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Regulation Fair Disclosure and Earnings Information: Market, Analyst, and Corporate Responses

WARREN BAILEY, HAITAO LI, CONNIE X. MAO, and RUI ZHONG*

ABSTRACT

With the adoption of Regulation Fair Disclosure (Reg FD), market behavior around earnings releases displays no significant change in return volatility (after controlling for decimalization of stock trading) but significant increases in trading volume due to difference in opinion. Analyst forecast dispersion increases, and increases in other measures of disagreement and difference of opinion suggest greater difficulty in forming forecasts beyond the current quarter. Corporations increase the quantity of voluntary disclosures, but only for current quarter earnings. Thus, Reg FD seems to increase the quantity of information available to the public while imposing greater demands on investment professionals.

GOVERNMENTS REGULATE SECURITIES MARKETS with a variety of goals in mind. A flow of information that is accurate, efficient, and fair contributes to a well-functioning capital market that satisfies the needs of all users and enhances economic growth and stability. A continuing concern of regulators and investors is “selective disclosure,” the practice of companies disclosing important information to certain securities analysts and institutions. Former U.S. Securities and Exchange Commission (SEC) Chairman Arthur Levitt (U.S. Securities and Exchange Commission (2000a), p. 1) speaks of information as “the lifeblood of strong, vibrant markets” and warns that “when that information is used to profit at the expense of the investing public, when that information comes by way of favored access rather than by acumen, insight, or diligence, . . . we risk nothing less than the public’s faith and confidence in America’s capital market.”

As part of the former chairman’s drive to improve transparency and fairness in U.S. stock markets, the SEC approved Regulation Fair Disclosure (Reg FD) on August 10, 2000. Reg FD is intended to level the playing field by reducing

*Bailey and Li are from Cornell University, Mao is from Temple University, and Zhong is from Fordham University. We are grateful to First Call/Thompson Financial and I/B/E/S for providing us with much of the data used in our study. We thank the editor, Rick Green, and the anonymous referee for many useful comments. We thank Haluk Unal, Rex Thompson, and Kumar Venkataraman for helpful discussions, Charles M. C. Lee for help in obtaining the First/Call database, and Mancang Dong for technical support. Previous versions of this paper circulated under the title “Regulation FD and Market Behavior around Earnings Announcements: Is the Cure Worse than the Disease?” Any errors are our own.

information disparities between individual and institutional market participants.¹ Reg FD prohibits selective disclosure of material information and requires broad, nonexclusionary disclosure of such information. For example, an advance warning about earnings telephoned to a security analyst must also be immediately released to the public with a press release, open conference call, or other public communication.

Aside from increasing public confidence in U.S. financial markets, proponents believe that Reg FD will improve the flow of information to financial markets. Corporate managers can no longer treat material information as a commodity to gain favor with analysts, who in turn feel pressure to issue favorable reports to maintain access to those corporations. Analysts must conduct more independent research rather than depending on data “spoon fed” by corporate management. Recipients of selective disclosures will no longer be able to trade on what is, in effect, private information that can reduce liquidity and increase price volatility (Admati and Pfleiderer (1988)). The regulation may also contribute to alleviating incentive problems when analyst and investment banking activities occur under the same roof (Teo (2000)).

Skeptics counter that, despite its good intentions, Reg FD will chill corporate disclosure and trigger an “information brownout.” If the materiality standard is vague, companies will restrict discussions with analysts and institutional investors to avoid potential SEC legal action. Communication will be reduced to “sound bites,” “boilerplate” disclosures, or large amounts of nonmaterial and raw information of little value to analysts and the public at large.² This, in turn, impedes the process (Grossman and Stiglitz (1980)) by which informed trading incorporates information into prices rapidly and effectively, thereby enhancing market efficiency.³ By hampering the ability of analysts to obtain and interpret new information and, thus, contribute to the formation of market consensus, a regulation intended to equalize the quantity and quality of information available to ordinary investors may instead leave them worse off.

Are concerns about Reg FD legitimate or merely an excuse for investment professionals to protect their undeserved privileges? Does this well-intentioned regulation have unintended and undesirable consequences? Given what is at stake in this debate, understanding the impact of Reg FD on financial markets is an important empirical question with profound practical implications.

In this paper, we assess the impact of Reg FD on stock market responses to earnings releases, on the earnings forecasts produced by analysts, and on the

¹See, for example, U.S. Securities and Exchange Commission (2000b).

²A recent survey indicates 72% of analysts interviewed by the Security Industry Association feel that information communicated by issuers to the public is of lower quality since implementation of the regulation. See <http://www.sia.com/testimony/html/kaswell5-17.html>.

³Stuart Kaswell, the general counsel of the SIA, states “We believe that communications between an issuer and individual analysts or a small group of analysts contribute to the overall mix of information in the market place, greater accuracy of market prices, less volatility and, in general greater efficiency . . . We are concerned the proposal will end up restricting the flow of information rather than encouraging it by imposing detailed rules on companies, investors and analysts.” See <http://www.sia.com/testimony/html/kaswell5-17.html>.

extent to which corporations voluntarily disclose information. A seemingly significant decline in return volatility at times of earnings announcements after the implementation of Reg FD is due to decimalization of stock trading rather than the adoption of Reg FD. There are significant increases in trading volume due to differential informed judgment or difference in opinion after controlling for other factors. While the accuracy of analyst forecasts of quarterly earnings seems unchanged, forecast dispersion increases significantly. Furthermore, increases in other measures of disagreement and differences of opinion among analysts suggest that forecasting earnings beyond the current quarter has become more difficult after the imposition of Reg FD. Finally, there is unambiguous evidence of increased voluntary corporate disclosure, though only for forthcoming quarterly earnings.

In some respects, Reg FD serves its intended purpose: Legal remedies are now in place to punish privileged communications, and our evidence shows that listed companies offer a greater quantity of voluntary disclosure to the public. At the same time, Reg FD imposes costs on market participants: We also find that disagreement among traders and analysts has increased since the regulation was adopted. This may validate complaints about Reg FD from the investment industry, or may predict that more effort and struggle on the part of analysts and other investment professionals will enhance market efficiency.

Our paper is part of a growing body of research inspired by the SEC's approval of Reg FD in the summer of 2000. Shane, Sonderstrom, and Yoon (2001), Eleswarapu, Thompson, and Venkataraman (2002), Gadarowski and Sinha (2002), and Heflin, Subrahmanyam and Zhang (2003) report that return volatility decreases significantly after Reg FD. In contrast, we attribute this decrease to decimalization rather than Reg FD itself. Eleswarapu et al. use intraday data to measure trading costs and find that information asymmetry has declined with Reg FD, particularly for small or illiquid stocks. Straser (2002) reports a decline in the proportion of informed traders but an increase in proxies for information asymmetry and private information. Topaloglu (2002) finds that institutions trade higher amounts during the event period, rather than pre-announcement, after the imposition of Reg FD, while Gintschel and Markov (2002) find a reduced impact of analyst forecasts, particularly from "high reputation" brokerages. These papers indicate that Reg FD induces substantial changes in the information environment, as is also suggested by our results on disagreement. In studies of analyst forecasts, Shane et al. and Heflin et al. find little post Reg FD change in the accuracy or dispersion of quarterly analyst forecasts, while Agrawal and Chadha (2002) report that both have increased, especially for small, information-poor, or unprofitable firms in certain industries. Topaloglu and Irani and Karamanou (2002) report increased forecast dispersion after Reg FD, Monhanram and Sunder (2001) find that increases in forecast errors and dispersion after Reg FD do not extend to "all-star" analysts, and Zitzewitz (2002) indicates that analysts respond more to public releases. We find no increase in forecast errors, but significant increases in forecast dispersion and other indicators of disagreement. Straser and Heflin et al. report increased voluntary disclosure after

Reg FD, as we report here as well.⁴ Our paper contributes to unifying and interpreting the diversity of empirical facts presented by this growing literature.

The balance of our paper is organized as follows. Section I describes our data and methodology. Section II presents event-study evidence, while Section III examines the impact on analyst forecasts and corporate voluntary disclosure. Section IV is a summary, conclusion, and agenda for future research.

I. Experimental Design

A. Comparison Periods and Data

To study the impact of Reg FD, we compare market behavior around earnings releases, analyst forecasts, and corporate voluntary disclosures before and after implementation of Reg FD. Given that Reg FD became effective on October 23, 2000, we define the fourth fiscal quarter of 2000 (IV 2000) and the first and second fiscal quarters of 2001 (I 2001 and II 2001) as our “post Reg FD” quarters.⁵ We also define two kinds of “pre Reg FD” comparison quarters. First, we use the same fiscal quarter in the previous year to capture any quarter-specific effects. Thus, post Reg FD IV 2000 is compared to pre Reg FD IV 1999, I 2001 is compared to I 2000, and II 2001 is compared to II 2000. Second, we use the last quarter before adoption of Reg FD, III 2000, to compare to the post Reg FD quarters, sacrificing a matching-quarter comparison, but minimizing the time difference between the post Reg FD and control quarters.

The First Call database is our source for quarterly earnings announcements, analyst forecasts, and corporate voluntary disclosures. The daily stock price, adjusted return, trading volume, and shares outstanding are obtained from the Center for Research in Securities Prices (CRSP) of the University of Chicago. Our sample consists of all December year-end firms with quarterly actual and forecast earnings per share and earnings announcement date in the First Call database, and returns and trading volumes from CRSP for the post Reg FD quarter of interest and its comparison quarter.⁶

⁴ Bushee, Matsumoto, and Miller (2002), Sunder (2002), and Irani (2003) take an imaginative approach to the impact of Reg FD on voluntary disclosure by studying conference calls before versus after Reg FD.

⁵ We have only three quarters since adoption of Reg FD because our First Call database extends through August 2001 only. Reg FD is effective as of October 23, 2000, that is, about three weeks into the fourth quarter of 2000. One concern is that companies disclose information regarding fourth quarter of 2000 earnings to analysts during the first 3 weeks before Reg FD is enforced, thus partially contaminating IV 2000 with disclosure not controlled by Reg FD. Contamination may occur for other quarters as well: Companies can guide analysts with information regarding earnings for several forthcoming quarters. However, such contamination should decay over time after October 23, 2000. Having three post Reg FD quarters in our study can help us assess the relative strength of the impact of Reg FD over time.

⁶ We eliminate all firms with a “DDC” code indicated in the First Call database. The DDC code denotes some form of discontinuity in the EPS series arising from events such as accounting change and mergers and acquisitions.

B. Methodology

B.1. Matched-pairs Comparison

We compare changes in a variety of market and analyst variables across pairs of pre Reg FD and post Reg FD quarters as described previously. We follow standard event-study practice to generate return and volume residuals. Defining the earnings announcement date as day 0, abnormal stock returns are generated using one-factor market model residuals estimated from day -200 to day -11 . The CRSP value-weighted index return is used as a proxy for market return. Abnormal return volatility is the absolute value of daily abnormal returns, summed over a window spanning the earnings announcement. Abnormal trading volumes are differences between trading volume and the mean of daily volume for that stock over the pre-announcement window ($-200, -11$), normalized by the mean volume, then summed over a window spanning the earnings announcements. *T*-tests and sign tests assess the significance of the mean and median within-firm change across pairs of pre and post Reg FD comparison quarters.

We also compare different aspects of analyst forecasts before and after the imposition of Reg FD. The *absolute consensus forecast error* is the absolute value of the difference between a firm's reported earnings for a quarter and the mean of most recent analyst forecasts for the quarter. The *absolute time-series forecast error* is the absolute value of the seasonal change in a firm's quarterly earnings. The *analyst information advantage* is the difference between a particular absolute consensus forecast error and the corresponding absolute time-series forecast error. Intuitively, this measures the "value added" by the analyst (Hefflin et al. (2003)). *Analyst forecast dispersion* is the standard deviation of individual analyst most recent forecasts of a firm's quarterly earnings. All forecast variables are scaled by the stock price at the end of the pre Reg FD comparison quarter.

B.2. Cross-sectional Regressions

To further assess the impact of Reg FD on return volatility and trading volume after controlling for several firm characteristics, we estimate multivariate regressions. For return volatility, the dependent variable is the absolute value of the abnormal return (computed from the market model) cumulated over a 3-day period (days $-1, 0$, and 1). For trading volume, the dependent variable is cumulative mean-adjusted trading volume over the same 3-day period. We construct explanatory variables for the cross-sectional regressions following Yoon and Starks (1995), Atiase and Bamber (1994), and others. *Absolute consensus forecast error* is defined above and serves in regressions to explain return volatility. *Firm size* is the market value of common shares outstanding at the end of the quarter. It can reflect for the amount of information available about the firm,⁷ market liquidity, average precision of investors' private predisclosure information, or other basic cross-sectional differences in information environment across firms. Pre-announcement information asymmetry is proxied with the *dispersion* in

⁷The idea is that larger firms tend to draw more press and analyst coverage.

Table I
Median Characteristics of Sample Firms

This table reports the median values of firm characteristics. The samples consist of all December year-end firms with quarterly actual and forecast earnings per share, earnings announcement dates in the First Call database, and returns and trading volume from CRSP for each pair of pre and post Reg FD quarter. Size is the firm's market capitalization, analysts is the number of analysts following a particular firm, the absolute consensus forecast error is the absolute value of the difference between actual earnings and consensus forecasts scaled by stock price at the end of the pre Reg FD quarter, and forecast dispersion is the standard deviation of the most recent individual forecasts. Abnormal stock returns are computed based on one-factor market model residuals estimated from day -200 to day -11 with CRSP value-weighted index returns. Abnormal return volatility is the absolute value of daily abnormal returns, summed over the window indicated. Abnormal trading volumes are generated as the differences between trading volume and the mean of daily volume for that stock over the pre-announcement window (-200 , -11) normalized by the mean volume, then summing over the period indicated.

	Number of Observations	Size	Analysts	Absolute Consensus Forecast Error	Forecast Dispersion	Abnormal Return Volatility ($-1, 1$)	Abnormal Trading Volume ($-1, 1$)
IV 1999	1914	1053.48	5	0.00075	0.00046	0.0552	0.2086
I 2000	2144	907.37	5	0.00083	0.00046	0.0611	0.0258
II 2000	1683	1178.35	5	0.00070	0.00046	0.0453	0.0979
III 2000	1919	1002.89	5	0.00068	0.00049	0.0545	0.0041
IV 2000	1914	1044.93	5	0.00075	0.00053	0.0490	0.1717
I 2001	2144	897.28	5	0.00070	0.00052	0.0454	0.05335
II 2001	1683	1144.95	5	0.00073	0.00053	0.0391	0.00433

analyst earnings forecasts as defined above. Additionally, the event-period abnormal return is used as an explanatory variable in regressions to explain abnormal volume. Previous authors have documented a significant positive relation between trading volume and the magnitude of returns at earnings announcements (Karpoff (1987) and Atiase and Bamber) and, as discussed below, this relation may be uniquely useful in identifying the nature of the market reaction to earnings. Finally, specifications for both abnormal return and abnormal volume include dummy variables to distinguish events occurring before versus after the imposition of Reg FD.

Table I summarizes characteristics of our sample firms and principal variables that we examine in our event-study and cross-sectional regression tests. Across the seven quarters that we study, the number of firms ranges from 1,683 to 2,144, while average firm size ranges from \$897 million to \$1.178 billion. Our sample appears comprehensive in that it includes both small and large firms, rather than only including relatively large firms as in many studies (e.g., Barron and Stuerke (1998)). The median number of analysts per firm is five, which appears low. Again this may be due to the inclusion of many small firms in our sample. The average absolute earnings surprise and analyst forecast dispersion are similar across

quarters. There appears to be considerable variation in abnormal market behavior across quarters, particularly for volume.

II. Reg FD and Market Responses to Earnings Releases

A. Univariate Behavior of Abnormal Return Volatility and Trading Volume

We begin by examining how abnormal return volatility and trading volume around earnings releases differ before versus after the adoption of Reg FD in October 2000. Table II reports univariate summary statistics for six pairs of comparison quarters. Abnormal stock returns are computed based on one-factor market model residuals estimated from day -200 to day -11 with respect to CRSP value-weighted index returns. Abnormal return volatility is the absolute value of daily abnormal returns, summed over the $(-1, +1)$ window. Abnormal trading volume is the difference between trading volume and the mean of daily volume for that stock over the pre-announcement window $(-200, -11)$ normalized by the mean volume, then summing over the same window.⁸ Results computed over windows of $(-1, 0)$, $(-2, +2)$, and $(-1, +5)$ are similar to those for $(-1, +1)$ and are available on request.

Panel A of Table II presents univariate summary statistics on abnormal return volatility around earnings releases. The results suggest a strong and uniform pattern of decreases in announcement period return volatility after the adoption of Reg FD. Return volatility in the post Reg FD quarters is significantly lower than in their pre Reg FD comparison quarters. All mean and median differences are statistically significant at better than the 1% level for all six pairs of comparison quarters.

Panel B of Table II presents univariate summary statistics on abnormal trading volume around earnings releases. Much of the theoretical and empirical literature on asset markets and information indicates that examining trading volume adds to our understanding of the market reaction. While security prices aggregate or average investor beliefs into a consensus price, the summing of individual trades into aggregate trading volume represents differences in investor interpretations of an accounting disclosure. These differences are suppressed in the averaging process that yields prices. Thus trading volume is more reflective of individual differences in obtaining, interpreting, and responding to an earnings event. Furthermore, previous empirical papers have documented a positive relation between trading volume and measures of different aspects of disagreement among traders. Theoretical models of stock trading and anticipated corporate news arrival (Kim and Verrecchia (1997), e.g.) demonstrate a relation between trading activity and “disagreement” among heterogeneous traders who seek and interpret pre-announcement and announcement period information. Therefore, excess trading can be viewed as a symptom of such disagreement whether it results from differential information or differences in opinion.

⁸ Use of abnormal trading volume is essential since there is a substantial rising trend in raw volume across most of our pairs of comparison quarters. A table of summary statistics of actual trading volume before and after Reg FD is available on request.

Table II
Univariate Analysis of Abnormal Stock Return Volatility and Trading
Volume around Earnings Announcements

Abnormal stock returns are computed based on one-factor market model residuals estimated from day -200 to day -11 with CRSP value-weighted index returns. Abnormal return volatility is the absolute value of daily abnormal returns, summed over the window indicated. Abnormal trading volumes are generated as the differences between trading volume and the mean of daily volume for that stock over the pre-announcement window ($-200, -11$) normalized by the mean volume, then summing over the period indicated. "Change" measures the mean and median within-firm change after Reg FD adoption. *P*-values are two sided, from *t*-tests for means, and from sign tests for medians. The results are similar over $(-1, 0)$, $(-2, +2)$, and $(-1, +5)$ windows.

Quarter	Panel A: Abnormal Return Volatility Over $(-1, +1)$		Panel B: Abnormal Trading Volume Over $(-1, +1)$	
	Mean	Median	Mean	Median
IV 1999	0.1090	0.0903	0.6318	0.3403
IV 2000	0.1026	0.0812	0.5435	0.2615
Change	-0.0063	-0.0071	-0.0883	-0.1285
<i>P</i> -value	0.001	0.001	0.022	0.000
III 2000	0.1127	0.0941	0.3809	0.0594
IV 2000	0.1027	0.0812	0.5371	0.2572
Change	-0.0100	-0.0086	0.1562	0.0917
<i>P</i> -value	0.000	0.000	0.000	0.000
I 2000	0.1156	0.0986	0.2425	0.0327
I 2001	0.0977	0.0763	0.3895	0.1229
Change	-0.0179	-0.0177	0.147	0.0743
<i>P</i> -value	0.000	0.000	0.000	0.000
III 2000	0.1107	0.0915	0.3922	0.0828
I 2001	0.0962	0.0753	0.4025	0.1624
Change	-0.0145	-0.0133	0.0104	0.0255
<i>P</i> -value	0.000	0.000	0.781	0.232
II 2000	0.0944	0.0761	0.223	0.0146
II 2001	0.0860	0.0680	0.3826	0.0735
Change	-0.0084	-0.0078	0.1596	0.0599
<i>P</i> -value	0.000	0.000	0.000	0.004
III 2000	0.1059	0.0874	0.4046	0.1037
II 2001	0.0834	0.0669	0.3794	0.0805
Change	-0.0225	-0.0163	-0.0252	-0.0376
<i>P</i> -value	0.000	0.000	0.578	0.288

In contrast to our findings for return volatility, Panel B of Table II shows that changes in abnormal volume after Reg FD are not uniform across different comparison periods. For the first post FD quarter, IV 2000, abnormal volume is lower compared to IV 1999 but is larger compared to III 2000. For the second and third post FD quarters, I 2001 and II 2001, abnormal volume is significantly higher than their fiscal comparison quarters, I 2000 and II 2000, respectively, but is not different from quarter III 2000. Thus, there is no clear change in abnormal trading volume observed across our six pairs of comparison quarters.

B. Multivariate Regressions to Explain Returns and Volume around Earnings Releases

Previous authors have identified several factors that explain return volatility around earnings announcements such as firm size, the number of analysts following a firm, the absolute consensus forecast error as a measure of the earnings surprise, and the dispersion in analyst forecasts (El-Gazzar (1998)). To control for the impact of these variables, we estimate multivariate regressions to assess the change in return volatility after implementing Reg FD. Panel A of Table III presents the results of cross-sectional regressions to explain return volatility around earnings announcements. The return volatility cumulated over $(-1, +1)$ is regressed on firm size, absolute forecast error, forecast dispersion, and a dummy variable, POST, to indicate the post Reg FD period.⁹

In Panel A of Table III, coefficients on firm size are significantly negative, which suggests that return volatility around earnings releases is particularly large for smaller firms. This is consistent with the empirical results documented by previous authors (El-Gazzar (1998)). Investors may have less incentive to gather pre-disclosure information about smaller or lightly followed firms and, as a consequence, the market reacts more to an earnings shock. The estimated coefficients on the absolute consensus forecast error are positive and significant, which is consistent with previous empirical findings. Larger earnings shocks yield larger market reactions. The coefficients on analyst forecast dispersion are mainly insignificant. The sign and significance of the coefficient on the POST dummy variable is consistently strong and negative across the six comparison quarters, suggesting lower post Reg FD return volatility around earnings releases, even after controlling for other firm characteristics.

Panel B of Table III presents cross-sectional regressions to explain abnormal trading volume. In the model of Kim and Verrecchia (1997), investors employ two types of private information at earnings announcements. Pre-announcement information is private information gathered in anticipation of a public disclosure. Event-period information is a direct product of differential information processing or differential informed judgment across investors stimulated by the earnings release.¹⁰ Models based exclusively on one type of information yield incomplete empirical implications involving price change and volume reactions. Their general model with both pre-announcement and event-period information yields some interesting insights: Trading volume at the earnings announcement

⁹The change in return volatility cumulated over different windows like $(-1, 0)$ and $(-1, +5)$ yields results very similar to those based on $(-1, +1)$. In addition, specifications with the number of analysts, rather than firm size, to proxy for the firm's information environment yield similar results.

¹⁰Differential information processing is modeled in Kim and Verrecchia (1994). They argue that some market participants process earnings announcements into private, and possibly diverse, information about a firm's performance at a cost. This private information can be thought of as informed judgments or differential interpretations of public announcements. Thus, earnings announcements stimulate informed judgments or differential information processing which, in turn, create or exacerbate information asymmetries between traders and market makers and ultimately lead to higher trading volume.

Table III
Cross-sectional Regressions to Explain Abnormal Stock Return Volatility and Trading Volume

Abnormal return volatility and trading volume over a 3-day window (days - 1, 0, and 1) are regressed on explanatory variables. A dummy variable, POST, equals 1 for quarterly earnings event after Reg FD adoption, 0 for earlier comparison quarter. Size is the firm's market capitalization, the absolute forecast error is the absolute value of the difference between actual earnings and consensus forecast scaled by stock price at the end of pre Reg FD quarter, and forecast dispersion is the standard deviation of the most recent individual forecasts. Abnormal stock return volatility also serves as an explanatory variable for abnormal trading volume. White's (1980) heteroskedasticity-consistent *p*-values are reported beneath each coefficient estimate. Specifications with number of analysts, rather than size, to proxy for the firm's information environment yield similar results.

	IV 2000 versus IV 1999	IV 2000 versus III 2000	I 2001 versus I 2000	I 2001 versus III 2000	II 2001 versus II 2000	II 2001 versus III 2000
Panel A: Abnormal Stock Return Volatility						
POST	- 0.00632	- 0.00809	- 0.01471	- 0.00826	- 0.00624	- 0.01472
Size * 1000	0.0003	< .0001	< .0001	< .0001	- 0.0003	< .0001
	- 0.00012	- 0.00016	- 0.00015	- 0.00015	- 0.00008	- 0.00011
Absolute	0.0034	0.0001	0.0001	0.0005	0.0267	0.0041
Forecast error	0.18667	0.41652	0.7245	0.78939	0.54832	0.31053
Forecast	0.0337	0.0039	0.0006	0.0003	< .0001	0.0261
Dispersion	0.53014	0.21658	0.22468	0.04506	0.21257	0.2767
Adjusted <i>R</i> ²	0.028	0.5379	0.5869	0.9254	0.6077	0.5791
	0.012	0.015	0.027	0.017	0.014	0.028
Panel B: Abnormal Trading Volume						
POST	- 0.05862	0.25522	0.16842	0.37525	0.13673	0.31211
	0.0163	0.0002	< .0001	< .0001	0.0002	< .00010
Return	9.29068	< .0001	7.48237	6.46553	7.87486	0.0003
Volatility	< .0001	< .0001	< .0001	< .0001	< .0001	< .0001
Return Vol * POST	- 1.6471	- 1.6471	- 0.929	- 0.53878	- 0.88111	- 1.49777
	< .0001	< .0001	0.0062	0.0476	0.0063	< .0001
Size * 1000	0.00078	0.00136	0.00203	0.00187	0.00087	0.00093
	0.4044	0.134	0.0204	0.0249	0.2517	0.2506
Forecast	- 11.6771	- 22.1266	- 14.1204	- 8.78212	- 23.1648	- 30.439
Dispersion	0.0216	0.0005	0.0386	0.026	0.0021	0.0007
Adjusted <i>R</i> ²	0.001	0.121	0.005	0.094	0.137	0.125

is positively related to the absolute value of the contemporaneous price reaction, pre-announcement differential informedness, and event-period private information (or differential informed judgment). Thus, we can isolate trading volume stimulated by differential informed judgment by controlling for absolute return change and our firm size and forecast dispersion variables that proxy for pre-announcement differential informedness. This motivates the regression specifications we estimate to explain trading volume. For simplicity, we adopt a linear and additive specification of the regression model following Bamber, Barron, and Stober (1997, 1999).

In Panel B of Table III, abnormal trading volume over $(-1, +1)$ is regressed on firm size, return volatility cumulated over the same window, analyst forecast dispersion, and the POST Reg FD dummy variable.¹¹ Given the importance of the return volatility term in the theoretical literature, we also add a slope dummy term to assess changes in the relation between volume and return after Reg FD is imposed. We include two regression specifications with and without control variables for each pair of comparison quarters. Without including the other variables, the sign and significance of the POST dummy varies across different comparison periods. This is consistent with the lack of a definite pattern in volume indicated in Table II. For the second specification, the coefficients on absolute return are uniformly significantly positive, while the coefficients on the POST Reg FD slope dummy for absolute return are uniformly significantly negative. Thus, abnormal trading volume is positively related to absolute return, which is consistent with the empirical findings of previous authors (Karpoff (1987) and Atiase and Bamber (1994)). The significant negative coefficient on the absolute return slope dummy indicates that the positive association between volume and price change is significantly weaker after the adoption of Reg FD. Unreported tests of the sum of coefficients on absolute return and its slope dummy suggest that this relation remains significantly positive after the introduction of Reg FD, even if its magnitude declines. Firm size and forecast dispersion proxy for the pre-announcement information environment. The coefficients on firm size are sometimes significantly positive while those on forecast dispersion are significantly negative.

The estimated coefficients on the POST dummy are positive and highly significant at better than the 1% level in all regressions. Recall that the unconditional level of volume indicated in Table II, Panel B does not show a uniform pattern of change after Reg FD is effective. Once we control for absolute return (which reflects the change in aggregate market expectation at the time of the earnings shock) and include proxies for pre-announcement differential informedness, what remains is trading volume generated by differential informed judgment (or difference in opinions). Thus, the strong positive coefficient on POST indicates that trading due to differential informed judgment increases significantly after the adoption of Reg FD. Moreover, the estimated coefficients imply an

¹¹ Results for trading volume cumulated over different windows like $(-1, 0)$ and $(-1, +5)$ are very similar to those for $(-1, +1)$. Specifications with the number of analysts, rather than firm size, to proxy for the firm's information environment yield similar results.

economically large impact: After the imposition of Reg FD, abnormal trading volume attributed to differential informed judgment increases, on average, by 31%.¹²

C. Does Decimalization Matter?

Our results thus far suggest that Reg FD reduces return volatility around times of earnings releases. However, our sample spans the period when the NYSE, AMEX, and Nasdaq “decimalized” stock trading by reducing tick sizes to one cent. This can have a significant impact on trading activity. Ronen and Weaver (2001), for example, find that reduced tick size is associated with reduced return volatility when the AMEX adopted 1/16 ticks in May 1997. To test whether decimalization affects our event-study results, we repeat the cross-sectional regressions of Table III with an intercept dummy for earnings events that occurred after decimalization of trading in the particular stock. Given the timing of the decimalization program, the number of pairs of “before” and “after” Reg FD quarters available for study is reduced.¹³ Put another way, we can only study those post Reg FD quarters for which data is available on both decimalized and undecimalized stocks.¹⁴

Table IV presents the results. In all regressions to explain return volatility, the decimal dummy is strongly significant while the POST dummy is insignificant. The apparent decrease in return volatility at earnings releases (in Panel A of Tables II and III and in Shane et al. (2001), Eleswarapu et al. (2002), and Heflin et al. (2003)) is due to decimalization rather than Reg FD. In contrast, the decimal dummy has little impact on our volume results: Our finding that trading volume at earnings releases increases significantly after the adoption of Reg FD remains strong.¹⁵ In brief, we find no significant change in return volatility and an increase in abnormal volume after the adoption of Reg FD.

There is an interesting parallel in the theoretical and empirical literature. In Kim and Verrecchia (1997), trading volume is independent of the absolute value of price change when there is only event-period private information. Thus, volume can arise without a price change at public news release, as has been documented in Kandel and Pearson (1995) for U.S. earnings announcements. Our results suggest that Reg FD may not change the flow of pre-announcement private information substantially. However, the pattern of no change in return volatility and increased abnormal volume suggests that Reg FD may stimulate event-period private information about future earnings as a result of increased differences in

¹² The average of coefficients on POST for the second specification in Table III, Panel B.

¹³ The NYSE and AMEX were fully decimalized on January 19, 2001 and the Nasdaq on April 9, 2001. Small numbers of stocks that underwent earlier decimalization are not present in our final sample of companies. Therefore, only one post Reg FD quarter, IV 2000 (i.e., the fiscal quarter whose earnings releases would occur in the first few months in 2001), is available for study, and is compared to pre Reg FD quarters III 2000 and IV 1999.

¹⁴ Our other two post Reg FD fiscal quarters, I 2001 and II 2001, are effectively “post decimalization.”

¹⁵ We thank the referee for pointing out the potential impact of decimalization on our results.

Table IV
The Impact of Decimalization on Abnormal Return Volatility and Abnormal Trading Volume

NYSE and AMEX trading was fully decimalized on January 19, 2001, and Nasdaq on April 9, 2001. This yields one post Reg FD quarter, IV 2000, with data for both decimalized and undecimalized sample firms. Abnormal return volatility (Panel A) and abnormal trading volume (Panel B) over a 3-day window $(-1, 1)$ are regressed on explanatory variables including dummy variables POST (1 for earnings events after Reg FD adoption, else 0) and DECIMAL (1 for earnings events at or after decimalization of trading in the stock, else 0). All other variables are defined in Tables II and III. White's (1980) heteroskedasticity-consistent p -values are reported beneath each coefficient estimate. Specifications with number of analysts, rather than size, to proxy for the firm's information environment yield similar results.

Panel A: Abnormal Return Volatility			Panel B: Abnormal Trading Volume		
	IV 2000 versus IV 1999	IV 2000 versus III 2000		IV 2000 versus IV 1999	IV 2000 versus III 2000
POST	-0.00108 0.5753	-0.00268 0.1769	POST	0.23438 0.0017	0.35026 <.0001
DECIMAL	-0.01716 <.0001	-0.01748 <.0001	DECIMAL	0.03998 0.5255	0.05479 0.3767
Size * 1000	-0.00013 0.0023	-0.00016 <.0001	Return volatility	9.28105 <.0001	7.52736 <.0001
Absolute forecast error	0.19246 0.0276	0.44565 0.0019	Return vol * POST	-1.58783 <.0001	-0.87450 0.0118
Forecast dispersion	0.63260 0.0179	0.36642 0.2946	Size * 1000	0.00079 0.3950	0.00134 0.1287
			Forecast dispersion	-11.95796 0.0191	-22.79923 0.0004
Adjusted R^2	0.024	0.027	Adjusted R^2	0.121	0.100

opinions. This can be interpreted as enhancing market efficiency if it reflects more information gathering and processing by analysts and traders who can no longer rely on special access to corporate information.

D. Correlation between Return and Volume Reactions

Previous authors have found that the strength of reaction to earnings can differ across price and volume. Kandel and Pearson (1995) report significant abnormal volume even in the absence of a substantial contemporaneous return reaction. Bamber and Cheon (1995) find that nearly 25% of earnings events display price and volume reactions of very different relative magnitudes. Kandel and Pearson argue that only models with differential interpretation of public information across investors can generate market behavior consistent with such empirical findings. In other words, differential informed judgment (or difference in opinions) can lead to different price and volume reactions. Therefore, another interesting way of assessing differential informed judgment is to examine the frequency of earnings announcement events that stimulate large volume reactions

but small price changes. We document associations between the price and volume reactions to earnings as follows. We classify the reaction to each earnings announcement into absolute return and abnormal trading volume deciles. Following Bamber and Cheon, we characterize earnings events as “large volume-small price reactions” if the volume decile is 5 or more deciles above the price decile. For example, a decile 4 price reaction is classified as a large volume-small price reaction if the contemporaneous volume reaction is in deciles 9 or 10. A contingency table summarizes the frequency of earnings announcements across all combinations of volume and price deciles.

Table V describes the frequency of observing earnings events with large volume-small price reactions.¹⁶ We focus on how the frequency of these events differs in comparing pre Reg FD periods to periods since the adoption of Reg FD. Across our six sets of comparison periods, the proportion of earnings events classified as large volume–small price reactions uniformly increases after the adoption of Reg FD. The increase in the proportion ranges from 14.05% to 45.39% depending on the particular quarters compared, and averages 23.54%. This result is consistent with our findings from the multivariate regressions: The association between price change and volume becomes weaker under Reg FD. Recall that the theoretical models of Kandel and Pearson (1995) and Kim and Verrecchia (1997) imply that a large volume-small price reaction is largely due to differential informed judgment at the time of the earnings release. Thus, Table V confirms the idea that, after the imposition of Reg FD, event-period private information due to differential informed judgment increases significantly.

E. Further Diagnostics

We conduct an additional check on the robustness of our event-study findings. We look for shifts in the balance between pre-announcement and announcement abnormal return volatility after the adoption of Reg FD. This serves two related purposes. First, we can measure the extent to which Reg FD appears to have altered the pre-announcement environment. Second, we can determine if the “effective” earnings announcement date has shifted forward in time before adopting Reg FD since Reg FD may attenuate pre-announcement leakage of the contents of earnings releases. Following El-Gazzar (1998), pre-announcement return volatility equals the average absolute return from the end of the quarter to 2 days before the earnings announcement for the quarter. Earnings announcement volatility equals the average absolute return over $(-1, +1)$. Thus, the degree to which the ratio of pre-announcement to event volatility exceeds one indicates, on average, how much more earnings information per day is conveyed prior to the formal release versus at the time of the release. The ratio is immune to decimalization effects.

¹⁶ The theoretical model in Kandel and Pearson (1995) indicates that the large volume–small price reaction case only occurs in the presence of difference in opinion among investors. It does not suggest any connection between a “small volume–large price reaction” event and difference in opinion. Therefore we do not assess the change of frequency of small volume–large price reaction events.

Table V
Summary Statistics from Contingency Tables of Abnormal Trading
Volume Reaction Deciles by Abnormal Return Volatility Deciles

We classify reactions to earnings announcements into return volatility and trading volume deciles and tabulate the frequency of earnings events in each volume-return reaction decile cells. We define large volume–small return reaction events as those for which the difference between the volume and return deciles is five or more. “Change” represents the percentage change in events with large volume–small price reactions in post Reg FD quarter.

Quarter	Number of Events with Large Volume–Small Price Reactions	Total Events	Percent of Events with Large Volume–Small Price Reactions
IV 1999	177	1914	9.25%
IV 2000	228	1914	11.91%
Change			28.81%
III 2000	152	1919	7.92%
IV 2000	221	1919	11.52%
Change			45.39%
I 2000	201	2144	9.38%
I 2001	235	2144	10.96%
Change			16.92%
III 2000	144	1615	8.92%
I 2001	165	1615	10.22%
Change			14.58%
II 2000	149	1683	8.85%
II 2001	181	1683	10.75%
Change			21.48%
III 2000	121	1277	9.48%
II 2001	138	1277	10.81%
Change			14.05%

Table VI presents the results. For three pairs of comparison quarters (post Reg FD IV 2000 versus pre Reg FD IV 1999, IV 2000 versus III 2000, and I 2001 versus III 2000), the ratio of pre-announcement return volatility to announcement period return volatility increases significantly after the adoption of Reg FD. For the other three pairs, the ratio decreases, though the magnitude of the decrease seems smaller than the increases observed for the others. Thus, there is no definitive evidence on the extent to which Reg FD is associated with more or less pre-announcement price volatility relative to announcement period volatility. Therefore, these results offer no clear evidence of a change in the pre-announcement environment after the adoption of Reg FD. In particular, there is no evidence that Reg FD prevents or enhances information leakage at the pre-announcement period.

III. The Impact of Reg FD on Analysts and Corporate Disclosure

In the previous section, we studied the impact of Reg FD through the lens of stock trading activity around earnings announcements. Most notably, the

Table VI
**Univariate Analysis of the Ratio of Pre-announcement Return Volatility
to Event-period Return Volatility**

Following El-Gazzar (1998), pre-announcement return volatility is the average absolute return from the end of the quarter to 2 days before the earnings announcement for the quarter. Earnings announcement event volatility is measured over window $(-1, 0)$ or window $(-1, +1)$. The degree to which the ratio of pre-announcement to event volatility exceeds one indicates, on average, how much earnings information per day is conveyed prior to the formal release relative to the amount of information per day conveyed around the time of the release. "Change" measures the mean and median within-firm change after Reg FD adoption. *P*-values are two sided, from *t*-tests for means, and from sign tests for medians. Results are similar over window $(-1, 0)$.

Quarter	Pre-announcement / Window $(-1, 1)$	
	Mean	Median
IV 1999	1.0152	0.8533
IV 2000	1.2576	1.0663
Change	0.2424	0.2130
<i>P</i> -value	0.0000	0.0000
III 2000	1.0049	0.8418
IV 2000	1.2560	1.0662
Change	0.2511	0.2245
<i>P</i> -value	0.0000	0.0000
I 2000	1.1392	0.9765
I 2001	1.1266	0.9417
Change	-0.0125	-0.0348
<i>P</i> -value	0.0485	0.0160
III 2000	0.9988	0.8483
I 2001	1.1105	0.9310
Change	0.1117	0.0827
<i>P</i> -value	0.0000	0.0000
II 2000	1.2089	0.9503
II 2001	1.0129	0.8345
Change	-0.1960	-0.1158
<i>P</i> -value	0.0000	0.0000
III 2000	0.9823	0.8468
II 2001	0.9817	0.8230
Change	-0.0006	-0.0238
<i>P</i> -value	0.9987	0.0147

cross-sectional regressions evidence on abnormal trading volume suggests that Reg FD has significantly increased differential informed judgments or differences in opinion, thereby stimulating trading volume. In this section, we seek further specific evidence of the impact of Reg FD on the ability of a class of investment professionals, financial analysts, to perform effectively. We also measure the extent to which corporations have increased or decreased voluntary public disclosures to, in some sense, replace private communication now banned by Reg FD.

Table VII
Univariate Analysis of Analyst Forecasts

Absolute consensus forecast error is the absolute value of the difference between reported earnings for a quarter and the mean of most recent analyst forecasts. Absolute time series forecast error is the absolute value of the seasonal change in quarterly earnings. Analyst information advantage equals absolute time series forecast error minus absolute consensus forecast error. Analyst forecast dispersion is the standard deviation of the most recent forecasts of quarterly earnings. All variables are scaled by the stock price at the end of the pre Reg FD comparison quarter. To save space, individual pairs of comparison quarters are suppressed. In Panel A, we aggregate all comparison quarters matched by fiscal quarters, including three post Reg FD quarters and their corresponding fiscal quarters in the previous years. In Panel B, we aggregate all comparison quarters match by proximity to Reg FD implementation, including three post Reg FD quarters and quarter III 2000. "Change" measures the mean and median within-firm change after Reg FD adoption. *P*-values are two-sided, from *t*-tests for means, and from sign tests for medians. The results are similar to those of individual pairs of comparison quarters, which are available upon request.

	Absolute Consensus Forecast Error		Absolute Time- Series Forecast Error		Analyst Information Advantage		Analyst Forecast Dispersion	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Aggregate All Comparison Quarters Matched by Fiscal Quarter								
Pre Reg FD	0.00179	0.00060	0.00719	0.00283	0.00540	0.00199	0.00092	0.00042
Post Reg FD	0.00166	0.00053	0.00841	0.00338	0.00675	0.00243	0.00110	0.00047
Change	-0.00012	-0.00003	0.00129	0.00016	0.00141	0.00020	0.00019	0.00005
<i>P</i> -value	0.416	0.001	0.000	0.002	0.000	0.000	0.000	0.000
Panel B: Aggregate All Comparison Quarters Matched by Proximity to Reg FD Implementation								
Pre Reg FD	0.00153	0.00052	0.00739	0.00311	0.00585	0.00229	0.00095	0.00043
Post Reg FD	0.00168	0.00055	0.00857	0.00341	0.00689	0.00242	0.00114	0.00048
Change	0.00015	0.00001	0.00117	0.00004	0.00102	0.00003	0.00019	0.00004
<i>P</i> -value	0.080	0.027	0.000	0.204	0.001	0.279	0.000	0.000

A. The Behavior of Pre-announcement Analyst Forecasts

The intention of Reg FD is to level the playing field and take away the advantage that financial analysts and others with privileged access to firms enjoy relative to ordinary investors. However, the new regulation may cause a chilling effect: Companies may become less forthcoming in public announcements for fear of litigation problems, and may be reluctant to reveal detailed information to the public for fear of benefiting competitors. The chilling effect may be especially significant on information regarding earnings beyond the current quarter. Cutting off private communication between companies and analysts may impair the ability of analysts to form opinions and reach consensus on interpreting earnings information, which in turn increases differential informed judgment among investors upon earnings releases.

Table VIII
Analyst Forecasts across Business Cycles

This table compares forecast behavior in post Reg FD quarters with quarters from the early 1990s economic downturn matched on either proximity to the business cycle peak or quarterly seasonality. Forecast variables are defined in Table VII. To save space, individual pairs of comparison quarters are suppressed. NBER business cycle peaks are July 1990 and March 2001. In Panel A, we aggregate all comparison quarters matched by fiscal quarters, including quarters IV 2000 and IV 1989, I 2001 and I 1990, and II 2001 and II 1991. In Panel B, we aggregate all comparison quarters match by proximity to business cycle peak, including quarters IV 2000 and II 1990, I 2001 and III 1990, and II 2001 and IV 1990. “Change” measures the mean and median within-firm change after Reg FD adoption. *P*-values are two-sided, from *t*-tests for means, and from sign tests for medians. The results are similar to those of individual pairs of comparison quarters, which are available upon request.

	Absolute Consensus Forecast Error		Absolute Time- Series Forecast Error		Analyst Information Advantage		Analyst Forecast Dispersion	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Aggregate All Comparison Quarters Matched by Fiscal Quarter								
1990 business cycle	0.00590	0.00071	0.00000	0.00000	− 0.00590	− 0.00071	0.00197	0.00067
2001 business cycle	0.00260	0.00070	0.00970	0.00376	0.00710	0.00242	0.00116	0.00053
Change	− 0.00329	− 0.00003	0.00970	0.00376	0.01299	0.00443	− 0.00078	− 0.00002
<i>P</i> -value	0.212	0.175	0.000	0.000	0.000	0.000	0.000	0.211
Panel B: Aggregate All Comparison Quarters Matched by Proximity to Business Cycle Peak								
1990 business cycle	0.00592	0.00086	0.01290	0.00240	0.00690	0.00103	0.00169	0.00063
2001 business cycle	0.00241	0.00067	0.00945	0.00352	0.00704	0.00227	0.00113	0.00050
Change	− 0.00351	− 0.00004	− 0.00337	0.00075	0.00019	0.00093	− 0.00054	− 0.00002
<i>P</i> -value	0.001	0.088	0.231	0.000	0.941	0.000	0.000	0.530

Table VII presents summary statistics on several aspects of analyst forecasts before and after the adoption of Reg FD. To save space, data are aggregated across all comparison quarters matched by fiscal quarters or by proximity to Reg FD implementation rather than presenting pairs of comparison quarters individually as in previous tables. The aggregated results are similar to what is found in the unreported individual quarterly summaries (available upon request). There is no consistent evidence of change in the absolute consensus forecast error after the adoption of Reg FD.¹⁷ The sign and magnitude of the change varies depending on whether we match by fiscal quarter or by proximity to Reg FD, and whether mean or median is examined. The time-series forecast error and analyst information advantage generally increase after the adoption of Reg FD. However, the significance of the change depends on whether mean or median is tested. In contrast, we observe unambiguously strong evidence that analyst forecast dispersion increases significantly after Reg FD is adopted, regardless of whether

¹⁷ See Monhanram and Sunder (2001), Shane et al. (2001), Topaloglu (2002), and Heflin et al. (2003) for related evidence.

mean or median dispersion is analyzed. It suggests that Reg FD impairs the ability of financial analysts to reach pre-announcement consensus given a reduced flow of private communications from corporations. On the other hand, consensus forecasts are not less accurate following the implementation of Reg FD.

While Table VII suggests that forecast dispersion increases after Reg FD, we note that some of our “before” and “after” periods span different points in the business cycle. In particular, our post Reg FD quarters represent a period of rising economic uncertainty and disappointing corporate earnings relative to our pre Reg FD quarters. Therefore, we also benchmark analyst behavior in post Reg FD quarters against quarters from an earlier economic cycle. The NBER’s “Business Cycle Expansions and Contractions”¹⁸ indicates a business cycle peak around the middle of our post Reg FD sample, March 2001, and an earlier peak at July 1990. Table VIII presents summary statistics that compare quarters centered on the July 1990 peak to our post Reg FD sample of quarters centered on the March 2001 peak. The post Reg FD quarters and early 1990s quarters are matched on either quarterly seasonality or proximity to the business cycle peak. Again, we present averages rather than individual quarters.

The most notable finding in this table is that, based on means though not medians, post Reg FD forecast dispersion is lower than in comparison quarters (matched on either proximity to the business cycle peak or quarterly seasonality) from the early 1990s downturn. Although we do not report results for individual quarters, this finding is consistent across different pairs of quarters, is typically significant for means, but typically insignificant for medians. Put another way, forecast dispersion is generally higher in the early 1990s regardless of whether we compare quarters before, at, or after the business cycle peak. However, we must note that the two business cycles are qualitatively different. The introduction of Reg FD in October 2000 precedes the March 2001 business cycle peak by several months, but occurs 7 months after the stock market peak in March 2000. In contrast, business cycle and Wilshire 5000 stock market peaks in the early 1990s coincide exactly at July 1990. The July 1990 peak is also associated with the invasion of Kuwait and higher oil prices while the peak of 2000/2001 is associated with the collapse of “dot com” stock prices and technology business. In addition, the information environment, corporate earnings disclosure policy, and information tools utilized by analysts differ in comparing 2001 to 1990. This could contribute to the difference in analysts forecast dispersion between the two periods. Finally, one pair of comparison quarters (post Reg FD IV 2000 versus pre Reg FD III 2000) are very close in time and occur entirely prior to the formal business cycle peak of March 2001. Thus, this comparison pair is drawn from similar business cycle conditions and the finding that forecast dispersion increases with Reg FD cannot be ascribed to substantially different phases of the business cycle. Therefore, it appears that, with the adoption of Reg FD, forecast dispersion has probably risen, although it does not exceed historical norms suggested by the early 1990s evidence.¹⁹

¹⁸ www.nber.org/cycles.html.

¹⁹ See additional evidence on business cycle effects consistent with our interpretation in Agrawal and Chadha (2002).

B. Belief Revisions and Other Aspects of Disagreement among Analysts

In the analysis above, forecast dispersion is a measure of pre-announcement disagreement among analysts. It is not necessarily directly related to differential informed judgment stimulated by the earnings release. Furthermore, disagreement has many facets. For example, Karpoff (1986) suggests that trading volume in periods immediately after an informative announcement may result from “prior dispersion of beliefs” or “jumbling” of beliefs. “Prior dispersion” refers to the predisclosure variation in beliefs across analysts, which is analyzed in Table VII. “Jumbling” refers to information-triggered belief revisions that differ across analysts. It is of particular interest, as it can reflect disagreement triggered by an earnings announcement, that is, differential informed judgment. In our earlier cross-sectional regression to explain abnormal trading volume, we try to isolate trading volume arising from differential interpretation of earnings by controlling for price change and differences in pre-announcement informedness.

Bamber et al. (1997) illustrate three distinct different aspects of disagreement among analysts and the incremental role of each in explaining trading volume around earnings announcements. *Dispersion in prior beliefs* is the level of variation in expectations before the earnings announcements. It is measured as the standard deviation of all analysts’ forecasts of annual earnings issued within 45 days of the interim earnings announcements, scaled by the absolute value of the mean annual earnings forecasts. *Belief jumbling* occurs as investors’ beliefs change positions relative to each other around the earnings announcement. It is measured as one minus the correlation between annual earnings forecasts issued in the 45 days before the interim earnings announcement and annual earnings forecasts issued within 30 days after the interim earnings announcements. *Change in dispersion* is the difference in the level of dispersion in beliefs after versus before the interim earnings announcement. It is measured as the standard deviation of annual forecasts issued within 45 days before an interim earnings announcement minus the standard deviation of annual earnings forecasts issued within 30 days after an interim earnings announcements. The change is deflated by the absolute value of the mean pre-announcement forecast.

Belief jumbling reflects some of the analyst disagreement resulting from differences in opinion. Kandel and Pearson (1995) develop an empirical measure that isolates differential belief revisions attributable exclusively to difference in opinion rather than predisclosure private information. Their measure identifies pairs of analyst forecasts that move in opposite directions and also either flip (i.e., cross) or diverge (i.e., move farther apart). The Kandel and Pearson measure is the proportion of such movements in all possible pairs of analyst forecasts revisions. Bamber et al. (1999) show that the Kandel and Pearson measure is significantly correlated with trading volume around earnings announcements. Thus, the Kandel and Pearson measure can be used as a direct test of whether Reg FD induces more differential informed judgment.

In Table IX, we document post Reg FD changes in the measures defined by Bamber et al. (1997) and Kandel and Pearson (1995). Given sample restrictions,

Table IX
Summary Statistics on Other Measures of Disagreement

The table summarizes several measures of disagreement. Dispersion of annual earnings forecasts before interim quarterly earnings announcement equals the standard deviation of all analysts' forecasts of annual earnings issued within 45 days prior to the interim earnings announcement, scaled by the absolute value of the mean annual earnings forecasts. Dispersion of annual earnings forecasts after interim quarterly earnings announcement equals the standard deviation of all analysts' forecasts of annual earnings issued within 30 days after the interim earnings announcement, scaled by the absolute value of the mean annual earnings forecasts. Change in forecast dispersion equals the standard deviation of annual forecasts issued within 45 days before the interim earnings announcement, minus the standard deviation of the annual earnings forecasts issued within 30 days after the interim earnings announcements. The change is deflated by the absolute value of the mean pre-announcement forecast. Belief jumbling around interim earnings announcements is measured as one minus the correlation between annual earnings forecasts issued in the 45 days before the interim earnings announcements and annual earnings forecasts issued within 30 days after the interim earnings announcements. To be included in our analysis, an analyst must issue a forecast of annual earnings within 45 days before the quarterly earnings announcement and the same analyst must issue a revised forecast of annual earnings within 30 days after the quarterly earnings announcement. Each firm must have at least four such analysts. Panels B, C, and D summarize the Kandel and Pearson (1995) measure of difference in opinion. For all possible pairings of analysts for each quarterly announcement, the Kandel and Pearson measure is the proportion of analyst pairs whose forecast revisions both move in opposite direction, and either flip or diverge. For all panels, "change" measures the mean and median within-firm change after Reg FD adoption. *P*-values are two-sided, from *t*-tests for means, and from sign tests for medians. The number of observations is designated "NOBS."

Panel A: Summary Statistics on Measures of Disagreement									
Quarter	Nobs	Forecast Dispersion before Announcement		Forecast Dispersion after Announcement		Change of Forecast Dispersion		Belief Jumbling	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median
II 2000	268	0.1368	0.0451	0.1111	0.0413	-0.0292	-0.0067	0.4895	0.2290
II 2001	268	0.1949	0.0839	0.1465	0.0491	-0.0518	-0.0212	0.5822	0.3677
Change		0.0581	0.0161	0.0353	0.0085	-0.0220	-0.0082	0.0911	0.0411
<i>P</i> -value		0.045	0.006	0.027	0.008	0.028	0.004	0.032	0.003

Panel B: Summary Statistics for the Kandel and Pearson Measure							
Quarter	Nobs	Mean	Median	STD	Minimum	Maximum	Zeros
II 2000	268	0.22918	0	0.32188	0	1	177 (66%)
II 2001	268	0.27117	0	0.3131	0	1	137 (51%)

Panel C: Distribution of Changes in the Kandel and Pearson Measure after Adopting Reg FD		
	Nobs	Percentage
Decrease	67	25%
No change	99	37%
Increase	102	38%
Total	268	

Table IX
(continued)

Panel D: Univariate Statistics on the Kandel and Pearson Measure		
Quarter	Mean	Median
II 2000	0.2292	0
II 2001	0.2712	0
Change	0.052	0
<i>p</i> -value	0.023	0.008

there are two post-Reg FD quarters, I 2001 and II 2001, and two comparison quarters, I 2000 and II 2000, available for this purpose.²⁰ Furthermore, there are too few annual forecasts for I 2001 to compute the measures of disagreement, perhaps because very few analysts offer or revise annual forecasts in the first fiscal quarter, given that the fiscal year end is distant. This yields one pair of comparison quarters, post Reg FD II 2001 and pre Reg FD II 2000, with 268 observations each.

Panel A reports summary statistics on the Bamber et al. (1997) measures. Consistent with the results of Table VII, the dispersion of annual earnings forecasts before interim earnings announcements is significantly higher after the adoption of Reg FD. The dispersion of annual earnings forecasts after quarterly earnings announcements decreases (relative to before quarterly earnings) for both II 2000 and II 2001. Although it decreases significantly more for II 2001, forecast dispersion after earnings announcements is still significantly higher in the post Reg FD quarter. The results suggest that, after the imposition of Reg FD, disagreement about annual earnings is both significantly higher pre and post interim earnings announcement. Panel A also shows that mean and median belief jumbling in quarter II 2001 are significantly larger than those in the pre Reg FD comparison quarter, II 2000. Thus, analysts' beliefs change positions relative to each other around the interim earnings announcements, indicating differential interpretation of interim earnings. Thus, the adoption of Reg FD induces more differential interpretation of earnings among analysts. In brief, we find that disagreement and differential informed judgment about future annual earnings increases with the adoption of Reg FD.

Panels B to D of Table IX report summary statistics on the Kandel and Pearson (1995) measure. Panel B indicates mean values of 23% and 27% for II 2000 and II 2001, respectively. Median values are zero for both quarters: The Kandel and Pearson measure is zero for 66% (51%) of firms in II 2000 (II 2001).²¹ Panel C

²⁰ We do not compare post Reg FD quarters with III 2000 since seasonality is very important for annual forecasts. The number and quality of annual forecasts in the third quarter are not comparable to those in the second quarter.

²¹ The Kandel and Pearson (1995) measure identifies pairs of analysts' forecasts that move in opposite directions and also either flip or diverge. This is a much more stringent proxy for differences in opinion than belief jumbling. It aims to identify analyst behavior exclusively due to differences in opinion in a Bayesian model, rather than due to differential predislosure information. In many cases, we may not observe any behavior satisfying the stringent requirement, and the measure equals zero.

shows that, after Reg FD is adopted, the Kandel and Pearson measure decreases for 25% of firms, remains unchanged for 37% of firms, and increases for 38% of firms. Tests reported in Panel D show that mean and median of the change of the measure after Reg FD are significantly positive.²² Thus, this measure of difference in opinion increases significantly after the adoption of Reg FD. This supports our earlier finding that Reg FD is associated with increased differential informed judgment.

C. Do Firms Respond to Reg FD with More Public Disclosure?

We conclude by examining the response of corporations to Reg FD. In Table X, we examine the change in the quantity of voluntary earnings-related disclosures after Reg FD is implemented. The source of corporate news releases that contain estimates or discussions of current or future earnings releases is the "Company Issued Guidance" (CIG) file of the First/Call databases. For each fiscal quarter we study, we examine the number of voluntary earnings-related disclosures occurring between the actual earnings announcement date for the previous quarter and the actual earnings announcement release date for the current quarter.

In Table X, the average number of total disclosures per firm (including news about current and future earnings) across all our sample firms increases significantly after the adoption of Reg FD. This result is robust across six pairs of comparison quarters, regardless of whether we exclude earnings disclosures occurring on the same day as the actual earnings announcement. While the average number of disclosures about current earnings increases significantly and uniformly after Reg FD, there is some spotty evidence that the average number of disclosures about future earnings decreases after Reg FD for some comparison quarters. Overall, only a small fraction of firms voluntarily discloses information about current earnings, and voluntary disclosures about future earnings are even more unusual. Therefore, we also measure the change in the proportion of sample firms making at least one such disclosure. Unreported results (available upon request) indicate that the proportion of such firms typically increases after the adoption of Reg FD. While the results are robust and uniform with respect to disclosures about current earnings, the results on disclosures about future earnings are inconclusive.²³

How do the results on voluntary releases by corporations relate to our findings on analyst forecasts and market reactions? We find that corporate information releases about forthcoming earnings increase, return volatility at earnings announcements does not increase, and the accuracy of analyst forecasts of current

²² Since more than 50% of observations having KP measures equal to zero in both quarters II 2000 and II 2001, the median values of the KP measure are zero in both quarters. However, a nonparametric sign test is able to examine the null hypothesis that the change in median is zero.

²³ Straser (2002) uses a smaller sample of firms and a smaller time period, but broader sources of company releases to conclude that the quantity of voluntary disclosure has increased. Heflin et al. (2003) also report an increase in voluntary corporate disclosures. Bushee et al. (2002) document changes in the use and impact of conference calls.

Table X
Changes in the Quantity of Corporate Voluntary Earnings Disclosures

We obtain corporate news releases that contain estimates or discussions of current or future earnings from the CIG file of the First/Call databases. For each fiscal quarter we study, we compute the number of disclosures occurring between the actual earnings announcement date for the previous quarter and the actual earnings announcement date for the current quarter. The “current quarter” column represents voluntary disclosures regarding the forthcoming earnings announcement. The “future quarter” column represents voluntary disclosures regarding the quarters beyond the current quarter. The “total” column includes both types of disclosures. Analysis is conducted with samples that either include or exclude disclosures occurring on the same day as the actual earnings announcement. “Change” measures the mean within-firm change after Reg FD adoption. *P*-values are two-sided, from *t*-tests for means.

	Average Number of Disclosures per Firm					
	Include Disclosures at Earnings Announcements			Exclude Disclosures at Earnings Announcements		
	Current Quarter	Future Quarter	Total	Current Quarter	Future Quarter	Total
IV 1999	0.1141	0.0084	0.1225	0.0966	0.0000	0.0966
IV 2000	0.1718	0.0679	0.2396	0.1393	0.0048	0.1441
Change	0.0577	0.0595	0.1172	0.0427	0.0048	0.0475
<i>P</i> -value	0.0000	0.0000	0.0000	0.0000	0.0046	0.0000
III 2000	0.1136	0.0368	0.1504	0.1087	0.0068	0.1154
IV 2000	0.1591	0.0676	0.2267	0.1345	0.0049	0.1394
Change	0.0455	0.0307	0.0763	0.0259	–0.0018	0.0240
<i>P</i> -value	0.0001	0.0000	0.0000	0.0163	0.0411	0.0244
I 2000	0.0824	0.0104	0.0928	0.0736	0.0005	0.0741
I 2001	0.1691	0.0494	0.2184	0.1372	0.0071	0.1444
Change	0.0867	0.0390	0.1256	0.0636	0.0066	0.0702
<i>P</i> -value	0.0000	0.0000	0.0000	0.0000	0.0013	0.0000
III 2000	0.1186	0.0507	0.1693	0.1131	0.0092	0.1201
I 2001	0.1994	0.0624	0.2617	0.1540	0.0070	0.1632
Change	0.0808	0.0117	0.0925	0.0409	–0.0022	0.0431
<i>P</i> -value	0.0000	0.0284	0.0000	0.4480	0.0455	0.0001
II 2000	0.0934	0.0064	0.0998	0.0855	0.0000	0.0855
II 2001	0.1831	0.0392	0.2222	0.1474	0.0036	0.1510
Change	0.0897	0.0328	0.1224	0.0619	0.0036	0.0655
<i>P</i> -value	0.0000	0.0000	0.0000	0.0000	0.0253	0.0000
III 2000	0.1415	0.0814	0.2229	0.1337	0.0194	0.1531
II 2001	0.2128	0.0580	0.2708	0.1576	0.0048	0.1625
Change	0.0713	–0.0234	0.0479	0.0239	–0.0145	0.0094
<i>P</i> -value	0.0000	0.0125	0.0000	0.0072	0.0076	0.0101

quarterly earnings does not deteriorate, though forecast dispersion increases after the adoption of Reg FD. On the other hand, there is more trading volume due to differences in opinions, more of a struggle in the form of belief revisions for forecasts of earnings beyond the current quarter, and no clear increase in voluntary releases concerning earnings beyond the current quarter. Therefore,

there may be a term structure to the impact of Reg FD: Greater difficulty with distant forecasts is the cost of more “fairness” with little effect on short-run forecasts. It may also be the case that companies are not comfortable releasing vague longer-horizon information publicly due to potential legal problems but, prior to Reg FD, were willing to discuss such information privately to analysts since they have the expertise to process such information. Furthermore, the increase in voluntary disclosure does not seem associated with a clear increase in the quality of information: The change in pre-announcement return volatility (versus event-period return volatility) after Reg FD is ambiguous. Straser (2002) also documents an increase in corporate disclosure after the adoption of Reg FD. However, this is accompanied by a significant increase in information asymmetry and a higher probability of private information in the financial market. Thus, companies may be responding to Reg FD with an increased quantity of lower quality public information releases.

IV. Summary and Conclusions

We study the impact of Regulation Fair Disclosure with stock market reactions to earnings announcements, analyst behavior, and corporate voluntary disclosures across several pairs of quarters that span the regulation's adoption in October 2000. Our results reveal a variety of facets to the impact of Reg FD. While there is no evidence that return volatility at earnings announcements is affected after controlling for decimalization, volume reveals substantially increased differential informed judgment (or difference in opinions) among investors after Reg FD came into force. A detailed examination of analyst forecasts indicates that several dimensions of disagreement among analysts increase after Reg FD came into force, confirming our interpretation of evidence on volume. In particular, it appears that the ability to forecast future annual earnings is made more difficult by Reg FD, although the accuracy of forecasts of current quarterly earnings seems unaffected.

In surveys of market participants recently conducted by the Security Industry Association (SIA), the National Investor Relations Institute (NIRI), and the Association for Investment Management and Research (AIMR),²⁴ many survey participants believe that the quantity and quality of information has declined since Reg FD was implemented. In particular, public communications of issuers are believed to be of lower quality. Thus, market participants perceive Reg FD as dampening the flow of information. Furthermore, sell-side analysts believe their recommendations are adversely affected, portfolio managers have less confidence in analyst estimates, and buy-side analysts feel that Reg FD has had an adverse impact on their ability to advise portfolio managers. Ultimately, the costs of Reg FD can trickle down to retail investors who depend on professional advisors for investment decisions and information gleaned from the financial media. On the other hand, surveys of analysts and other investment professionals may

²⁴ See Securities Industry Association (2001).

merely reflect their fear that Reg FD removes some of their privileges, rather than their concern for “fairness” or for the well-being of small investors.

How does our evidence confirm or refute the concerns of investment professionals? Our summary of voluntary corporate disclosure suggests that it is not true that Reg FD has reduced the quantity of information. Our evidence on the accuracy of quarterly analyst forecasts indicates that Reg FD has not caused the quality of these forecasts to deteriorate. On the other hand, the evidence on forecast revision and belief jumbling suggests that preparing forecasts of future earnings has become more difficult with the adoption of Reg FD. Our volume evidence suggests increased differential informed judgment after the adoption of Reg FD. There is, of course, more than one interpretation of this evidence: With more corporate voluntary disclosure and more effort devoted to financial analysis in place of privileged communication, a greater variety of information and opinions manifests itself in increased trading volume.

Our overall evidence suggests the following scenario to explain the effect of Reg FD. With the adoption of Reg FD, corporations release more information about current quarter earnings, though not about more distant future earnings. Analysts forecasts about current quarter earnings do not significantly deteriorate and event-period return volatility does not change significantly. However the chilling effect of Reg FD on future earnings information yields increased abnormal trading volume due to increased differences in opinion and belief revisions among analysts. Fairness increases with no cost in terms of analyst activity regarding current quality earnings, but with an impact on their distant forecasts.

Our results call for more extensive investigation of the possible benefits and costs of Reg FD. A vibrant and efficient stock market is a source of growth and prosperity, and it is important to determine whether or not this new regulation causes more problems for the stock market than it solves. We can suggest several directions for future research. If market participants are still adjusting to the new regulation, more definitive results will be possible once more data from the period since October 2000 has accumulated. Other markets may provide further evidence on the importance of Reg FD. Foreign securities listed in the U.S. are not subject to Reg FD and may show no post Reg FD changes in market behavior. If foreign securities analysts continue to obtain privileged information about U.S. corporations after Reg FD, overseas trading of U.S. stocks may differ from domestic trading. Finally, legislation similar to Reg FD may spread to other jurisdictions. The influence of such regulation may depend on market structure, legal systems, accounting quality, and other aspects of markets beyond the United States.^{25,26}

²⁵ For example, the securities laws of some Canadian provinces already imply a requirement similar to Reg FD, and some regulatory officials have expressed interest in further strengthening their effect (see Canadian Press (2000)). U.K. regulators are contemplating strengthening their regulations.

²⁶ See, for example, Fleming (2001) for Australian evidence.

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