predicted Sign	Coefficient	Std. Error	Wald Chi-square	p-value[b]
Intercept		6.8636	1.2986	27.9347	<0.0001
PIN_{pre}	-	-14.8199	4.0968	13.0861	0.0002
$R\&D_{pre}$	+	3.2155	1.4472	4.9365	0.0132
$LITIGATION_{pre}$	-	-0.2065	0.2912	0.5029	0.2391
$ISSUANCE_{pre}$	-	0.1837	0.3230	0.3235	0.2848
$SIZE_{pre}$	-	-0.7266	0.1153	39.7158	<0.0001

Log likelihood = 403.920 Pseudo R^2 = 0.2367
Percent Concordant: 75.6 LR chi-square (5 *df*) = 66.6662
Percent Discordant: 24.2 Prob > chi-square = <0.0001

[a] Variable definitions: PostFD_ND = 1 for post-FD new nondisclosers, and = 0 for post-FD new public disclosers; PIN_{pre} is the probability of informed trading, averaged over 1996-1999; $R\&D_{pre}$ is the R&D expenditures scaled by total assets, averaged over 1996-1999; $LITIGATION_{pre}$ = 1 if a firm is in a high litigation risk industry and has an earnings decrease of more than 20% for at least one year during 1996-1999, and 0 otherwise; $ISSUANCE_{pre}$ is cumulative proceeds from external debt and equity issuance during 1996-1999, scaled by average total assets over the same period; $SIZE_{pre}$ is the natural logarithm of market value of equity, averaged over 1996-1999.

[b] p-values are one-tailed for variables with predicted signs and two-tailed for variables without predicted signs.

Table 4
Descriptive Statistics on Changes in Measures of Firms' Information Environments and Control Variables after Reg FD (H2a-H2d)

Variable[a]	*N*	*Mean*	*Std Dev*	*Lower Quartile*	*Median*	*Upper Quartile*
ΔACAR	729	0.0051	0.0425	-0.0181	-0.0022	0.0226
ΔAF	725	-0.9668	5.6899	-3.9167	-1.2500	1.7500
ΔLn|FE|	623	0.5153	1.7895	-0.5626	0.4129	1.4237
ΔLnDisp	580	0.6476	1.5157	-0.2784	0.5787	1.5086
ΔStdEPS	729	0.0492	0.6443	-0.1433	-0.0125	0.1224
ΔLosses	729	15.8886	31.2302	-6.2500	6.2500	38.8889

[a] Variable definitions: ΔACAR is the difference in the average absolute cumulative abnormal returns from two days before to one day after quarterly earnings announcements between the post-FD period and the pre-FD period; ΔAF is the difference in the mean number of analysts providing annual earnings forecasts between the post-FD period and the pre-FD period; ΔLn|FE| is the difference between the post-FD period and the pre-FD period in the average natural logarithm of the absolute consensus forecast errors scaled by share price at the end of the year; ΔLnDisp is the difference between the post-FD period and the pre-FD period in the average natural logarithm of analyst forecast dispersion scaled by share price at the end of the year; ΔStdEPS is the difference in the standard deviation of quarterly earnings per share between the post-FD period and the pre-FD period; ΔLosses is the difference in the proportion of loss quarters between the post-FD period and the pre-FD period.

Table 5
Univariate Analyses of Information Environment Measures

Panel A: Pre- and Post-FD Comparisons within Discloser Groups

	ACAR[a]				***#AF***[b]			
	Pre-FD	Post-FD	Difference (% change)	p-value[e]	Pre-FD	Post-FD	Difference (% change)	p-value
Post-FD new non- disclosers	0.0711	0.0890	0.0179 (25.18%)	0.0001	7.4765	4.7352	-2.7413 (-36.67%)	<0.0001
Post-FD new public disclosers	0.0674	0.0680	0.0006 (0.89%)	0.8258	9.8635	10.3015	0.4380 (4.44%)	0.3885
Pre-FD public disclosers	0.0647	0.0664	0.0017 (2.63%)	0.3494	12.3366	11.5455	-0.7821 (-6.34%)	0.0052
	Ln|FE| [c]				***LnDisp***[d]			
	Pre-FD	Post-FD	Difference (% change)	p-value	Pre-FD	Post-FD	Difference (% change)	p-value
Post-FD new non disclosers	-4.5265	-3.4317	1.0948 (24.19%)	<0.0001	-4.6615	-3.8566	0.8050 (17.27%)	<0.0001
Post-FD new public disclosers	-5.3357	-5.0344	0.3013 (5.65%)	0.0436	-5.5231	-4.7841	0.7390 (13.38%)	<0.0001
Pre-FD public disclosers	-6.1058	-5.6758	0.4299 (7.04%)	<0.0001	-6.1476	-5.5777	0.5696 (9.27%)	<0.0001

[a] ACAR is the absolute cumulative abnormal returns from 2 days before to 1 day after quarterly earnings announcements.
[b] #AF is the number of analysts providing annual earnings forecasts.
[c] Ln|FE| is the natural logarithm of the absolute consensus forecast errors, scaled by share price at the end of the year.
[d] LnDisp is the natural logarithm of the dispersion in analyst forecasts, scaled by share price at the end of the year.
[e] p-values are based on two-tailed paired t-tests.

Table 5 (continued)

Panel B: Cross-group Comparisons — Post-FD New Nondisclosers vs. Pre-FD Public Disclosers

Variable[a]	***Post-FD new nondisclosers***	***Pre-FD public disclosers***	***Difference***	***p-value***[b]
ΔACAR	0.0179	0.0017	0.0163	0.0012
ΔAF	-2.7413	-0.7821	-1.9592	<0.0001
ΔLn|FE|	1.0948	0.4299	0.6649	0.0020
ΔLnDisp	0.8050	0.5696	0.2354	0.1842

Panel C: Cross-group Comparisons — Post-FD New Nondisclosers vs. Post-FD New Public Disclosers

Variable	***Post-FD new nondisclosers***	***Post-FD new public disclosers***	***Difference***	***p-value***
ΔACAR	0.0179	0.0006	0.0173	0.0014
ΔAF	-2.7413	0.4380	-3.1793	<0.0001
ΔLn|FE|	1.0948	0.3013	0.7935	0.0010
ΔLnDisp	0.8050	0.7390	-0.0660	0.7532

Panel D: Cross-group Comparisons — Post-FD New Public Disclosers vs. Pre-FD Public Disclosers

Variable	***Post-FD new public disclosers***	***Pre-FD public disclosers***	***Difference***	***p-value***
ΔACAR	0.0006	0.0017	-0.0009	0.7446
ΔAF	0.4380	-0.7821	1.2201	0.0357
ΔLn|FE|	0.3013	0.4299	-0.1286	0.4562
ΔLnDisp	0.7390	0.5696	0.1694	0.2632

Panel E: Changes in Sample Composition for the Analyses of Analyst Forecast Errors and Dispersion

	# of observations entering the analysis		
	$\Delta\overline{AF}_{post-pre}$ (base group)	$\Delta\overline{\ln \lvert FE \rvert}_{post-pre}$ (% drop)	$\Delta\overline{\ln Disp}_{post-pre}$ (% drop)
Post-FD new nondiscloser	163	108 (33.74)	93 (42.94)
Post-FD new public discloser	152	145 (4.61)	138 (9.21)
Pre-FD public discloser	410	370 (9.76)	349 (14.88)
Total	725	623 (14.07)	580 (20.00)

[a] Variable definitions: ΔACAR is the difference in the average absolute cumulative abnormal returns from two days before to one day after quarterly earnings announcements between the post-FD period and the pre-FD period; ΔAF is the difference in the mean number of analysts providing annual earnings forecasts between the post-FD period and the pre-FD period; ΔLn|FE| is the difference between the post-FD period and the pre-FD period in the average natural logarithm of the absolute consensus forecast errors scaled by share price at the end of the year; ΔLnDisp is the difference between the post-FD period and the pre-FD period in the average natural logarithm of analyst forecast dispersion scaled by share price at the end of the year.

[b] p-values are based on two-tailed t-test of two independent samples.

Table 6
OLS Regression Analysis of Cross-sectional Differences in the Changes in Firms' Information Environments

Panel A: Changes in the Magnitude of Price Reactions to Earnings Announcements (H2a)

$$\Delta\overline{ACAR}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3 \Delta StdEPS_{post-pre} + \delta_4 \Delta Losses_{post-pre} + \mu$$

Variable[a] (n=729)	Predicted sign	Coefficient Estimate	p-value[b]
Intercept		-0.0001	0.7259
PostFD_NewNon	+	0.0141	0.0003
PostFD_NewPublic	?	-0.0021	0.5932
ΔStdEPS	+	0.0118	<0.0001
ΔLoss	+	0.0002	0.0004

$R^2 = 0.0838$ Adjusted $R^2 = 0.0788$
Test Results for $\delta_1 - \delta_2 > 0$
F value: 10.98 Pr > F: 0.0005

Panel B: Changes in Analyst Following (H2b)

$$\Delta\overline{AF}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3 \Delta Losses_{post-pre} + \mu$$

Variable (n=725)	Predicted sign	Coefficient Estimate	p-value|
Intercept		-0.4619	0.1251
PostFD_NewNon	-	-1.6979	0.0005
PostFD_NewPublic	?	1.2658	0.0180
ΔLoss	-	-0.0241	0.0001

$R^2 = 0.0553$ Adjusted $R^2 = 0.0514$
Test Results for $\delta_1 - \delta_2 < 0$
F value: 22.54 Pr > F: 0.0001

*Panel C: Changes in Analyst Forecast Error*s (H2c)

$$\Delta\overline{Ln|FE|}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3 \Delta StdEPS_{post-pre} + \delta_4 \Delta Losses_{post-pre} + \mu$$

Variable (n=623)	Predicted sign	Coefficient Estimate	p-value
Intercept		0.1062	0.1956
PostFD_NewNon	+	0.2493	0.0674
PostFD_NewPublic	?	-0.2405	0.1032
ΔStdEPS	+	0.4716	<0.0001
ΔLoss	+	0.0278	<0.0001

$R^2 = 0.3006$ Adjusted $R^2 = 0.2961$
Test Results for $\delta_1 - \delta_2 > 0$
F value: 6.52 Pr > F: 0.0055

Table 6 (continued)

Panel D: Changes in Analyst Forecast Dispersion (H2d)

$$\overline{\Delta LnDisp}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3 \Delta StdEPS + \delta_4 \Delta Losses_{post-pre} + \mu$$

Variable (n=580)	Predicted sign	Coefficient Estimate	p-value
Intercept		0.3048	<0.0001
PostFD_NewNon	+	-0.1319	0.1950
PostFD_NewPublic	?	0.0655	0.6162
ΔStdEPS	+	0.2560	0.0009
ΔLoss	+	0.0245	<0.0001

$R^2 = 0.2742$ Adjusted $R^2 = 0.2691$

Test Results for $\delta_1 - \delta_2 > 0$

F value: 1.28 Pr > F: 0.1296

[a] Variable definitions: PostFD_NewNon = 1 for post-FD new nondisclosers, and 0 otherwise; PostFD_NewPublic = 1 for post-FD new public disclosers, and 0 otherwise; ΔStdEPS is the difference in the standard deviation of quarterly earnings per share between the post-FD period and the pre-FD period; ΔLosses is the difference in the proportion of loss quarters between the post-FD period and the pre-FD period; ΔACAR is the difference in the average absolute cumulative abnormal returns from two days before to one day after quarterly earnings announcements between the post-FD period and the pre-FD period; ΔAF is the difference in the mean number of analysts providing annual earnings forecasts between the post-FD period and the pre-FD period; Δ Ln|FE| is the difference between the post-FD period and the pre-FD period in the average natural logarithm of the absolute consensus forecast errors scaled by share price at the end of the year; ΔLnDisp is the difference between the post-FD period and the pre-FD period in the average natural logarithm of analyst forecast dispersion scaled by share price at the end of the year.

[b] p-values are one-tailed for variables with predicted signs and two-tailed for variables without predicted signs.