

Is there less informed trading after regulation fair disclosure?

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Abstract

I provide new tests of regulatory impact on informed trading in the stock market. After the implementation of Reg FD there is a significant decrease in the Hasbrouck [Hasbrouck, J., 1991a. The summary informativeness of stock trades: an econometric analysis. *Review of Financial Studies* 4, 571–595.] summary informativeness statistic, a measure of informed trading based on intra-daily trade level data. But, the switch to decimalization on the New York Stock Exchange has a much larger impact on this measure. These results highlight the difficulty in attributing specific effects to broad based regulatory events.

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1. Introduction

Regulation Fair Disclosure (Reg FD) was intended to eliminate selective disclosure of private information to securities markets participants. The Securities and Exchange Commission (SEC) passed the regulation on August 10, 2000 and implemented it on October 23, 2000. Since then, firms can no longer selectively disclose material information. And if such a disclosure does occur, firms must issue a public announcement within twenty-four hours. Reg FD was designed by the SEC staff and sold to the Commission as a tool to restore public confidence in US securities markets. The economic significance of the regulation was to be manifest in improved flow of information from corporations to financial markets. Opponents of Reg FD—and there were many,

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including most corporations, investment banks and the Securities Industry Association—claimed that Reg FD would result in decreased information flow as firms “clammed up” for fear of facing SEC sanctions in the event of an unintended disclosure of material information.

Does Reg FD improve information flow as the SEC claims? Since information flow is unobservable, financial economists resort to a variety of imperfect proxies and methods to estimate the level informed trading. These proxies include volume, volatility and measures of trading costs such as spread decomposition.¹ Recent studies of the impact of Reg FD on information flow employ many of these proxies for informed trading and provide differing conclusions (Chiyachantana et al., 2004; Eleswarapu et al., 2004; Mathew et al., 2004; Bailey et al., 2003). While these studies differ somewhat with respect to data and methodologies and provide some differing conclusions regarding volume, volatility and trading costs, most suggest that the information environment has changed somewhat after Reg FD, especially for small firms. More recent research confirms this general finding. For example, Ahmed and Schneible (2007-this volume) attempt to decompose abnormal volume during the earnings announcement period into two distinct sources related to asymmetric information: volume related to price change is ascribed to differential prior information among investors and volume unrelated to price change is attributed to differential interpretation. The authors show that earnings announcement period volume attributed to differential prior information declines significantly after Reg FD for smaller capitalization firms.

While past studies report the effects of Reg FD on liquidity, trading costs, volume and return volatility, none attempt to directly address the most important question: is there really less informed trading after Regulation Fair Disclosure? The Hasbrouck (1991a) econometric model and summary informativeness (SI) measure permits assessment of regulatory impact on informed trading in the stock market. I chose this approach for two reasons. First, stock price variance can be decomposed into trade-related (informed) and trade-unrelated (uninformed) components. Second, the permanent price impact of signed equity trades can be determined, providing additional insight into whether trades are informed. Most spread decomposition models attribute the adverse selection component of spreads to perceived informed trading. But, spread decomposition can be an inaccurate method for calculating adverse selection costs (Van Ness et al., 2002). Unlike most spread decomposition models the SI measure accounts for the current and lagged impact of stock trades on stock returns while ascribing a portion of total stock return variance to informed trades. In summary, the SI measure accounts for the fact that a portion of stock price variance could be unrelated to informed trading while allocating roles to trade size (stock volume) and bid-ask spreads in the econometric model.

This study extends our understanding of regulatory impact on informed trading along several dimensions. First, the econometric model and transaction level data provide a direct measure of informed trading on an intra-daily basis. Previous research attempts to discern changes in the financial market information environment with noisy price or volatility metrics and aggregate (i.e., daily) trade data. Second, while most research focuses on regulatory impact on the information environment during the earnings announcement period, this study shows that regulatory change exerts no incremental impact on informed trading during earnings announcement periods. Third, consistent with several other studies that find the impact of Reg FD limited to small capitalization stocks (Ahmed and Schneible, 2007-this volume; Gomes et al., 2007-this volume;

¹ Volume, volatility, trade costs and informed trading belong to a long history of market microstructure research. Good references include O’Hara (1997) and Hasbrouck (1996) for the theory and practice, respectively, of market microstructure research.

Eleswarapu et al., 2004), this study provides no evidence to suggest that the information environment for large capitalization NYSE firms is significantly impacted by Reg FD.

The next section outlines the relations between liquidity, information and regulatory changes, describes the data and presents some preliminary results. Section 3 provides the panel regression models and discusses the results. Section 4 summarizes and concludes the paper.

2. Hypotheses and data

2.1. Hypothesis development

Proponents of Reg FD argue that prior to enactment of the regulation corporations supplied preferred analysts with early access to material information. In turn, analysts passed the information along to favored institutional customers and in-house proprietary traders. The resulting slow leak of private information into the market at the firm's direction put liquidity suppliers, such as retail traders, limit order traders, and possibly the specialist, at a disadvantage. To counter a perceived increased probability of trading with an informed trader, the specialist could increase the bid-ask spread, decrease the number of shares available at the quoted prices, or both. Other liquidity suppliers could also decrease the number of shares per limit price or set limit prices further away from the specialist quote, or both. However, if private information is expected to exert substantial influence on future prices, an informed trader would willingly break up his trade, hitting the quoted depth and perhaps several of the limits.² The result is a series of trades that are correlated with future stock returns and an increase in the SI measure.

If Reg FD is enforced, then there should be no preferential access to private information. Informed trading should decline after the regulation along with the perceived probability of trading with an informed trader. The specialist would quote a smaller spread and provide more depth at the quoted prices. Uninformed limit order traders would be willing to set prices closer to the specialist's quote, resulting in greater depth at or inside the prevailing quote, and, retail traders, who generally trade smaller orders, would be more willing to transact at the quoted prices. Overall, liquidity should improve with fewer trades hitting the quoted depth.³

Hypothesis 1. Informed trading is significantly lower after implementation of Regulation Fair Disclosure than before.

Hypothesis 2. Trade size relative to quoted depth is significantly lower after implementation of Regulation Fair Disclosure.

The following hypotheses address whether there is a discernable difference in informed trading in the two day pre- and post announcement periods relative to the non-announcement period and whether Reg FD exerts any incremental influence on these differences.

Gomes et al. (2007-this volume) discuss five channels by which private information can reach the market. Three of these channels potentially impact informed trading during the earnings announcement window and can be influenced by Reg FD: selective disclosure that Reg FD explicitly seeks to prevent; sell side research produced specifically for sale to public customers; and voluntary public disclosure such as earnings pre-announcements.

² Easley and O'Hara (1987) provide a model where large traders are more likely to be informed. Bacidore, Battalio and Jennings (2002) discuss the case where large orders are compelled to "walk the book".

³ See O'Hara (1997) for a good overview of asymmetric information and its impact on the behavior of securities market participants.

If Reg FD prohibits selective release of material information then two possibilities obtain. If the firm wants the information to become public, then it will publicly pre-announce. If not, the information becomes concentrated on the earnings announcement day. There are several possible empirical effects. First, prior to Reg FD, informed trading could be higher than normal during the one or two days before the announcement because analysts apply more pressure on firms to supply guidance. Of course, this is the activity that Reg FD was designed to prevent. After Reg FD, informed trading could be higher during preannouncement due to increased diligence on the part of analysts to independently discern private information or because there is a lack of enforcement. If Reg FD is enforced and firms publicly pre-announce all new information well before the earnings window, then there will be no discernable difference in informed trading during the one or two days preceding the earnings announcement.

Hypothesis 3A. In the pre Regulation Fair Disclosure era, there is more informed trading during the pre earnings announcement period relative to the non-announcement period.

Hypothesis 3B. Following the implementation of Regulation Fair Disclosure, there is either no change or an increase in informed trading during the pre earnings announcement period relative to the non-announcement period.

Most firms schedule earnings announcements and associated conference calls during hours when the market is closed. If material private information is disclosed at this time, then the price change will be reflected in the opening price as the specialist clears the market via the auction process. However, there will be no informed trading after the announcement unless there is a difference in public information processing ability among market participants (Kim and Verrecchia, 1994). If selective disclosure was widespread in the pre Reg FD era, then there should have been less new information released in the earnings announcement. Most worthwhile information would have been disseminated to a few select analysts before the announcement and conference call. Therefore, there should be no significant change, or perhaps a decline in informed trading after the earnings announcement.

Hypothesis 4. In the pre Regulation Fair Disclosure era, there is either no change or a decline in informed trading during the post earnings announcement period relative to the non-announcement period.

The existence of multiple channels for disclosure again results in two opposite potential impacts of fair disclosure on informed trading during the earnings announcement window. If compliance with Reg FD results in material information being concentrated in the earnings announcement and associated call, then the presence of superior public information processors should result in increased informed trading after the earnings announcement in the post Reg FD era. But, if a majority of firms choose to pre-announce information rather than concentrate it in the earnings release and call then public information processors have less material information to work with. Informed trading should decline in the post announcement period. Therefore, the impact of Reg FD on post announcement informed trading is an empirical matter.

2.2. Data

The sample period is centered on the Reg FD implementation date and ranges from August 1, 1999 to January 31, 2002. Stock transaction data for this study are extracted from the NYSE's Transactions and Quotes Database. The sample consists of 82 NYSE listed large capitalization firms in the S&P 100. While testing the impact of Reg FD on small firms might be interesting, I do

Table 1

Summary of *t*-tests for significant differences in summary informativeness (SI) and relative depth (RD) measures in the pre versus post Reg FD period

	Pre FD > post FD				Pre FD < post FD			
	# of firms	at 1%	at 5%	at 10%	# of firms	at 1%	at 5%	at 10%
Mean daily SI	82	75	4	2	0	0	0	0
Mean daily RD	41	18	3	2	40	19	3	3

This table presents the results of *t*-tests for the difference in mean firm-level SI and RD measures in the pre versus post Reg FD period. The sample period is 8/1/1999 to 1/31/2002. Reg FD was implemented on 10/23/2000. The total sample consists of 82 NYSE listed large capitalization firms in the S&P 100. The SI measure is calculated for each firm and each day of the sample period following Hasbrouck (1991a,b). The RD measure is the average signed trade size relative to quoted depth on the appropriate side of the quote for each firm and each day (Heflin and Shaw, 2005).

not apply the Hasbrouck model to small firms primarily because the econometric model requires at least 20 trades per day for estimation and considerably more than 20 trades per day for reliable inference.⁴

The SI measure is calculated for each firm and each day as in Hasbrouck (1991a,b). The average daily SI statistic ranges from 11.15% (LTD) to 23.96% (C). The liquidity measure for this study is the relative depth (RD) statistic of Heflin and Shaw (2005). Each signed trade is scaled by the depth on the appropriate side of the quote. Trades with volume exceeding the depth on the appropriate side of the quote are deemed upstairs trades and are excluded from the liquidity measure. The resulting statistic ranges from –1 to 1 for each eligible trade, with values near the extremes indicating lower liquidity and values below 0 indicating a preponderance of public sell orders. The daily average RD measure ranges from –0.94% (T) to 4.34% (LEH).⁵

2.3. Preliminary tests

Table 1 provides a summary of the changes in the mean firm-level SI and RD measures after Reg FD.⁶ For every firm in the sample, the average daily SI measure is lower in the post Reg FD period than in the pre Reg FD period, and, with one exception, the difference is statistically significant. These results provide some evidence in support of Hypothesis 1: informed trading is significantly lower in the post Reg FD period. The impact of Reg FD on RD is less substantial. For exactly half of the firms in the sample, the mean absolute value of the daily RD is greater in the pre Reg FD period, and only twenty-five of the differences are significant at standard levels. For the other half of the sample, one firm exhibited no change in the mean absolute value of the daily RD and twenty-five of the remaining forty firms showed a statistically significant increase in the RD measure in the post Reg FD period. While Reg FD seems to impact liquidity, the direction of the impact is firm specific. These results provide little overall support for Hypothesis 2: when the difference in trade size relative to quoted depth is statistically significant, it is firm specific. This suggests that RD should control for changes in time varying firm-specific liquidity that are unrelated to Reg FD.

⁴ Eleswarapu et al. (2004) report that small firms had an average of 12 to 29 trades per day (see their Table 1). The relative economic value of the impact of Reg FD on small firms is questionable. In the Eleswarapu, et al. study, small firms accounted for 1.6 to 1.65 percent of the trades and 0.28 to 0.86% of the market capitalization of the entire sample.

⁵ Firm-level summary statistics for the SI and RD measures are available at the author's website: <http://www.huizenga.nova.edu/collver/documents/RegFDtables.pdf>.

⁶ Firm-level comparisons of the pre vs. post Reg FD SI measures and RD measures as well as the associated *t*-statistics are available at the author's website.

Table 2

Distribution of earnings announcement window summary informativeness and relative depth measures

Percentile	Pre FD					Post FD				
	Window	Day – 2	Day – 1	Day + 1	Day + 2	Window	Day – 2	Day – 1	Day + 1	Day + 2
<i>Summary Informativeness</i>										
>90th	9.61	11.91	10.92	10.13	5.33	10.04	12.05	10.98	10.51	6.67
>95th	5.02	7.23	3.93	6.17	2.67	5.61	6.43	6.67	6.23	3.14
<i>Relative Depth</i>										
<5th	3.60	4.68	4.37	1.32	4.00	3.74	4.02	5.10	2.33	3.53
<10th	8.52	10.21	8.30	5.29	10.22	8.27	9.24	10.98	6.61	6.27
>90th	11.35	8.51	8.73	16.74	11.56	10.43	10.44	4.31	13.62	13.33
>95th	5.35	2.55	2.18	10.57	6.22	4.63	4.82	1.57	7.39	4.71

This table reports the percentage of the summary informativeness and relative depth measures across all firms above (below) the 90th and 95th (5th and 10th) period-specific firm-level percentiles for the four day announcement window and each announcement day. The sample period is 8/1/1999 to 1/31/2002. Reg FD was implemented on 10/23/2000. The subsample of 82 NYSE listed large capitalization firms in the S&P 100 includes each firm with an identifiable earnings announcement outside of normal trading hours for every quarterly announcement between 8/1/1999 and 1/31/2002. A total 49 firms met this requirement. The summary informativeness measure is calculated for each firm and each day of the sample period following Hasbrouck (1991a,b). The relative depth measure is the average signed trade size relative to quoted depth on the appropriate side of the quote for each firm and each day (Heflin and Shaw, 2005). For each firm and each measure, the announcement day measure is compared to the distribution of the measure for the appropriate period (pre Reg FD or post Reg FD).

To test the overall impact of Reg FD on informed trading during the earnings announcement window, the daily SI and RD measures from the earnings announcement window are compared to their respective firm-specific empirical distributions for each period, pre vs. post Reg FD. The sample is limited to those firms with an identifiable earnings announcement outside normal trading hours for every quarterly announcement in the sample period.⁷ While the test should generally be considered descriptive, it does have the benefit of not relying on a particular distribution assumption.

Table 2 presents some summary results from this analysis. During the pre Reg FD period, the SI measures for the two days prior to and one day after the announcement day appear to be slightly larger than would be expected, while the day + 2 SI measures are considerably lower than expected. In the post Reg FD period, the earnings announcement day SI measures appear in the top 90th and 95th percentiles with similar frequencies. These results suggest that after controlling for the impact of Reg FD on the entire empirical distribution of SI measures there is no change in informed trading in the pre vs. post Reg FD earnings announcement windows.

The proportion of RD measures from the earnings announcement window that fall in the 5th and 10th percentile is little changed in the post Reg FD period. The proportion of RD measures from the earnings announcement window that fall in the 95th and 90th percentile is slightly lower in the post Reg FD period. Interestingly, a higher than expected proportion of RD measures fall in the 90th and 95th percentile during the post announcement period in both the pre Reg FD and post Reg FD samples. Overall, the RD measure is more likely to fall in the upper tail of the distribution on post announcement days. Liquidity deteriorates during the two days following an earnings announcement, and this deterioration is unaffected by regulatory change.

⁷ There are 10 quarterly announcements for each firm. The firm is included in the sample if all ten announcements were reported by the Dow Jones News Service or PR Newswire before 9:30 am or after 4:00 pm Eastern. Forty-nine firms met this criterion.

3. Regression models

The distribution results of the previous section are best viewed as descriptive. Several pooled cross-section regressions test the incremental impact of regulation, firm-specific liquidity and earnings announcement window effects on the level of informed trading. All of the models control for individual fixed effects, individual AR(1) components and day of the week effects. Additionally, each model provides pooled estimates for the impact of firm-level liquidity and earnings announcement day effects. The models are estimated by generalized least squares and the standard errors are corrected for cross-section heteroscedasticity and contemporaneous correlation (White, 1980; Wooldridge, 2002).

The complete model (Model 1) has the following form:

$$\begin{aligned}
 SI_{i,t} = & \alpha + \beta_1 AbsRD_{i,t} + \beta_2 NegRD_{i,t} + \beta_3 Monday_t + \gamma_i SI_{i,t-1} + \delta_1 Day-2_{i,t} + \delta_2 Day-1_{i,t} \\
 & + \delta_3 Day + 1_{i,t} + \delta_4 Day + 2_{i,t} + FD * (\alpha_{FD} + \beta_{FD,1} AbsRD_{i,t} + \beta_{FD,2} NegRD_{i,t} \\
 & + \delta_{FD,1} Day-2_{i,t} + \delta_{FD,2} Day-1_{i,t} + \delta_{FD,3} Day + 1_{i,t} + \delta_{FD,4} Day + 2_{i,t}) \\
 & + DEC * (\alpha_{DEC} + \beta_{DEC,1} AbsRD_{i,t} + \beta_{DEC,2} NegRD_{i,t} + \delta_{DEC,1} Day-2_{i,t} \\
 & + \delta_{DEC,2} Day-1_{i,t} + \delta_{DEC,3} Day + 1_{i,t} + \delta_{DEC,4} Day + 2_{i,t}) + \mu_i + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

where $SI_{i,t}$ is the daily summary informativeness measure for each firm i and day t ; $AbsRD_{i,t}$ is the absolute value of the relative depth measure for each firm i and day t ; $NegRD_{i,t}$ is the absolute value of the relative depth measure for each firm i and day t when relative depth is negative; $Monday_t$ is an indicator; $Day-2_{i,t}$, $Day-1_{i,t}$, $Day+1_{i,t}$, $Day+2_{i,t}$ are announcement window day indicators; and μ_i is the individual firm fixed effect in excess of α . $AbsRD$ controls for firm-specific time-varying liquidity. For example, stocks in the S&P 100 are managed by several different specialist groups on the NYSE, each of whom could display divergent and time varying levels of risk aversion. Additionally, there are a variety of other non-earnings related news announcements that could systematically affect liquidity in all stocks. $NegRD$ takes on the value of $AbsRD$ only if the raw relative depth measure is negative. As such, β_2 measures the incremental impact of relative depth on SI when daily average relative depth is negative. On days when average relative depth is negative, the preponderance of trades occurs near the bid. It is likely that the specialist is building inventory during a period of falling prices, while discretionary liquidity providers back away. $NegRD$ allows for assessment of the impact of liquidity on informed trading when prices are falling.

Reg FD was implemented on October 23, 2000. It is possible that the effects on informed trading attributed to Reg FD could also be due to another SEC regulation: the switch to penny pricing on the NYSE. Most firms were switched to penny pricing on January 29, 2001. Two firms in this sample switched on September 25, 2000: CI and CL. Previous research attempts to control for decimalization before attributing any specific causal effects solely to Reg FD. For example, Bailey et al. (2003) include a decimal dummy in their volatility regressions and Eleswarapu et al. (2004) include a decimal regime in their trading costs regressions. This study follows more closely the method of Bailey et al. (2003). To test for the incremental impact of Reg FD and decimalization on SI, indicator variables for the post Reg FD and post decimalization periods are included in the regression model. Interaction terms allow for testing of incremental post regulation impacts of liquidity and earnings announcement window days on informed trading. Several precursor models result from setting the indicator variables to zero for the entire time series. A Reg FD model (Model 2) results when $DEC=0$, a Decimal model (Model 3) results when $FD=0$ and a baseline model (Model 4) results when $DEC=FD=0$.

Table 3

Pooled cross-section estimation of the summary informativeness equation

	Model 1		Model 2		Model 3		Model 4	
Abs. val. relative depth	−0.1858*	(−5.57)	−0.1718*	(−5.10)	−0.1819*	(−5.85)	−0.0773*	(−3.20)
Neg. relative depth	0.1526*	(2.65)	0.1485*	(2.57)	0.1351*	(2.60)	0.0727**	(1.69)
Day − 2 indicator	0.0016	(0.29)	0.0017	(0.31)	0.0033	(0.68)	0.0048	(1.24)
Day − 1 indicator	0.0027	(0.46)	0.0035	(0.58)	0.0027	(0.49)	−0.0002	(−0.04)
Day + 1 indicator	−0.0109	(−1.62)	−0.0099	(−1.44)	−0.0114***	(−1.90)	−0.0048	(−0.98)
Day + 2 indicator	−0.0139**	(−2.27)	−0.0132**	(−2.13)	−0.0143**	(−2.52)	−0.0085***	(−1.95)
Monday indicator	0.0053*	(3.49)	0.0047**	(2.21)	0.0054*	(3.52)	0.0044	(1.61)
<i>Incremental effects of:</i>								
Reg FD indicator	−0.0027	(−0.82)	−0.0554*	(−21.8)				
Abs. val. relative depth*Reg FD	0.0091	(0.11)	0.1444*	(3.23)				
Neg. relative depth*Reg FD	−0.1127	(−0.90)	−0.1947**	(−2.54)				
Day − 2 indicator*Reg FD	0.0100	(0.91)	0.0065	(0.85)				
Day − 1 indicator*Reg FD	0.0002	(0.01)	−0.0054	(−0.66)				
Day + 1 indicator*Reg FD	−0.0019	(−0.13)	0.0120	(1.26)				
Day + 2 indicator*Reg FD	−0.0011	(−0.07)	0.0104	(1.27)				
Decimal indicator	−0.0713*	(−22.4)			−0.0734*	(−41.0)		
Abs. val. relative depth*Decimal	0.2581*	(3.31)			0.2633*	(6.41)		
Neg. relative depth*Decimal	−0.1689	(−1.40)			−0.2643*	(−3.78)		
Day − 2 indicator*Decimal	−0.0048	(−0.44)			0.0034	(0.49)		
Day − 1 indicator*Decimal	−0.0073	(−0.51)			−0.0071	(−0.97)		
Day + 1 indicator*Decimal	0.0171	(1.15)			0.0157***	(1.73)		
Day + 2 indicator*Decimal	0.0134	(0.91)			0.0126***	(1.69)		
Adjusted R ²	0.209		0.175		0.209		0.123	

This table presents the coefficients from GLS regressions of summary informativeness on liquidity and indicators for announcements days, post Reg FD (FD), and post decimalization (Decimal) along with interactions of the indicator variables. Individual fixed effects and AR(1) coefficients are unreported. Standard errors are corrected for cross-section correlation and heteroscedasticity. The dependent variable is the summary informativeness measure for each firm and each day of the sample. AbsRD_{*i,t*} is the absolute value of the relative depth measure for each firm *i* and day *t*; NegRD_{*i,t*} is the AbsRD_{*i,t*} for each firm *i* and day *t* when relative depth is negative; Monday_{*t*} is an indicator; Day − 2_{*i,t*}, Day − 1_{*i,t*}, Day + 1_{*i,t*}, Day + 2_{*i,t*} are announcement window day indicators. The summary informativeness measure is calculated for each firm and each day of the sample period following Hasbrouck (1991a,b). The relative depth measure is the average signed trade size relative to quoted depth on the appropriate side of the quote for each firm and each day (Heflin and Shaw, 2005). *t*-statistics are reported in parentheses with significance at 1%, 5% and 10% levels indicated by *, ** and ***, respectively.

Table 3 reports the regression results for each of the models.⁸ Since the complete model provides the basis for comparing the impact of both Reg FD and decimalization together, it is the focus of the remaining discussion. β_1 is negative and significant in Model 1, suggesting that an increase in relative depth (decrease in liquidity) is associated with decreased informed trading. β_2 is nearly equal to β_1 , but opposite in sign, indicating that the positive relation between liquidity and informed trading holds only when relative depth is positive. The Monday indicator is positive and statistically significant suggesting increased informed trading on the first day of the week. None of the other days of the week were significant in any of the models. Day of the week effects

⁸ The individual fixed effects and AR(1) coefficients are not presented in Table 3, but are available upon request.

are well documented for stock returns (Gibbons and Hess, 1981; French, 1980). Increased information gathering and analysis over the weekend could explain the increase in informed trading on Monday. The Day+2 indicator is negative and significant, signifying a decrease in informed trading on the second day following the earnings announcement.

The Reg FD indicator is considerably smaller than in Model 2 (-0.0027 vs. -0.0554) and statistically insignificant. Reg FD exhibits no impact on informed trading after controlling for the incremental impact of decimalization. The Decimal indicator is negative and significant at the 1% level, and marginally smaller than in Model 3 (-0.0713 vs. -0.0734) suggesting that decimalization explains the reduction in informed trading in the post Reg FD period. Taken together these results suggest that decimalization, not Reg FD, had the greatest impact on informed trading.

Why should the switch to penny pricing affect informed trading? The SI measure is based upon a variance decomposition method. The measure seeks to attribute a portion of the variance in efficient stock price changes (the denominator) to the variance in signed stock volume (the numerator). A decrease in the SI measure could be due to an increase in the denominator or a decrease in the numerator. The latter explanation seems more likely.⁹ Decimalization has resulted in decreased liquidity on the NYSE, including smaller depths, smaller stock trades and decreased quoted and effective spreads (Chakravarty et al., 2002; Bessembinder, 2003). The resulting decrease in the variance of (signed) stock trade size could explain the decrease in the SI measure after decimalization. However, the firm specific daily liquidity measures (i.e., AbsRD and NegRD) should control for this systematic change in liquidity. But, these measures are daily averages of the relative depth for each trade and therefore do not completely control for the intra-daily variation in liquidity.

The results of Model 1 also help to disentangle the impact of liquidity on informed trading in the post regulation period. $\beta_{FD,1}$ and $\beta_{FD,2}$ are insignificant. The incremental impact of the absolute value of relative depth in the post Reg FD period is $\beta_1 + \beta_{FD,1} = -0.1767$. The positive relation between liquidity and informed trading holds in the post Reg FD period. The incremental impact of negative relative depth is $\beta_1 + \beta_{FD,1} + \beta_2 + \beta_{FD,2} = -0.1368$. An increase in negative relative depth (decreased liquidity on “down market” days) is associated with decreased informed trading in the post Reg FD era, and this decrease is primarily due to the incremental post Reg FD impact of NegRD (not AbsRD).

For most firms in the sample, decimalization occurred after Reg FD. The true impact of regulation on liquidity and informed trading results from the incremental impacts of both regulations. The total impact of AbsRD on SI is the sum of β_1 , $\beta_{FD,1}$ and $\beta_{DEC,1}$ ($=0.0814$). The impact of AbsRD on informed trading is negative in the pre regulation period and positive in the post regulation period. The total impact of NegRD on SI is the sum of β_1 , $\beta_{FD,1}$, $\beta_{DEC,1}$, β_2 , $\beta_{FD,2}$ and $\beta_{DEC,2}$ ($=-0.0476$). The impact of NegRD on informed trading is predominantly a post regulation phenomenon. To summarize, decreased liquidity when relative depth is positive (“up market” days) is associated with decreased informed trading in the pre regulation period and increased informed trading in the post regulation period. Decreased liquidity when relative depth is negative (“down market” days) is associated with decreased informed trading in the post decimalization period. In general, prices in US equity markets were rising in the pre regulation period and falling in the post regulation period. It is entirely possible that the differential relations

⁹ Hasbrouck (1991a) terms the numerator absolute informativeness and the denominator total return variance. In unreported tests, absolute trade informativeness is significantly lower in the post decimalization period for 81% of the firms in this study and total return variance is significantly higher for 1.27% of the firms. The results are available upon request.

between liquidity and informed trading can be explained by the general overall direction of prices in the two sample periods.

The final interpretations involve the impact of earnings announcement days on SI. δ_4 is a statistically significant -0.0139 , suggesting that informed trading declines on Day +2, the second trading day after the announcement. Both $\delta_{FD,4}$ and $\delta_{DEC,4}$ are insignificantly different from zero. Regulation appears to have no incremental impact on the level of informed trading on Day +2. After controlling for the overall impact of Reg FD and decimalization, there is no statistical evidence to support any incremental change in informed trading during the days surrounding earnings announcements.

4. Conclusion

Regulation Fair Disclosure is intended to prevent selective disclosure of private information to a preferred group of analysts. Several studies address the impact of Reg FD on analyst behavior (see Bushee et al., 2004; Gintschel and Markov, 2004; Agrawal et al., *in press*, for example). Others measure volatility and trading costs in the markets. To date, no research has addressed the question of informed trading directly. Is there less informed trading after Reg FD? This study adds to the understanding of regulatory impact on financial markets by measuring the incremental impact of two SEC regulations on informed trading in a sample of NYSE listed large capitalization firms. Overall, the results of this study support the view that informed trading declined after implementation of Reg FD, but the regression model results show that this decline is not due to Reg FD. The implementation of penny pricing results in an approximately thirty-fold larger impact on informed trading. This result highlights an important caveat for these types of event studies: the event period is unique and cannot be artificially repeated. It is possible that during the sample period other events could have altered the information environment for one or more of the firms in the sample. The regression models may not completely control for these unspecified events. Also, due to the fixed effects specification of the regression models, inferences are limited to large capitalization firms.

Traders possessing superior information regarding actual earnings or any other private information expected to be disclosed at the conference call will likely trade a day or two before the announcement in order to avoid any adverse market-wide price moves. Superior public information processors are likely to trade soon after the announcement and conference call. For this reason, most previous research involving the impact of Reg FD on analyst or market behavior focuses on earnings announcements. But past research fails to provide unanimous or definitive evidence in support of regulatory impact during the earnings announcement period. This study provides some descriptive data suggesting that informed trading has not changed during the earnings announcement window in the post Reg FD era.¹⁰ Gomes et al. (2007-this volume) suggest that large firms were able to replace selective disclosure with increased analyst following

¹⁰ Decimalization of stock prices on the NYSE is not the only regulatory change that occurred around the sample period. The demise and eventual bankruptcy of Enron in December of 2001 along with some other high profile accounting scandals prompted a dramatic revolution in corporate governance and disclosure regulation. In July of 2002, the Sarbanes–Oxley Act of 2002 was enacted “To protect investors by improving the accuracy and reliability of corporate disclosures made pursuant to the securities laws, and for other purposes.” While the act did not become law until six months after the sample period in this study, it is entirely possible that the initial news of scandals and ensuing public debate could have altered the corporate disclosure environment during the sample period, especially the period after Reg FD. However, the regression models show little evidence of any change in informed trading during the earnings announcement period after Reg FD. I thank the anonymous referee for pointing this out.

and more public disclosure after Reg FD. The regression models provide no evidence of increased informed trading in the pre announcement period during either regulatory era. This suggests that if large firms were practicing selective disclosure prior to Reg FD, they were disclosing before the earnings announcement window. That is, there is no evidence to suggest that analysts were pressuring large firms to provide further earnings guidance as the announcement drew near. The fact that there is no increase in informed trading in the pre announcement period during the post Reg FD era is also consistent with large firms making more use of pre-announcements.

Bailey et al. (2003) report a significant increase in abnormal trading volume during the earnings announcement period post Reg FD and attribute it to increased differences in opinion resulting from improved information gathering and processing by analysts. Kim and Verrecchia (1994) attribute abnormal volume during the earnings announcement window to two possible sources: improved private information gathering pre announcement and superior public information processing post announcement. Bailey et al. (2003) do not separate pre and post announcement trading. The results of this study suggest that there is no significant increase in informed trading in the pre announcement period under either regulatory regime. However there is decreased informed trading following the announcement and this decrease is not specific to either decimalization or Reg FD. This result is also consistent with large firms avoiding the practice of concentrating information at the earnings announcement in either regulatory regime. Chiyachantana et al. (2004) find increased retail trading activity after earnings announcements in both regulatory periods. Taken together, these results suggest that post announcement abnormal volume does not result from superior public information processing, but more likely from increased noise trading originating from retail trading activity. While there may be abnormal trading volume following an earnings announcement, it is not due to superior information processing or to changes in the regulatory environment.

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