Regulation Fair Disclosure and the Frequency of Analysts' Earnings Forecasts*

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Abstract

This article examines whether the introduction of Regulation Fair Disclosure (Reg FD) in 2000 altered the frequency of analysts' earnings estimates using quarterly EPS forecasts in the US stock markets. Given that Reg FD was introduced to sever the selective communication channel between corporate management and investment professionals, the regulation is likely to reduce security analysts' information advantages. Whether this reduction will lead to an increase or a decrease in the number of earnings forecasts published by analysts is an open empirical question. We find that Reg FD significantly increases the number of EPS forecasts. Analysts' experience and breadth of coverage positively impact changes in the number of estimates post-Reg FD. However, broker size has a negative effect as the improved flow of information under the new regulation reduces size advantages. Our overall results suggest that Reg FD did not constrict security analysts' information collection and research activities. Instead, it intensified them.

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I. Introduction

Analysts play a pivotal role in resolving information uncertainties in securities markets by supplying value-relevant information to the public. The literature presents abundant evidence that analyst reports help reduce information disparities in the market (Brown and Rozeff, 1978, Brown et al., 1987, Givoly and Lakonishok, 1979, Lys and Sohn, 1990, Barth and Hutton, 2004, among others). Firms with a large analyst following or those with frequent analyst reports tend to have more information available in the market and less information asymmetry among investors.

While academicians seem to have a consensus that analyst activities help improve information efficiency, little is known about whether the reverse would hold. In other words, does information transparency influence the incentives of analysts to engage in information search and processing activities? For example, if a sudden rule change enhances transparency in corporate information disclosure, will it increase or decrease analyst activities? Predictions can go either way. Analysts collect information through both private and public channels. If the information superiority of analysts over the general investing public mainly stems from their proprietary access to nonpublic corporate information, the rule change would reduce their information edge by impeding the proprietary information channel. The quantity of information provided by analysts to investors would diminish, and analyst report frequency would decrease. On the contrary, improved transparency might also enhance competition among analysts in terms of information search and production activities. When faced with diminishing opportunities to monopolize material information obtained through privileged communication with corporate management, analysts might increase their independent information search and research activities to maintain the viability and competitiveness of their business. Information collection from public sources becomes more

important. The implication is that greater transparency results in increased information gathering and research activities and high frequency of publications by analysts.

Which of the above two predictions would prevail is an open empirical question that we attempt to answer. More specifically, we empirically test whether information transparency increases or decreases information production by analysts using a unique event involving a regulation change that significantly reduces the advantages of analysts in terms of acquiring corporate information. The event that we examine is the implementation of the Regulation Fair Disclosure (Reg FD)[1] in 2000.

On October 23, 2000, the Securities and Exchange Commission (SEC) passed a landmark rule concerning the fair disclosure of privileged information by firms. The introduction of the new rule, called Reg FD, was intended to reduce the selective disclosure of material information by firms to analysts and other investment professionals. Before Reg FD, firms were allowed to communicate with security analysts and selective investment professionals about nonpublic information that they had before they made a full disclosure of the same information to the general public. Where this had happened, the SEC observed, those who were privy to the information beforehand were able to profit or avoid a loss at the expense of those left unaware.

Reg FD is a critical development affecting capital market dynamics and causing significant changes in the way analysts and brokerage firms handle new investment information. Research analysts collect or produce information, which they make public through publications of their research reports. Analysts and sales personnel in brokerage firms could communicate information with investors only after the release of their reports and the information in the notes becomes public.

[1] See the Reg FD adopting release available at http://www.sec.gov/rules/final/33-7881.htm.

Under Reg FD, whenever a public company, or any person acting on its behalf, discloses material nonpublic information to certain enumerated persons, this company must disclose that information to the public simultaneously. If successfully implemented, Reg FD would reduce the information advantages of investment professionals over the general investing public and significantly lessen the information asymmetry among market participants.

Strong evidence suggests that the introduction of Reg FD enhanced the information environment. For instance, Bushee et al. (2004) report that, after its introduction, Reg FD neither decreased the amount of information disclosed during corporate conference call periods, nor did it increase price volatility around the time of corporate earnings announcements. Almost all publicly traded companies opened their earnings announcement conference calls to public. The outcome is that the market environment becomes less discretionary in information flows and more informationally efficient because investors gain access to previously exclusive information. Heflin et al. (2003) also find evidence of improvement in price efficiency before earnings announcements and a substantial increase in firms' voluntary disclosures of earnings-related information. The SEC introduced Reg FD as a vehicle to pursue equality in the information playing field. Expanded disclosure can reduce the information asymmetry between firms and their shareholders or potential buyers. This practice can also eventually promote firm value by reducing any misevaluation.

While many of the existing studies on Reg FD address issues related to its impact on stock price efficiency, return volatility, analyst forecast accuracy, and forecast dispersion (e.g., Agrawal et al., 2006, Bailey et al., 2003, Bushee et al., 2004, and Heflin et al., 2003), we focus on how the new regulation affects the frequency of analysts' earnings estimate releases. Publications of earnings estimates are among the central vehicles through which analysts convey the information

that they have about firms to the market. While the actual volume of analysts' information production is not measurable, we can still infer it from the volume of analyst earnings estimates because increased (decreased) analysts' information search and research activities would inevitably result in a greater (smaller) number of earnings forecasts.

Despite the presence of a significant number of studies that examine the impacts of Reg FD on information transparency and analyst forecast accuracy, there is little empirical evidence on the impact of the new regulation on analyst forecast frequency. One can only deduce the direction of the change in forecast frequency indirectly from related studies. Trueman (1990) finds that analysts may choose not to revise their estimates in response to new information by considering the effects of revisions on analyst reputation. However, Reg FD reduces room for analysts' discretion on estimate publication, interval, and even contents. Consequently, one can predict that with the introduction of Reg FD, the number of analyst reports will decrease. By contrast, Bailey et al. (2003) observe that the regulation increases the quantity of information available to the public, along with greater demands on investment professionals. Facing greater demands, analysts undertake research activities more aggressively. From this, one can expect that analysts publish more estimates with Reg FD.

We examine analysts' earnings estimates over the eight-year period before and after the introduction of Reg FD. We find a significant increase in the number of analysts' earnings forecasts after the introduction of Reg FD. The result remains strong even after we control for the effects of factors such as brokerage size, analyst experience, breadth of coverage, and industry. We further find that the information advantages of large brokerage firms diminished after Reg FD. Meanwhile, analyst experience became more important. Finally, we also find that the influence of Reg FD on

analyst report frequency varies across industries, with the retail and finance industries showing the greatest increases and the construction and wholesale industries displaying the least changes in analyst report frequency.

Existing studies on analyst behavior have largely ignored analyst forecast frequency. In addition, no study on the effects of Reg FD investigates how the regulation affects analyst forecast frequency. To our best knowledge, this study is the first that recognizes the importance of the frequency of EPS forecasts as an important analyst attribute that is closely linked to information environments. We particularly focus on how transferring information flows from private information channels to public information channels affects information agents' behavior. Further, we shed light on the possibility that Reg FD fundamentally changed the quoting behavior of analysts. .

The remainder of this article is organized as follows: Section II introduces the testable hypotheses. Section III explains the data and the research design. Section IV presents the empirical results. Section V concludes the paper.

II. Testable Hypotheses

Reg FD significantly influences analyst behavior in terms of research report generation and publication intervals. Before Reg FD, analysts were allowed to communicate nonmaterial, nonpublic information with firm management. However, Reg FD essentially stipulates that corporate managers should disseminate any material information simultaneously to all market participants, thus prohibiting selective disclosure to investment professionals. As a result, analysts need to exert more effort toward independent information search in place of their privilege to

communicate directly with firm managers. To stay competitive in their business, analysts may need to engage more actively in financial analysis than before (Bailey et al., 2003). Furthermore, confronting the declining accuracy of their estimates affected by Reg FD (Agrawal, Chadha, and Chen, 2006), analysts may need to find more nonpublic, nonmaterial information to have a competitive edge over their peers. Consequently, analysts will supply more opinions and a greater variety of information to assist market participants during the post-Reg FD period. In other words, the analyst estimates and publications incorporating new information about firms and their future earnings become more abundant after the adoption of Reg FD. These considerations lead to our first and primary hypothesis.

Hypothesis 1 (H1): Analyst forecast frequency increases after the introduction of Reg FD.

The opposite prediction is equally possible if the primary source of the analysts' information advantages before Reg FD is their privileged access to nonpublic corporate information. A successful implementation of Reg FD would effectually reduce the set of privileged information that analysts obtain from corporations. With less information to issue, analyst forecast frequency would decrease after the implementation of Reg FD.

Our remaining hypotheses deal with how analyst characteristics affect the way Reg FD influences analyst report frequency. More specifically, we examine whether the impacts of Reg FD on analyst report frequency vary across brokerage size, analyst experience, and analyst coverage.

We first examine the effect of brokerage size. The literature reports that the size of the broker with which an analyst is affiliated is significantly related to the performance of the analyst

(Lim, 2001, and Jackson, 2005). Analysts from large brokerage firms may have greater access to corporate information and access to management. Hence, the apparent report frequency patterns of individual analysts could merely reflect the characteristics of the brokerage firms they work for rather than their individual characteristics. Before Reg FD, large brokerage firms had more favored access to firm management and material corporate information. Thus, these firms had an edge in terms of information acquisition over their smaller competitors. With the introduction of Reg FD, however, this edge would erode. Hence, those working in large brokerage firms may see their advantage in information access decline with Reg FD. Two opposing predictions are possible. First, with privileged information no longer available from firm management, analysts working for large brokerage firms will not issue reports as frequently as before when compared with analysts working for small brokerage firms. Quite the opposite could also happen. Regardless of their size, brokerage firms may increase analyst activities post Reg FD to maintain their competitive edge, as predicted by H1. However, large brokerage houses usually have greater resources to spend than smaller ones and are thus likely to engage in more active research activities to maintain their competitiveness. Thus, analysts in large brokerage firms would issue reports more aggressively relative to those in small ones after Reg FD. We believe that the latter prediction is more likely to occur post Reg FD. Thus, our second hypothesis is as follows:

Hypothesis 2 (H2): With Reg FD, analysts in large brokerage houses issue earnings forecasts more frequently than before compared with those in small brokerage houses.

Meanwhile, experienced analysts who covered firms for longer periods would have had an

advantage in gathering private corporate information in the past (Clemont and Tse, 2005). Experienced analysts who have a long-term relationship with corporations and their management would have better access to proprietary corporate data before Reg FD. However, after Reg FD, such advantages would vanish. Hence, our next hypothesis is the following.

Hypothesis 3 (H3): With Reg FD, experienced analysts issue earnings forecasts more frequently than before compared with those with a limited experience.

Analysts with a wider breath of coverage, as measured by the number of firms that an analyst covers in a given year, tend to participate in markets more actively and make larger commitments toward the capital market (Hong and Kubik, 2003). Moreover, wider stock coverage may indicate an analysts' superior ability to analyze stocks. Hence, after Reg FD, these analysts may have greater opportunities to utilize the improved information flows and information equality effectively. Consequently, they generate more estimates and research productions post Reg FD. This leads to our last hypothesis.

Hypothesis 4 (H4): With Reg FD, analysts with a wide breadth of coverage issue earnings forecasts more aggressively than before compared with those with a narrow breadth of coverage.

III. Data and Empirical Design

3.1 Data

We use quarterly data on analyst earnings estimates per share (EPS) for the period of 1997 to 2004 from the Institutional Brokers' Estimate System (I/B/E/S). To avoid possible distortions in test results due to outliers, we exclude estimates from analysts with less than eight (not necessarily consecutive) quarters of earnings per share (EPS) forecast history. We also drop companies that have less than five analysts covering them, given that we need to consider companies with a reasonable number of analysts following and market presence. The final data set includes 468,936 analysts' estimates over the period of eight years. We also obtain stock returns, industry SIC codes, and exchange codes from the Center for Research in Security Prices (CRSP) database.

3.2 Empirical Design

Analyst estimate frequency

We measure analyst estimate frequency as the number of EPS estimates issued by an analyst per firm for a given period. We compare the mean number of analyst EPS forecasts per firm before and after the introduction of Reg FD. Our primary test horizon is one year prior and subsequent to the initiation of Reg FD. This one-year window may be effective in capturing the immediate impact of Reg FD on analyst behavior. However, it may not be sufficiently long enough to capture any mid-term or long-term effects. For example, the market might take more than a year before it accommodates the new regulation change. Hence, we also apply extended test horizons of two, three, and four years before and after the introduction of Reg FD. For example, the two-year horizon covers two years before ("Pre") and two years after Reg FD ("Post").

We find numerous instances of entries and exits by analysts in the capital market during our sample period of eight years. If a sizable number of new analysts enter or existing analysts leave

the market during the sample period, the estimated means of analysts' estimate frequency over various time horizons may mislead. Therefore, we only include analysts who cover firms during both the pre- and post-Reg FD periods to capture the frequency changes from the same analysts who perform analysis during both periods. Our final samples include 26,254 cases, 50,182 cases, 71,843, cases, and 91,989 cases for the one-, two-, three-, and four-year horizons, respectively.

Univariate analysis

We conduct our analyses in two steps. First, we perform a *t*-test to examine whether a significant change occurs in the mean of forecast frequency surrounding the adoption of Reg FD for all four test horizons. We also conduct *t*-tests for the various subgroups of analysts based on analyst characteristics to investigate how analyst attributes affect the pattern of analyst report frequency around the event. We analyze the analyst characteristics of broker size, experience, and breadth of stock coverage. The literature cites all these variables as important analyst attributes. Lim (2001) and Jackson (2005) report that the size of the broker with which an analyst is affiliated is significantly related to analyst performance. Analyst characteristics, such as experience (Clemont and Tse, 2005) and breadth of coverage (Hong and Kubik, 2003), are also known to influence analysts' forecasting behaviors and market impacts. Our analysis also includes information on industries covered by individual analysts because different industries have varying patterns of information flows, which may significantly affect analysts' report frequency patterns.

To examine the effect of broker size, we categorize the analyst estimates according to the size of brokerage firms with which the analysts are affiliated. We find that 30 brokerage firms have maintained more than 30 analysts each year since the inception of their operation. We classify

brokerage firms that have more than 30 analysts as "Large" brokerage firms and the rest as "Small" brokerage firms. Then, we examine whether the analysts belonging to large brokerage firms display frequency patterns different from those of analysts belonging to small brokerage firms. We measure analyst experience by the number of quarters that an individual analyst has covered stocks as a sell-side analyst (Clemont and Tse, 2005). We regard analysts having more than 20 quarters of stock covering experiences as experienced analysts and include them in the "Long" experience group. We include the others in the "Short" experience group. Next, we measure the breadth of analysts' stock coverage based on the number of companies covered by an individual analyst in a given year (Hong and Kubik, 2003). We classify analysts who cover more than six firms into the "Wide" coverage group, whereas the rest are included in the "Narrow" coverage group. Finally, we divide analysts' estimates by the industries to which the covered firms belong. We use the first two digits of the SIC codes to make a broad industry breakdown.

Regression analysis

Even if we find a significant result from a univariate analysis, we should interpret such a result with caution. The reason is that the same result could also be a manifestation of interactions between Reg FD and some other factors that could affect analyst earnings forecast frequency. For example, a significant change in analyst report frequency after Reg FD could also result from a change in the breadth of coverage by analysts around the event. Hence, one needs to control for the effects of other variables that may affect analyst forecast frequency in a regression framework. We perform a cross-sectional regression analysis of the analyst estimate frequency on Reg FD with control variables. *RFD* is a dummy variable that takes the value of one if the observation is from

the post-Reg FD period and zero otherwise. The control variables include the abovementioned analyst characteristics of broker size, experience, breadth of coverage, and industries. We also include another control variable, which is the stock exchange in which the stock is listed. We use the log values for all three variables of broker size (*Broker Size*), analysts' experience (*Experience*), and coverage breadth (*Coverage*). We include both industries and exchanges as dummy variables. If a stock belongs to the New York Stock Exchange, the dummy variable, *Exchange*, takes the value of one. It takes zero otherwise. If analyst estimate frequency increases after Reg FD, we will have a positive coefficient of *Reg FD*. In addition, we conduct a separate regression analysis that includes interaction terms between *Reg FD* and the three variables of analyst attributes, including broker size, experience, and coverage, to augment our univariate analysis. The regression will help us understand how analyst attributes influence the impact of Reg FD on analyst estimate frequency. We include fixed effects on brokers in all of the specifications to remove the possibility that the apparent pattern of analysts' estimate frequency is driven by broker characteristics.

IV. Empirical Results

4.1 Univariate Analysis

Earnings estimate frequency: overall evidence

Table 1 reports the number of EPS estimates by analysts and related analyst characteristics from 1997 to 2004, four years before and after Reg FD. The period involves 468,936 estimates. The average annual number of estimates increases significantly from 47,913 during the pre-Reg FD period to 69,322 during the post-Reg FD period, which is equivalent to an increase of 44.7%. We also observe that the number of earnings estimates almost doubles over eight years, from 43,133 in

1997 to 85,532 in 2004 [Column (a) of Table 1]. The initiation of Reg FD is responsible for this significant growth in the number of earnings estimates. However, the growth of the securities industry and the resultant increases in the number of analysts, the number of brokers, and/or the number of covered companies over the same period may have also resulted in this growth. Indeed, we observe a pattern of steady annual growth in each of the three variables, namely the numbers of analysts, brokers, and covered companies [Columns (b) thru (d)]. Hence, to examine the net effect of Reg FD on analyst report frequency free from any trend in the securities industry, we adjust the number of analyst estimates by dividing by the number of analysts [(a)/(b)], number of brokers [(a)/(c)], and number of covered firms [(a)/(d)]. The adjusted numbers of estimates reported in the last three columns of Table 1 show an unambiguous pattern of growth in analyst report frequency post Reg FD. The average annual number of estimates per analyst increases by 27% from the pre- to post-Reg FD periods (21.5 to 27.3). During the same period, the average number of estimates per broker and the number of estimates per covered firm also grow by 26% and 28.8%, respectively.

Figure 1 shows the number of analyst estimates per firm over the eight-year period from 1997 to 2004. The figure reveals a clear structural break in analyst report frequency around the implementation of Reg FD. Instead of gradual changes, the number of estimates jumps sharply right after the introduction of Reg FD. The number remains at an elevated level before picking up again in 2004. The evidence presented in Table 1 and Figure 1 clearly demonstrates that Reg FD increased the frequency with which analysts release EPS estimates.

Table 2 presents the number of analyst EPS estimates per covered firm. The table reports the results for both the entire set of estimates from all analysts and the subset of estimates from analysts who cover firms during both pre- and post-Reg FD periods. Both sets of samples show a

clear sign of an increase in the number of estimates per firm after Reg FD. When we compare the one-year windows before and after Reg FD, the mean of analyst estimates per firm rises by 0.58, from 3.38 to 3.96. The subset of analysts who cover firms during both the pre- and post-Reg FD periods show an even larger increase of 0.62, from 4.07 to 3.45. The frequency increases in these two sets of data are both highly significant at the 1% level of significance. The significant increase in analyst estimate frequency does not appear to be a short-term phenomenon. Analyst estimate frequency continues to display the same pattern of significant increases for the two-, three-, and four-year horizons before and after Reg FD. The subset of analysts who cover both pre- and post-event periods again shows larger increases, which are also highly significant. Table 2 demonstrates that Reg FD makes a significant change in analysts' information production behavior, making them issue more estimates. This result is consistent with our primary hypothesis, H1.

Broker size

Table 3 reports the results of the subgroup analysis based on broker size. The analysis is based on analysts who cover firms during both the pre- and post-Reg FD periods only. When the one-year horizon is used, analysts who work for "Large" brokerage firms issue on average 3.55 estimates before Reg FD. The number increases to 4.20 afterwards. The difference of 0.65 is significant at the 1% level. We also observe such a significant increase in estimate frequency in each of the remaining multi-year test horizons, although the magnitude of increases monotonically declines as the horizon lengthens. Nevertheless, the changes are statistically significant in all cases.

As expected, the analyst forecast frequency from small brokerage firms is smaller than that from large brokerage firms. Nevertheless, like the case of large brokerage firms, the average

number of estimates from analysts in small brokerage firms increases significantly after Reg FD in all four time horizons. All of the changes are significant at the 1% level. However, unlike the case of large brokerage firms, the growth of frequency around the introduction of Reg FD does not monotonically decrease as the test horizon widens. The pre-post difference in estimate frequency for smaller brokerage firms for the one-year horizon (0.58) does not differ materially from that for the four-year horizon (0.52).

Table 3 also shows differences in analyst estimate frequency between large and small brokerage firms during the pre- and post-Reg FD periods. The figures are reported in the last two columns of the table. Given that analysts from large brokerage firms generally issue more forecasts than those from small brokerage firms, all differences are positive and significant. We initially predicted that after Reg FD, analysts in large brokerage firms would issue estimates more aggressively than analysts in small brokerage firms (H2). A careful look at the numbers shown in Table 3 reveals the opposite. Instead of widening the gap between large and small brokerage firms, Reg FD helps narrow it. Except for the one-year horizon, the mean difference in analyst forecast frequency between large and small broker groups is always smaller during the post-Reg FD period regardless of the test horizon. For instance, over a three-year horizon, large brokerage firms issue 0.45 more estimates per analyst than small brokerage firms before Reg FD. With Reg FD, large brokerage firms issue only 0.21 more estimates than their smaller competitors.

To sum up the results reported in Table 3, analyst EPS estimate frequency increases after Reg FD for both large and small brokerage firms. However, the marginal increase is larger with small brokerage firms. These results illustrate that analysts in small brokerage firms are catching up with those in large brokerage firms after Reg FD. This condition assists these analysts in reducing

the lingering disadvantage in information access attributed to broker size. The evidence supports the argument that Reg FD improves information flows and helps reduce information disparities among investors.

Experience

Table 4 presents the results from the subgroup analysis based on analyst experience. We form the subgroups according to the length of analysts' experiences measured in quarters. Two patterns are notable in the numbers reported in Table 4. First, analysts with a long experience do not necessarily issue more estimates before Reg FD. Actually, for one year before and after Reg FD, analysts with a short experience issue more estimates than those with a long experience. Second, Reg FD-induced increase in earnings estimate frequency is greater for analysts with a long experience than for those with a shorter experience. For example, in the case of a one-year horizon, the number of estimates issued by analysts with a long experience increases significantly by 0.66 (from 3.41 to 4.07), compared with an increase of 0.41 (from 3.65 to 4.07) for those issued by analysts with a short experience. We also see a similar pattern in other test horizons, that is, analysts with a longer experience issue estimates more aggressively than those with a short experience post Reg FD. This finding suggests that the advantage from long experience in terms of analytical skills and information accessibility does not weaken over times in the post-Reg FD period. Instead, the opposite happens, which is consistent with our prediction (H3).

Breadth of coverage

Next, we conduct a subgroup analysis based on analysts' breadth of stock coverage. The

breadth of coverage, measured by the number of companies covered by an analyst in a given year, illustrates how actively analysts work in the industry and their levels of commitment and involvement with the capital market. Table 5 reports the results. As expected, analysts with a wider breadth of coverage publish more estimates than those with a narrower breadth of coverage. This is always the case regardless of test period (i.e., pre vs. post) and length of horizon. This finding is interesting because no substitution effect apparently exists between width (i.e., the breadth of coverage) and depth (i.e., the frequency of earnings forecasts per stock). Maybe the analysts who cover more stocks are also those who have more experience and skills. Hence, they supply more information to the market.

Table 5 shows an increase in EPS forecast frequency around Reg FD in both groups of analysts, regardless of the lengths of horizons. All increases are highly significant at the 1% level. In the case of the one-year horizon, analysts who have wide coverage issue more estimates per firm after Reg FD by 0.55 (3.47 pre vs. 4.02 post Reg FD). Similarly, the number of estimates from analysts with narrow coverage grows from 3.06 to 3.70 around Reg FD. These increases are all statistically significant at the 1% level. The difference in the changes in the number of estimates around Reg FD between analysts in the "Wide" and "Narrow" coverage groups declines slightly after Reg FD for all horizons, except for the four-year horizon. However, the magnitudes of the declines are almost negligible compared with those of the changes we witnessed previously for broker size and experience, thus making it difficult to draw a meaningful conclusion. We revisit this issue later in the cross-sectional regression part.

Industry

Table 6 reports the changes in earnings forecast frequency across different industries. We divide industries according to the first two digits of SIC codes to identify broad industry classifications. The three major industries in stock markets, namely the manufacturing industry; the finance, insurance, and real estate industry; and the services industry, jointly account for approximately 70% of total analyst estimates over the sample period. Forecast frequency increases post Reg FD in almost all industries. In the majority of cases, the increases are highly significant at the 1% level. The retail industry posts the largest increase, followed by the manufacturing industry. While the magnitude of the increase in the manufacturing industry declines over the extended horizons, the increase in frequency in the retail sector remains strong over time. The only exception is the construction industry, in which forecast frequency actually declines after Reg FD. However, the decreases are statistically insignificant in three out of four horizons. Overall, the evidence presented in Table 6 renders strong support to the conjecture that the increase in analyst forecast frequency post Reg FD is likely a pervasive phenomenon commonly observed across different industries.

4.2 Regression Analysis

In this section, we perform a regression analysis to detect any changes in the pattern of analyst's earnings forecast frequency surrounding the introduction of Reg FD. We run a pair of regressions for each horizon, one without and the other with dummy interaction terms. The dependent variable is the number of earnings forecast per firm issued by each analyst during the pre- or post-Reg FD period. The key independent variable is *RFD*, a dummy variable that takes the value of one if the observation belongs to the post-Reg FD period, and zero otherwise. For our

primary hypothesis (H1) to hold, the variable should yield a positive and significant coefficient. The regression model also includes broker size, analyst experience, the breadth of coverage, the listing exchange dummy, and the industry dummies as control variables. We run the regression for each of the four different test horizons.

Table 7 shows the coefficients and their p-values from the regression without dummy interaction terms. As mentioned previously, our variable of interest is *RFD*. The estimated coefficients of the variable are in the range of 0.327 to 0.534. The coefficients are highly significant in all four horizons. For example, when we confine the test windows to within one year before and after Reg FD, the coefficient of *RFD* is 0.534, which implies that analyst forecast frequency increases by an average of 0.534 after Reg FD. Given that the intercept is 2.440, the marginal increase of 0.534 is equivalent to a more than 21% increase from the pre-Reg FD level. The coefficient estimates of *RFD* from the multi-year horizons are slightly smaller than those from the one-year horizon. Nevertheless, their magnitudes remain sizable. Overall, the regression proves that, even after controlling for analyst characteristics, analyst forecast frequency increases significantly after Reg FD (H1).

Table 7 also shows that the control variables produce results that are similar to those reported from the univariate analysis. Broker size and the breadth of coverage are positively related to forecast frequency, whereas analyst experience is negatively related to it. The variable *Exchange* is also positively associated with forecast frequency, which indicates that analysts who cover NYSE firms issue more forecasts than those who do not.

We now turn to the results of the regression with dummy interaction terms (Table 8). *RFD* does not produce a significant coefficient, except for that in the two-year horizon. This is

understandable if the dummy interaction terms capture a significant portion of the variation in analyst forecast frequency. The signs of the coefficients of the dummy interaction terms are generally consistent with the results from the univariate analysis. First, *RFD×Broker_Size* is negative and significant in all horizons, except for the one-year horizon. The result shows that, contrary to H2, analysts in smaller brokerage firms increase their forecast frequency more than those in larger brokerage firms. The implication is that Reg FD helps reduce the advantage coming from brokerage size, thus leveling the playing field for smaller brokerage firms. Next, *RFD×Experience* has a positive coefficient in all four horizons, with two of the coefficient estimates being highly significant. The result indicates that analysts with more experience issue forecasts more actively than those with less experience, a result that is consistent with H3. Finally, the coefficient estimates of *RFD×Coverage* are positive and significant in three out of the four horizons. Although the one-year horizon shows a negative coefficient, the result is not statistically significant. The positive coefficient (i.e., a greater increase in forecast frequency by analysts with wide coverage) is somewhat inconsistent with the result shown in Table 5. However, the same result offers support for the prediction that analysts with wide coverage increase their forecast frequency more aggressively post Reg FD than those with narrow coverage (H4).

V. Conclusion

Using analyst earnings estimate data in U.S. stock markets, we examine whether the introduction of Reg FD changes the number of EPS estimates released by analysts. Before the adoption of the regulation, the SEC allowed corporate management to release sensitive corporate information to analysts prior to its public release. This practice gave an important information edge

to analysts. Reg FD bans the practice, thus removing one important information advantage that analysts have and fundamentally altering the way by which analysts produce and release information to their customers and the market. We investigate how analysts react to this change. We particularly focus on how frequently they issue EPS estimates.

We find that the number of analyst's estimates increases significantly after Reg FD. The finding is consistent with our prediction that, with their preferential communication channel with corporate management blocked by Reg FD, analysts intensify their information collection and research activities. We also have some interesting findings from our subgroup analysis using analyst characteristics. Although EPS forecast frequency increases post Reg FD across all groups of analysts, a certain group reacts more aggressively to the rule change. First, analysts in small brokerage firms are more aggressive in issuing estimates relative to those in large brokerage firms. Second, experienced analysts generate forecasts more aggressively than less experienced ones. Third, we find evidence, albeit weak, that analysts with wide coverage issue estimates more aggressively than those with narrow coverage.

Although we do not present any direct evidence of improved efficiency subsequent to the adoption of Reg FD, the strong and unambiguous proof of increased analyst forecast frequency under Reg FD signals the expansion of the volume of value-relevant information flows by analysts. In this regard, our overall evidence is consistent with the empirical finding reported by Bushee et al. (2004) and Heflin et al. (2003). Both studies report that Reg FD improves information efficiency.

The SEC introduced Reg FD to sever the selective communication channel between firm management and investment professionals, thus putting all investors, small or large and naïve or sophisticated, on an equal footing. In the process, the regulation fundamentally altered information

flows in the market. Our evidence indicates that, with their privileged access to material corporate information blocked, analysts intensify efforts in their information search and production activities. Reg FD, which was intended to restrict the information base of security analysts, does not constrict analysts' information production activities. Instead, the regulation helps intensify them.

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Table 1. Annual Frequencies of Analysts' Earnings Estimates

This table shows the annual times series data of the number of analysts' earnings estimate forecasts, the number of analysts who release forecasts, the number of brokers, the number of firms covered by earnings forecasts, as well as the ratios of the number of earnings estimates to the number of analysts (a/b), to the number of brokers, and to the number of firms covered. The sample period of eight years from 1997 to 2004 was chosen to capture the four years (1997 to 2000) before and the four years (2001 to 2004) after the introduction of Reg FD in October 2000.

	Year	(a) Number of Estimates	(b) Number of Analysts	(c) Number of Brokers	(d) No. of Firms Covered	(a)/(b)	(a)/(c)	(a)/(d)
Pre-Reg FD	1997	43,133	1,994	167	1,993	21.63	258.28	21.64
	1998	48,641	2,183	184	2,050	22.28	264.35	23.73
	1999	50,712	2,334	184	2,131	21.73	275.61	23.80
	2000	49,164	2,416	177	2,184	20.35	277.76	22.51
Post-Reg FD	2001	60,662	2,427	170	2,176	24.99	356.84	27.88
	2002	64,300	2,516	185	2,266	25.56	347.57	28.38
	2003	68,792	2,533	223	2,370	27.16	308.48	29.03
	2004	83,532	2,650	243	2,550	31.52	343.75	32.76
Average Per Year	Entire Period (1997–2004)	58,617	2,382	192	2,215	24.40	304.08	26.21
	Pre-Reg FD	47,913	2,232	178	2,090	21.50	269.00	22.92
	Post-Reg FD	69,322	2,532	205	2,341	27.31	339.16	29.51
Change (%)	Pre-to-Post	44.68	13.43	15.31	12.01	27.03	26.08	28.75

Table 2. Analyst EPS Forecast Frequency per Firm

This table shows the mean number of analysts' earnings estimate forecasts per firm in each year (Panel A) and over different investigation horizons (Panel B) surrounding the adoption of Reg FD. The mean values are shown separately for the entire sample and as a subsample that includes only the cases in which analysts publish earnings estimates during both the pre- and post-event periods.

Panel A.

	Year	No. of Analysts' Annual Estimates per Firm (All Analysts)	No. of Analysts' Annual Estimates per Firm (Subset of Analysts Who Cover Firms During Both Pre- and Post-Reg FD Periods)
Pre-Reg FD	1997	3.41	3.40
	1998	3.65	3.65
	1999	3.60	3.62
	2000	3.38	3.45
Post-Reg FD	2001	3.96	4.07
	2002	3.82	3.86
	2003	3.75	3.79
	2004	4.09	4.14

Panel B.

Windows	Mean				Mean (subset)			
	Before	After	Change	p-value from t-test	Before	After	Change	p-value from t-test
Pre & Post 1 Year Each (2000 vs. 2001)	3.38	3.96	0.58	<0.0001	3.45	4.07	0.62	<0.0001
Pre & Post 2 Years Each (1999–2000 vs. 2001–2002)	3.49	3.88	0.39	<0.0001	3.53	3.96	0.44	<0.0001
Pre & Post 3 Years Each (1998–2000 vs. 2001–2003)	3.54	3.83	0.29	<0.0001	3.56	3.91	0.35	<0.0001
Pre & Post 4 Years Each (1997–2000 vs. 2001–2004)	3.51	3.91	0.40	<0.0001	3.53	3.96	0.43	<0.0001

Table 3. Broker Size and Analyst EPS Forecast Frequency

This table shows the cross-sectional mean values of the number of analysts' earnings forecasts per firm over different investigation horizons for analyst subgroups based on broker size. The changes in the mean forecast frequency from the pre- to post-event periods and the mean difference in forecast frequency between large and small broker groups are also shown. The p-values from t-tests are presented in the last column. The large broker group includes analysts from brokerage houses with more than 30 analysts. The small group consists of the rest. The analysis includes only the analysts who report earnings during both the pre- and post-event periods.

		Broker Size			
Length of Pre & Post Windows	Event Window	Large	Small	Diff. (Large – Small)	p-value
	Pre	3.55	3.07	0.48	<.001
One-Year Windows	Post	4.20	3.65	0.55	<.001
(2000 vs. 2001)	Change (Post – Pre)	0.65	0.58		
	p-value	<0.001	<0.001		
	Pre	3.66	3.14	0.52	<.001
Two-Year Windows	Post	4.03	3.69	0.34	<.001
(1999–2000 vs. 2001–2002)	Change (Post – Pre)	0.37	0.55		
	p-value	<0.001	<0.001		
	Pre	3.68	3.23	0.45	<.001
Three-Year Windows	Post	3.97	3.66	0.21	<.001
(1998–2000 vs. 2001–2003)	Change (Post – Pre)	0.29	0.43		
	p-value	<0.001	<0.001		
	Pre	3.64	3.21	0.43	<.001
Four-Year Windows	Post	4.02	3.73	0.30	<.001
(1997–2000 vs. 2001–2004)	Change (Post – Pre)	0.38	0.52		
	p-value	<0.001	<0.001		

Table 4. Analyst Experience and Analyst EPS Forecast Frequency

This table shows the cross-sectional mean values of the number of analysts' earnings forecasts per firm over different investigation horizons for subgroups based on analyst experience. The changes in the mean forecast frequency from the pre- to post-event periods and the mean difference in forecast frequency between long- and short-experience groups are also shown. The p-values from t-tests are presented in the last column. The long experience group includes analysts with longer than 20 quarters of experience. The small group contains the rest. The analysis includes only the analysts who report earnings during both the pre- and post-event periods.

		Experience			
Length of Pre & Post Windows	Event Window	Long	Short	Diff. (Long - Short)	p-value
One-Year Windows (2000 vs. 2001)	Pre	3.41	3.65	-0.24	<0.001
	Post	4.07	4.07	0.00	0.952
	Change (Post – Pre)	0.66	0.41		
	p-value	<0.001	<0.001		
Two-Year Windows (1999–2000 vs. 2001–2002)	Pre	3.53	3.52	0.00	0.861
	Post	3.99	3.87	0.12	0.004
	Change (Post – Pre)	0.45	0.34		
	p-value	<0.001	<0.001		
Three-Year Windows (1998–2000 vs. 2001–2003)	Pre	3.57	3.51	0.06	0.064
	Post	3.93	3.79	0.14	<0.001
	Change (Post – Pre)	0.36	0.27		
	p-value	<0.001	<0.001		
Four-Year Windows (1997–2000 vs. 2001–2004)	Pre	3.54	3.48	0.07	0.029
	Post	3.99	3.72	0.27	<0.001
	Change (Post – Pre)	0.45	0.25		
	p-value	<0.001	<0.001		

Table 5. Breadth of Coverage and Analyst EPS Forecast Frequency

This table shows the cross-sectional mean values of the number of analysts' earnings forecasts per firm over different investigation horizons for subgroups based on analysts' breadth of stock coverage. The changes in the mean forecast frequency from the pre- to post-event periods and the mean difference in forecast frequency between long- and short-experience groups are also shown. The p-values from t-tests are presented in the last column. The wide coverage group includes analysts who cover more than six firms. The narrow coverage group includes the rest. The analysis includes only the analysts who report earnings during both the pre- and post-event periods.

		Breath of Coverage			
Length of Pre & Post Windows	Event Window	Wide	Narrow	Diff. (Wide - Narrow)	p-value
One-Year Windows (2000 vs. 2001)	Pre	3.52	3.15	0.37	<0.001
	Post	4.13	3.79	0.34	<0.001
	Change (Post – Pre)	0.61	0.64		
	p-value	<0.001	<0.001		
Two-Year Windows (1999–2000 vs. 2001–2002)	Pre	3.61	3.20	0.40	<0.001
	Post	4.02	3.69	0.33	<0.001
	Change (Post – Pre)	0.41	0.48		
	p-value	<0.001	<0.001		
Three-Year Windows (1998–2000 vs. 2001–2003)	Pre	3.64	3.24	0.40	<0.001
	Post	3.97	3.60	0.37	<0.001
	Change (Post – Pre)	0.33	0.36		
	p-value	<0.001	<0.001		
Four-Year Windows (1997–2000 vs. 2001–2004)	Pre	3.61	3.21	0.40	<0.001
	Post	4.03	3.59	0.43	<0.001
	Change (Post – Pre)	0.42	0.38		
	p-value	<0.001	<0.001		

Table 6. Analyst Forecast Frequency by Industry

This table shows the cross-sectional mean values of the number of analysts' earnings forecasts per firm over different investigation horizons for subgroups based on industry. The changes in the mean forecast frequency from the pre- to post-event periods are also shown. The first two digits of the SIC codes are used for industry classification. The analysis includes only the analysts who report earnings during both the pre- and post-event periods.

			Industries							
	YEAR	Event Window	Mining	Const.	Mfng.	Trans. & Util.	Whole.	Retail	Fin.	Services
	% Distribution		7.0%	1.2%	38.2%	9.9%	2.7%	8.9%	15.1%	0.6%
Mean (subset)	One-Year Windows	Pre	4.44	3.87	3.46	3.38	3.09	3.86	3.18	2.95
	(2000 vs. 2001)	Post	4.42	3.42	4.10	3.83	3.35	4.92	3.52	3.49
		Change	-0.02	-0.46*	0.64***	0.45***	0.26**	1.06***	0.34***	0.54***
	Two-Year Windows	Pre	4.55	3.83	3.56	3.50	3.13	3.89	3.16	3.01
	(1999–2000 vs. 2001–2002)	Post	4.77	3.55	3.94	3.84	3.20	4.82	3.55	3.39
		Change	0.22**	-0.27	0.38***	0.34***	0.07	0.92***	0.39***	0.39***
	Three-Year Windows	Pre	4.45	3.78	3.65	3.48	3.11	3.89	3.13	3.04
	(1998–2000 vs. 2001–2003)	Post	5.05	3.59	3.84	3.77	3.20	4.79	3.60	3.33
		Change	0.59***	-0.19	0.19***	0.28***	0.09	0.90***	0.47***	0.29***
	Four-Year Windows	Pre	4.31	3.78	3.63	3.43	3.09	3.83	3.10	3.05
	(1997–2000 vs. 2001–2004)	Post	5.28	3.62	3.88	3.78	3.32	4.91	3.67	3.33
		Change	0.97***	-0.17	0.25***	0.34***	0.24***	1.08***	0.57***	0.28***

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, based on t-tests.

Table 7. Ordinary Least Squares Regression of Analyst Forecast Frequency

This table shows the estimated coefficients and their p-values (reported in parentheses) from a cross-sectional regression of the number of analysts' earnings forecasts per firm over different investigation horizons around the adoption of Reg FD. The independent variables include: *RFD*, a dummy variable that takes the value of one if the observation is from the post-Reg FD period and zero otherwise; *Broker_Size*, the log number of the analysts affiliated with the broker; *Experience*, the log number of stock quarters that an individual analyst has covered the stock; *Coverage*, the log number of stocks an individual analyst covers during the investigation window; *Exchange*, a dummy variable that takes the value of one if the stock is listed on the New York Exchange and zero otherwise; and a group of industry dummy variables. The first two digits of the SIC codes are used for industry classification. The analysis includes only the analysts who report earnings during both the pre- and post-event periods. Broker fixed effects are included in all the specifications.

	One-Year Windows	Two-Year Windows	Three-Year Windows	Four-Year Windows
	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
Intercept	2.440 (0.001)	1.295 (0.002)	1.890 (<.001)	2.132 (<.001)
RFD	0.534 (<.001)	0.396 (<.001)	0.327 (<.001)	0.402 (<.001)
Broker_Size	-0.013 (0.848)	0.089 (0.032)	0.111 (<.001)	0.133 (<.001)
Experience	-0.444 (<.001)	-0.324 (<.001)	-0.267 (<.001)	-0.202 (<.001)
Coverage	0.562 (<.001)	0.553 (<.001)	0.516 (<.001)	0.493 (<.001)
Exchange	0.162 (<.001)	0.261 (<.001)	0.285 (<.001)	0.289 (<.001)
Mining	1.741 (0.014)	2.383 (<.001)	1.718 (<.001)	1.243 (<.001)
Construction	1.136 (0.113)	1.526 (<.001)	0.733 (0.010)	0.168 (0.471)
Manufacturing	1.402 (0.046)	1.751 (<.001)	0.954 (<.001)	0.401 (0.069)
Trans. & Util.	1.137 (0.107)	1.600 (<.001)	0.771 (0.005)	0.201 (0.365)
Wholesale	0.872 (0.217)	1.176 (<.001)	0.381 (0.165)	-0.123 (0.583)
Retail Trade	2.021 (0.004)	2.303 (<.001)	1.517 (<.001)	1.016 (<.001)
Fin., Ins., & Real Est.	0.946 (0.179)	1.292 (0.001)	0.496 (0.068)	-0.024 (0.912)
Services	1.003 (0.154)	1.377 (<.001)	0.574 (0.035)	-0.001 (0.997)
R Square	0.069	0.072	0.071	0.075

Table 8. Ordinary Least Squares Regression of Analyst Forecast Frequency with Interaction Variables

This table shows the estimated coefficients and their p-values x from a cross-sectional regression of the number of analysts' earnings forecasts per firm over different investigation horizons around the adoption of Reg FD. The independent variables include: *RFD*, a dummy variable that takes the value of one if the observation is from the post-Reg FD period and zero otherwise; *Broker_Size*, the log number of the analysts affiliated with the broker; *Experience*, the log number of stock quarters that an individual analyst has covered the stock; *Coverage*, the log number of stocks an individual analyst covers during the investigation window; *Exchange*, a dummy variable that takes the value of one if the stock is listed on the New York Exchange and zero otherwise; and a group of industry dummy variables. The first two digits of the SIC codes are used for industry classification. A group of interaction variables between *RFD* and broker size (*RFD×Broker Size*), analyst experience (*RFD×Experience*), and the breadth of coverage (*RFD×Coverage*) are also included in the specification. The analysis includes only the analysts who report earnings during both the pre- and post-event periods. Broker fixed effects are included in all the specifications

	One-Year Windows	Two-Year Windows	Three-Year Windows	Four-Year Windows
	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
Intercept	2.651 (<.000)	1.367 (0.002)	2.045 (<.001)	2.410 (<.001)
RFD	0.253 (0.181)	0.355 (0.014)	0.150 (0.239)	-0.009 (0.942)
Broker_Size	-0.010 (0.884)	0.120 (<.004)	0.136 (<.001)	0.146 (<.001)
Experience	-0.514 (<.001)	-0.352 (<.001)	-0.296 (<.001)	-0.259 (<.001)
Coverage	0.577 (<.001)	0.514 (<.001)	0.449 (<.001)	0.431 (<.001)
Exchange	0.161 (<.001)	0.261 (<.001)	0.286 (<.001)	0.289 (<.001)
RFD×Broker Size	-0.040 (0.127)	-0.087 (0.001)	-0.084 (<.001)	-0.066 (<.001)
RFD×Experience	0.139 (0.007)	0.054 (0.169)	0.051 (0.135)	0.103 (0.001)
RFD×Coverage	-0.033 (0.489)	0.076 (0.033)	0.136 (<.001)	0.125 (<.001)
Industry Dummies	YES	YES	YES	YES
R Square	0.068	0.071	0.071	0.075

Figure 1. Number of Analyst Earnings Estimates per Firm