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Analyst Report Readability and Stock Returns

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Abstract: This study investigates the market's response to analyst report readability. We posit that readable reports decrease uncertainty of earnings expectations and by extension increase stock prices. Our results show that the equity market reacts more positively to readable reports and that this positive reaction is attributable to a reduction in uncertainty of future performance. Moreover, we find that the effect of readability on stock prices is significantly positive only for firms with greater R&D spending, higher bid-ask spreads, a greater proportion of uninformed investors, and more experienced analysts, which suggests that readability matters only when information asymmetry in the equity market is high.

Keywords: readability, analyst reports, stock returns

1. INTRODUCTION

Analyst forecast reports can provide investors with valuable insight into a firm's future profitability. For example, Asquith et al. (2005) suggest that analyst discussions of the research logic and justifications behind their forecasts can help investors better understand firm value. Readability is a linguistic feature that improves the effectiveness of written communications. In one study, Lehavy et al. (2011) provide empirical evidence that less readable 10-K filings are associated with greater overall uncertainty in analyst earnings forecasts. Similarly, De Franco et al. (2014) suggest that greater readability allows investors to obtain more precise information from a report. Although analyst reports contain value-relevant information and are associated with significant market reactions (Frankel et al., 2006), it is unclear whether investors price the readability of analyst reports favorably. To answer this question, we examine the market's reaction to the readability of analyst reports.

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We argue that the stock market reacts *positively* to analyst reports with better readability. Our hypothesis is based on the idea that a readable report decreases uncertainty of future earnings, as readers find a well-written report easier to understand (Lehavy et al., 2011). This lower uncertainty decreases the information-processing costs of investors and allows them to apply analyst forecast revisions to their trading decisions with greater certainty, which decreases the estimation risk and discount rate when valuing a firm (Bloomfield, 2002; Lehavy et al., 2011). Moreover, the reduction in uncertainty about a firm's future earnings also helps to decrease the information asymmetry between uninformed and informed investors, which decreases the discount rate. Therefore, from the perspective of firm valuation, higher readability lowers uncertainty and the discount rate, which results in higher stock prices. In addition to its effect on the discount rate, whether readability affects firm valuation through changes in earnings expectations is an open question. This is because readability may be either orthogonal to or positively associated with earnings news in analyst reports (e.g., Li, 2008). Combining the possible effects of readability on the discount rate and earnings expectations, we expect a *positive* relationship between readability and stock price reactions.

This study focuses on analyst reports on firms in the high-tech industries. This allows us to obtain a sample of firms with consistent industry backgrounds and a strong need for analyst research (e.g., Barth et al., 2002; Barron et al., 2002). We follow Li (2008) and others and apply the Fog index to measure report readability.[1] Using an event study design, we examine the influence of report readability on firm value by analyzing stock returns at the time analyst reports are issued. This short event window helps mitigate endogeneity concerns related to a potential correlated omitted variable. In addition to studying the association between readability and stock prices, we explore whether this association is due to a reduction in uncertainty about a firm's future earnings. Finally, we examine the conditions in which readability may have a stronger effect on stock prices.

The results of our study show that stock returns at the time of analyst report issuance are significantly more positive for firms with readable analyst reports. We find that an increase of one standard deviation in readability increases a 3-day abnormal return by about 0.58%. We also find that uncertainty of future performance, which is measured by implied volatility, is inversely related to report readability. We also investigate whether our results are caused by increased expectations of future earnings. However, we find no evidence supporting an association between readability and changes in earnings expectations. In summary, our results suggest that the market reacts positively to more-readable reports, as such reports decrease investors' uncertainty about earnings expectations.

We provide further insights into our main findings by conducting cross-sectional tests involving scenarios in which report readability is more likely to influence stock prices. We expect that readable reports have a greater role in decreasing uncertainty in situations where firms are difficult to value, have high information asymmetry, have less-sophisticated investors, or are covered by more influential analysts. We conduct empirical tests of these predictions using four measures: 1) research and development (R&D) expenses (Aboody and Lev, 2000), 2) the bid-ask spread (Brennan and Subrahmanyam, 1996), 3) investor sophistication (Mikhail et al., 2007), and 4) the

1 Our results are robust to the use of either the Flesch or Flesch-Kincaid measures of readability.

level of analyst experience (Mikhail et al., 1997). Our findings show that the market reacts positively to readable reports only when firms spend more on R&D, the bid-ask spread is larger, investors are less sophisticated, and the analyst issuing the report is more experienced. These findings support our conclusion that more-readable reports reduce investor uncertainty, which translates into higher stock returns. In summary, our findings suggest an important insight that readability matters only when the market has high information asymmetry.

We conduct several additional analyses to ensure the robustness of our findings. First, to ensure that our findings are not driven by potential information omitted from analyst reports, we re-run our tests by including more information-related variables. Moreover, we match the sample reports in pairs by firm with the closest level of analyst forecast revisions. In both tests, readability is positively related to stock returns. Second, to examine whether earnings announcements play a role in our findings, we add control variables for concurrent earnings announcements. Our results remain robust to the inclusion of these control variables.

This study makes several important contributions to the literature. First, it contributes to the accounting and finance literature related to report readability. Studies have found that readability provides value-relevant information. For example, Lehavy et al. (2011) find that less-readable 10-Ks are associated with lower analyst forecast accuracy and greater dispersion. In another study, De Franco et al. (2014) find that analysts with greater ability are more likely to issue more-readable reports. These reports represent more precise information and are consequently associated with larger trading volumes. However, although studies have examined the effect of report readability on analyst forecast dispersion and trading volume, they have not examined whether investors price the readability of analyst reports using signed returns. Thus, our finding that the market reacts positively to analyst report readability extends the literature by suggesting the value premium of readability.

Second, our study contributes to the literature related to analyst reports, which shows that these reports are important outputs from financial analysts and are widely read by different types of investors (Hirst et al., 1995; Frankel et al., 2006; Mikhail et al., 2007; Kadous et al., 2009). In particular, Asquith et al. (2005) provide empirical evidence that analyst reports are value relevant, as they help investors understand the value of a firm.[2] Readability reflects the writing and is an inseparable part of analyst reports. Therefore, by providing empirical evidence of the market reaction associated with readability through decreasing earnings uncertainty, our findings extend the literature related to whether and how analyst reports provide value relevant information to investors.

Although we conduct a series of robustness tests, our findings should be interpreted with caution. First, we may not fully control for the forecast news in the tests. Our main findings are robust after matching reports with the closest forecast revision and controlling the additional proxy for report information (i.e., target price and recommendation revisions). However, to the extent that readability may be correlated with any news in the analyst report, it adds noise to our tests. Second, our tests focus on a sample of high-tech firms for which analyst research is most valuable.

2 De Franco and Hope (2011) find that the trading volume and unsigned market reaction are associated with the issuance of analyst notes, a form of analyst disclosure used to communicate day-to-day timely information.

Our sample choice may limit the economic and statistical generalizability of our study.[3]

The remainder of this study is organized as follows. Section 2 reviews the relevant literature and develops the empirical expectations. Section 3 describes the data and section 4 explains the research plan and methodology. Section 5 discusses the empirical findings. We perform additional tests in sections 6, 7 and 8. Section 9 concludes the study.

2. LITERATURE REVIEW AND RESEARCH QUESTION

(i) Prior Literature Related to Analyst Reports and Textual Analysis

The accounting and finance literature related to financial analysts examines the role analysts play in improving capital market efficiency and decreasing information asymmetry (e.g., Zhang, 2008). For example, Francis et al. (2002) find that although analyst reports are less informative, the aggregate market reaction to analyst reports is larger than that to earnings announcements. In another study, Frankel et al. (2006) show that analyst reports are more informative when potential brokerage profits are higher. Researchers have also examined the specific components of analyst reports. Asquith et al. (2005) find that target prices and their justifications in analyst reports are significant reiterative elements. Finally, De Franco and Hope (2011) find a significant relationship between analyst notes, another form of analysts' written disclosure, and the absolute value of abnormal returns for a firm. Together, these studies suggest that analyst reports and notes provide new information to investors.

A more recent stream of research examines the effect of document tone and readability on investor behavior. For example, Kothari et al. (2009b) find that a favorable (unfavorable) tone in an analyst report is accompanied by a significant decrease (increase) in risk measures. Huang et al. (2014) find that investors react more strongly to analyst reports written in a negative tone. In a study examining financial report readability, Li (2008) finds that managers may use less-readable 10-K documents as a means of diffusing bad news about current earnings. Lehavy et al. (2011) find that less-readable 10-Ks lead to lower analyst forecast accuracy and higher analyst forecast dispersion. Finally, Lawrence (2013) finds that small investors are more likely to invest in firms with more-readable disclosures, and Miller (2010) finds that such investors are more active around the time when these firms file their reports.

In addition to the effect of the readability of firm filings, evidence also suggests that readability is an important characteristic of analyst reports. In particular, De Franco et al. (2014) find a positive association between readability and both analyst ability and trading volume. Their findings suggest that better readability represents more precise information. Our study extends their study by focusing on the role of analyst report readability in firm valuation (using signed returns). Thus, our paper is the first study to investigate whether investors price analyst report readability positively.

3 We re-run our regressions after adding a sample of 300 randomly selected firms from the manufacturing industries (two-digit SIC code 30). Our findings (untabulated) are robust after including these additional reports in our testing sample.

(ii) Readability and Market Reaction

In the traditional dividend discount model of stock valuation, a firm's stock price is modeled as follows:

$$P = k * \sum_{t=1}^{\infty} E_t/(1+r)^t,$$

where P is the stock price, k is the dividend payout rate assumed to be a constant percentage of earnings, E is the expected earnings, and r is the discount rate.

As the model indicates, stock returns may be driven by two factors: 1) changes in the discount rate, and/or 2) changes in the expected earnings. We discuss these two factors separately as follows.

(a) Readability and Discount Rate

In this section, we discuss the effect of readability on the denominator of the preceding model, i.e., the discount rate. We expect readability to decrease uncertainty of future earnings information, leading to a lower discount rate.[4]

We predict that analyst report readability helps to decrease investors' uncertainty about future earnings. Analyst reports are an important information source that help investors estimate future earnings. Therefore, how well these reports are written (i.e., their readability) affects the investors' uncertainty about future earnings. In particular, more-readable reports explain the reasoning behind analysts' forecasts and stock recommendations in a more comprehensive way, thereby decreasing readers' confusion about interpreting future earnings expectations in the reports. Prior studies support this conjecture. For example, De Franco et al. (2014) suggest that more-readable reports represent more precise information. Lehavy et al. (2011) study the readability of 10-Ks and find that less-readable 10-Ks lead to higher analyst forecast dispersion, a measure of uncertainty of future earnings. Based on these empirical findings, we posit that better readability of analyst reports decreases investors' uncertainty of future earnings.

Following from this conjecture, we expect that the discount rate will also be lowered. Prior research shows that lower uncertainty may decrease the discount rate by decreasing investors' estimation risk or information asymmetry. First, studies show that lower uncertainty may decrease investor estimation risk and thus the discount rate applied to securities (e.g., Coles and Loewenstein, 1988; Handa and Linn, 1993; Coles et al., 1995). Estimation risk arises due to investors' uncertainty about the parameters of future returns or pay-off distributions. Given that this risk is non-diversifiable, investors demand a higher discount rate for firms with more-uncertain information sets. Barry and Brown (1985) provide an explicit link between the uncertainty in investors' estimates of a firm's return distribution parameters and equilibrium discount rates. By allowing the estimation risk to differ across firms, Barry

4 Studies suggest that analyst information affects the discount rate. For example, Brennan and Subrahmanyam (1996) suggest that the analyst following of a firm decreases the adverse selection cost of transactions and improves liquidity. Furthermore, Bowen et al. (2008) document a negative association between analyst following and the cost of equity capital upon issuance of seasoned equity offerings. These findings provide evidence of a direct linkage between analyst following, information asymmetry and the cost of capital. Empirical evidence further suggests that public information that decreases information asymmetry is rewarded with a positive market reaction.

and Brown (1985) find that "low-uncertainty" securities (i.e., securities for which the investor is able to observe a longer series of prior returns) have smaller betas and thus lower equilibrium discount rates.

Second, lower uncertainty may also decrease the discount rate by decreasing the degree of information asymmetry between informed and uninformed investors (e.g., Merton, 1987; Leuz and Verrecchia, 2000; Francis et al., 2004; Hail and Leuz, 2006). Easley and O'Hara (2004) document the consequences of information asymmetry and find that it increases the information risk of uninformed investors holding stocks. These uninformed investors demand compensation for the losses expected from transacting with informed investors, thereby increasing the expected return and discount rate. To mitigate this effect, the availability of more precise public information can allow uninformed investors to better incorporate new information into their trades and thus lower their risk of trading with informed investors.[5]

In summary, prior studies show that decreasing the uncertainty of future pay-offs lowers the discount rate, resulting in a positive effect on stock prices. We expect that, *ceteris paribus*, readability has a positive effect on stock returns because it helps decrease uncertainty of future earnings.

(b) Readability and Earnings Expectations

In the preceding stock valuation model, an increase in earnings expectations (i.e., the numerator) may also lead to higher stock returns. Thus, the effect of readability on earnings expectations is worth exploring. Readability may not be associated with a change in earnings expectations if it is merely a linguistic feature orthogonal to analyst expectations about future earnings. That is, analysts communicate with report readers in the same way regardless of the nature of their earnings expectations. However, if readability is a reflection of an analyst's incentive to reveal good or bad news, then it may be associated with a change in earnings expectations. For example, the literature suggests that financial analysts have a stronger incentive to report good news because it generates more trading business (e.g., Kothari et al., 2009a). Thus, analysts may have an incentive to issue less-readable reports when the news within those reports is bad in order to obfuscate negative information (Li, 2008). In general, the literature provides no direct evidence about whether and how report readability is associated with earnings news in a report and whether it in turn changes investors' earnings expectations. Therefore, the relationship between earnings expectations and readability remains an empirical question.

Summarizing the discussion in sections 2(ii)(a) and 2(ii)(b), we expect that the relationship between analyst report readability and stock returns is positive for the following reasons. From the denominator perspective, the well-established literature related to the effect of readability on uncertainty suggests that higher readability is associated with lower uncertainty and consequently a lower discount rate (Glosten and Milgrom, 1985; O'Hara, 2003). From the numerator perspective, the relationship between readability and earnings expectations is either orthogonal or

5 Studies have also attributed the discount rate to transaction costs (e.g., Amihud and Mendelson, 1986). Following the argument that lower uncertainty decreases information asymmetry, studies have found that a lower degree of information asymmetry decreases the portion of the bid-ask spread caused by adverse selection (see Amihud and Mendelson, 1986; Diamond and Verrecchia, 1991). These decreased transaction costs may increase the demand of the stock and lower the discount rates.

positive. Combining the numerator and denominator effects, if any, higher readability elicits a positive market reaction. We therefore expect that analyst report readability is associated with higher returns. In the empirical part of this study, we examine the effect of readability on the uncertainty as well as earnings expectations to provide additional insights into the relationship between readability and stock returns.[6]

3. DATA AND SAMPLE SELECTION

We obtain our analyst report data from Thomson Financial's *Investext* database in the form of PDF files. To analyze the readability of these reports, we manually select the discussion portion of each report and then convert the files into a machine-readable form. We use this manual selection technique because the typesetting of analyst reports is usually complicated and varies in style across brokerage houses and analysts. An analyst report typically contains non-text features such as brokerage firm logos, figures and tables. In addition, there are often sections of text in the reports that are not analysis-related, such as disclaimer statements, descriptions of analyst qualifications, analyst contacts (e.g., phone numbers and e-mail addresses), and page numbers. To decrease the potential measurement errors associated with non-analysis-related text, we manually collect and verify each analyst report before calculating the readability.

We focus on analyst reports for firms in the high-tech industries. This allows us to obtain a sample of firms with consistent industry backgrounds and a strong need for analyst research, as high-tech firms typically exhibit high levels of industry growth and valuation uncertainty. Barth et al. (2002) and Barron et al. (2002) provide evidence that investors demand more information from security analysts for firms with higher levels of growth and larger proportions of intangible assets. A study of the readability of analyst reports in the high-tech industries thus provides us a sample of homogenous firms whose analyst reports are valued most.

Table 1 shows the sample selection procedures. We identify all of the high-tech-industry analyst reports released between 2005 and 2007 that are available from Investext.[7] We define high-tech industries by following Baginski et al. (2004) (i.e., SIC codes = 2833–2836, 8731–8734, 7371–7379, 3570–3577 and 3600–3674). This gives us an initial sample of 3,950 reports. We then delete any reports with missing data in the I/B/E/S, Compustat and CRSP databases, yielding a sample of 2,930 reports for our stock return tests. To test the association between readability and uncertainty, we merge this sample with OptionMetrics to calculate the implied volatility. This procedure yields a sample size of 2,164 observations.

4. RESEARCH PLAN AND METHODOLOGY

(i) Measures of Analyst Report Readability

We follow previous studies and adopt the Fog index to determine report readability (Li, 2008; De Franco et al., 2014). The Fog index (*Fog_Index*) uses the number of words

6 We emphasize that investors react towards report readability positively. As a result, we expect market premium for readability in both good-news and bad-news reports.

7 We focus on reports made in 2005–2007 as we require the I/B/E/S translation file to link the analyst identities in the analyst reports to the I/B/E/S database. The I/B/E/S released the last available translation file to the public in 2006.

Table 1
Sample Selection

	N
Analyst reports from *Investext* covering high-tech industry companies (following the definition used by Baginski et al. (2004)) from 2005 to 2007	3,950
Deduct:	
Analyst reports without sufficient content for linguistic analysis or with analyst names not available in the I/B/E/S translation files	(396)
Analyst reports before merging with financial data files to calculate variables	3,554
Deduct:	
Reports without sufficient data in the I/B/E/S consensus and detail files	(435)
Reports without sufficient data in Compustat and CRSP	(189)
Sample number of reports for the stock return tests (Table 3)	**2,930**
Deduct:	
Reports without sufficient data in the OptionMetrics standardized options file	(766)
Sample number of reports for changes in uncertainty and expectations tests (Tables 4 and 5)	**2,164**

per sentence and percentage of complex words to estimate the number of years of education required to understand an article. It is measured as 0.4 * ((words/sentence) + 100 (complex words/words)). A lower value indicates fewer years of education required and thus implies that the text is easier to understand.

Appendix A illustrates the application of the Fog index to the summary sections at the beginning of two analyst reports. For the sake of comparability, we select two reports issued on the same day for the same company by two different analysts to control for the information events that the two reports focus on. The first report has fewer words (155) than the second (258). However, the first report contains more complex words, with an average of 1.79 syllables per word compared with 1.5 syllables per word in the second report. In addition, the first report has an average of 25.83 words per sentence compared with 17.2 words per sentence in the second report. Thus, although the first report contains fewer words, it has a more complex syntax and sentence structure and thus scores as less readable with a *Fog_Index* value of 17.82. The second report scores a lower *Fog_Index* value of 12.8.

(ii) The Effect of Analyst Report Readability on Stock Returns

We test the market's reaction to report readability within an event study setting. We use the following regression to test whether the market's reaction at the time of an analyst forecast revision is associated with report readability:

$$CAR\,[-1,\ +1] = a + b * \ READABILITY + c * CONTROLS + Industry\ fixed\ effects + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon, \quad (1)$$

where *CAR* represents the market-adjusted cumulative abnormal returns from 1 day before to 1 day after the analyst report date (i.e., day 0). *READABILITY* is calculated as the *Fog_Index* multiplied by –1 and then standardized between 0 and 1 to linearize the variable. A higher *READABILITY* value thus represents better readability. Following the expectation that readability increases stock prices, we expect that coefficient *b* is significantly positive in equation (1).

We include report, analyst, and firm characteristics in our regressions to control for potentially correlated omitted variables (e.g., Gleason and Lee, 2003). We begin by controlling for report-specific characteristics that may be related to report readability. To control for the influence of forecast revisions, we include forecast revisions from the same analyst, ΔEST, which is defined as the difference between the analyst's EPS forecast made on the report issuance date and the analyst's previous forecast for the same period, scaled by the stock price at the end of the previous quarter. We also control for the tone in each report. The variable *TONE* equals 1 if the combination of the percentage of words with positive emotion in a given report, *PCT_POS*, minus the percentage of words with negative emotion, *PCT_NEG*, is equal to or greater than 0; otherwise, *TONE* equals 0 (Kothari et al., 2009b; Huang et al., 2014).[8] Finally, we use *LENGTH* to control for the effect of report length, which is measured as the logarithm of the number of words in a report.

In addition to controlling for textual features, we follow De Franco et al. (2014) and include several variables to control for analyst characteristics. First, we use *FIRM_EXP* to control for analyst firm experience, which is defined as the logarithm of the number of years through year *t* for which analyst *i* supplied at least one forecast during the year for firm *j*. We use *FIRM_COV* to control for analyst firm coverage, which is defined as the logarithm of the number of companies that analyst *i* followed in year *t*. Other variables include *FREQUENCY*, the logarithm of analyst *i*'s forecast frequency for firm *j* during a specific year; *IND_COV*, the logarithm of the number of industries that analyst *i* followed in year *t*; *GEN_EXP*, the logarithm of the number of years for which analyst *i* supplied at least one forecast during the year through year *t*; and *FERROR*, the standardized ranking of analyst *i*'s average absolute forecast errors (|FE|) between 1986 and year *t*, scaled by the stock price at the end of the last quarter.

We consider several firm-specific control variables. For example, report readability may be correlated with the level of complexity in a target firm's underlying business model (e.g., Li, 2008). To control for this possibility, we include variables that proxy for the complexity of a target firm's business model, including firm size, firm age, merger and acquisition activity, and number of segments. To control for firm size, we include the log value of the market value of equity, *MVE*, as the literature suggests that larger firms have richer information environments (e.g., Collins et al., 1987). We include the logarithm of firm age, *AGE*, to control for firm age. We include *M&A* to control for merger and acquisition activity, a dichotomous variable that equals 1 if a firm engages in mergers and acquisitions in a specific quarter, and 0 otherwise. Finally, we control for business segments by including *NOSEGMT*, the logarithm of the number of business segments in a firm.

In addition to firm complexity, we control for the predictability of future firm performance. We include *RET_VOL*, the standard deviation of 15-month stock returns for a specific quarter, and *EPS_VOL*, the standard deviation of EPS during the preceding 16 quarters, as controls for returns and earnings volatility, respectively. As research shows that negative earnings are more difficult to forecast (Brown, 2001),

8 The emotions of the words used are defined according to the Linguistic Inquiry and Word Count (LIWC) 2007 dictionary. Our results are similar if we control for the positive and negative tones of the analyst reports separately (Kothari et al., 2009b).

we also include *LOSS*, a dichotomous variable that equals 1 if the analyst-predicted earnings are negative, and 0 otherwise. Moreover, we include *EGROWTH* to control for changes in income before extraordinary items during the most recent quarter, scaled by income before extraordinary items in the preceding quarter.

Finally, we use market-to-book ratio, *MTB*, to control for growth, as well as potential mispricing and the extent of private information acquisition activity. We measure *MTB* as the market value of equity plus the book value of liabilities scaled by the total assets. We also use the 180-day buy-and-hold return up to the report's issuance date, *MOMENTUM*, to control for the information environment in the period leading up to the analyst report issuance. We control for the influence of a firm's capital structure on its financial reporting through *LEVERAGE*, the ratio of total assets to stockholders' equity for the most recent quarter. To control for public disclosure before report issuance, we include *RELEASE_NEWS*, the quarterly EPS from the most recent earnings release, minus the actual EPS in the same quarter of the preceding year, scaled by the quarter-end stock price. We also include industry (four-digit SIC code), year, and brokerage fixed effects in the regressions as controls, with standard errors adjusted for firm clustering.[9]

5. EMPIRICAL FINDINGS

(i) Descriptive Statistics and Correlations

Panel A of Table 2 provides the descriptive statistics for our variables. These statistics show that the market has a generally positive reaction to analyst reports in our sample, as indicated by a median *CAR[–1, +1]* of about 0.3%. The statistics also show that the reports in our sample have a mean Fog index of 14.01 years, indicating that about 14 years of education are required for a reader to understand an analyst report. In addition, we find that the reports in our sample provide a balance of good and bad news, as indicated by a median ΔEST close to 0.[10] Our reports are also generally positive in tone (median = 1 and mean = 0.847) and written by experienced analysts (7 years of experience) who cover 18 firms on average.

Panels B and C of Table 2 report the Pearson correlations between our testing variables and the report, analyst and firm characteristics for our sample, respectively. These results show that *READABILITY* is positively correlated with *CAR[–1, +1]*, suggesting that the market reacts positively to more-readable reports. However, *READABILITY* is not significantly correlated with ΔEST (correlation coef. = –0.03), which suggests that readability is not related to the forecast revision news in analyst reports. Moreover, the correlation between *READABILITY* and *RELEASE_NEWS* is insignificant (correlation coef. = –0.01), indicating that readability is not associated with prior earnings news either. Consistent with the findings of De Franco et al. (2014), the results show that readability is negatively correlated with text length

9 Unbiased standard errors in an OLS regression are premised on a basis of stochastic observations. This assumption is no longer valid as the sample contains multiple reports from the same firm. We avoid this bias by adjusting our standard error for clustering at the firm level. To ensure that our findings are not driven by a cluster of events on the same date, we also adjust the standard errors using double clustering for both firm and report dates in the robustness check. We also use the sample of analyst reports that are the only reports issued on an event date. Our findings are robust to these adjustments.

10 Less than 1% of our sample reports zero ΔEST.

Table 2
Descriptive Statistics and Variable Correlations

Panel A. Descriptive Statistics

Variable	*Mean*	*Std.*	*10%*	*25%*	*Median*	*75%*	*90%*
Dependent variables							
CAR[–1, +1]	0.002	0.080	–0.098	–0.038	0.003	0.049	0.100
ΔEXPECTATION	–0.024	0.150	–0.173	–0.048	0.001	0.041	0.103
ΔUNCERTAINTY	–0.037	0.069	–0.120	–0.080	–0.035	0.001	0.046
Testing variable							
Fog_Index	14.008	2.080	11.495	12.525	13.824	15.322	16.797
Report characteristics							
ΔEST	0.000	0.002	–0.003	–0.001	0.000	0.001	0.001
TONE	0.847	0.360	0.000	1.000	1.000	1.000	1.000
LENGTH	6.716	0.635	5.841	6.280	6.789	7.142	7.446
Analyst characteristics							
FIRM_EXP	0.861	0.715	0.000	0.000	0.693	1.386	1.792
FIRM_COV	2.828	0.394	2.303	2.639	2.890	3.091	3.258
FREQUENCY	2.081	0.744	1.099	1.609	2.197	2.565	2.833
IND_COV	0.995	0.440	0.693	0.693	1.099	1.386	1.609
GEN_EXP	1.789	0.606	1.099	1.386	1.946	2.079	2.485
FERROR	0.201	0.220	0.018	0.054	0.123	0.264	0.500
Firm characteristics							
MVE	8.448	1.781	6.284	6.966	8.377	9.656	11.171
AGE	2.523	0.801	1.593	2.058	2.539	3.024	3.502
M&A	0.249	0.432	0.000	0.000	0.000	0.000	1.000
NOSEGMT	1.092	0.530	0.693	0.693	0.693	1.609	1.792
RET_VOL	0.091	0.034	0.053	0.066	0.086	0.114	0.138
EPS_VOL	0.204	0.356	0.043	0.065	0.112	0.194	0.315
EGROWTH	0.099	1.164	-0.607	-0.221	0.043	0.308	0.769
LOSS	0.025	0.157	0.000	0.000	0.000	0.000	0.000
MTB	2.927	1.527	1.405	1.915	2.504	3.570	4.749
MOMENTUM	0.088	0.292	–0.256	–0.092	0.065	0.251	0.440
LEVERAGE	1.731	0.568	1.179	1.314	1.590	1.931	2.447
RELEASE_NEWS	0.001	0.005	–0.005	-0.001	0.001	0.003	0.005

(*Continued*)

Table 2
Continued

Panel B. Pearson Correlations: Report and Analyst Characteristics

		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
(1)	*CAR[–1, +1]*												
(2)	*ΔEXPECTATION*	**0.36**	1.00										
(3)	*ΔUNCERTAINTY*	**–0.30**	**–0.13**	1.00									
(4)	*READABILITY*	**0.06**	–0.01	**–0.15**	1.00								
(5)	*ΔEST*	**0.27**	**0.54**	**–0.09**	–0.03	1.00							
(6)	*TONE*	**0.24**	**0.20**	**–0.11**	**–0.05**	**0.16**	1.00						
(7)	*LENGTH*	0.01	**0.03**	-0.02	**–0.28**	**0.08**	**0.12**	1.00					
(8)	*FIRM_EXP*	**0.04**	**0.04**	**0.08**	**0.05**	**0.03**	0.00	**0.03**	1.00				
(9)	*FIRM_COV*	0.01	0.01	0.02	**0.07**	0.00	**0.03**	**–0.10**	**0.20**	1.00			
(10)	*FREQUENCY*	0.00	**0.04**	**0.08**	**0.06**	**0.05**	–0.02	0.02	**0.65**	**0.17**	1.00		
(11)	*IND_COV*	0.01	**–0.05**	0.01	**0.16**	**-0.05**	**0.05**	**–0.09**	**0.08**	**0.24**	**0.09**	1.00	
(12)	*GEN_EXP*	0.00	0.01	**0.08**	0.03	**0.04**	-0.01	**0.03**	**0.42**	**0.46**	**0.23**	**0.15**	1.00
(13)	*FERROR*	**0.04**	0.02	**–0.04**	-0.01	**0.05**	**0.04**	–0.01	0.02	0.00	**–0.04**	**0.05**	0.01

Panel C. Pearson Correlations: Firm Characteristics

		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*
(1)	*CAR[–1, +1]*															
(2)	*ΔEXPECTATION*	**0.36**	1.00													
(3)	*ΔUNCERTAINTY*	**–0.30**	**–0.13**	1.00												
(4)	*READABILITY*	**0.06**	–0.01	**–0.15**	1.00											
(5)	*MVE*	**0.03**	**0.09**	**0.10**	**–0.05**	1.00										
(6)	*AGE*	0.02	**0.05**	**0.09**	0.00	**0.57**	1.00									
(7)	*M&A*	**–0.05**	0.01	**0.07**	**–0.06**	**0.32**	**0.15**	1.00								
(8)	*NOSEGMT*	**–0.03**	**–0.03**	**0.07**	**–0.04**	**0.46**	**0.36**	**0.31**	1.00							
(9)	*RET_VOL*	–0.03	0.00	**–0.14**	0.01	**–0.39**	**–0.44**	**–0.14**	**–0.39**	1.00						

(Continued)

Table 2
Continued

Panel C. Pearson Correlations: Firm Characteristics

		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*
(10)	*EPS_VOL*	–0.01	–0.03	**–0.05**	0.03	**–0.10**	**–0.12**	**–0.06**	**–0.04**	**0.16**	1.00					
(11)	*EGROWTH*	**0.05**	**0.06**	0.02	0.02	**–0.03**	**–0.04**	0.01	**–0.05**	**0.04**	**–0.05**	1.00				
(12)	*LOSS*	**–0.05**	**–0.07**	0.01	–0.01	**–0.17**	**–0.16**	**–0.07**	**–0.08**	**0.12**	0.02	0.01	1.00			
(13)	*MTB*	**0.04**	0.02	0.03	**0.03**	**0.29**	**–0.16**	**0.05**	**–0.07**	**0.20**	**–0.07**	0.01	**0.03**	1.00		
(14)	*MOMENTUM*	**0.21**	**0.34**	–0.02	0.02	**0.08**	-0.02	0.01	**–0.12**	**0.11**	0.01	**0.08**	**–0.06**	**0.15**	1.00	
(15)	*LEVERAGE*	0.00	0.02	**–0.06**	–0.01	**–0.04**	-0.02	**–0.03**	**0.09**	**–0.05**	**–0.04**	0.00	**0.24**	**–0.09**	**0.15**	1.00
(16)	*RELEASE_NEWS*	0.00	**0.23**	–0.03	–0.01	**0.07**	**0.08**	**0.04**	**-0.07**	**0.04**	–0.02	**0.15**	**–0.22**	**–0.15**	**0.36**	–0.03

Note:
This table reports the descriptive statistics for the variables and Pearson correlations. Correlations significant at the 10% level (two-tailed) are marked in bold. Please refer to Appendix B for variable definitions.

(correlation coef. = –0.28) but positively related to analyst ability (*FIRM_EXP*, correlation coef. = 0.05; *FIRM_COV*, correlation coef. = 0.07; *FREQUENCY*, correlation coef. = 0.06; *IND_COV*, correlation coef. = 0.16). Consistent with the correlations found by Li (2008), *READABILITY* is negatively associated with *MVE* and positively associated with *MTB* (e.g., MD&A section). Finally, *READABILITY* is negatively associated with *M&A* and *NOSEGMT*, suggesting that report readability is lower for firms that engage in mergers and acquisitions or firms with more segments. None of our variables have correlations high enough to raise multicollinearity concerns in our model.

(ii) Readability and Market Reaction

Table 3 presents the results from equation (1) using a 3-day ([–1, +1]) abnormal return around the analyst report issuance date as the dependent variable. Column (A) reports the results without our control variables. The result shows a significantly positive coefficient for *READABILITY* (coef. = 0.0209; $t = 2.92$). Including our control variables, the results in column (B) show that the coefficient for *READABILITY* does not change dramatically and remains significantly positive at the 1% level ($t = 3.09$). The value of *CAR[–1, +1]* increases 58 basis points, if the value of *READABILITY* increases by one standard deviation. This result is consistent with our prediction that the market reacts positively to more-readable reports.

The results also show a significantly positive coefficient for *TONE* at the 1% level, suggesting that the market reacts positively to analyst reports written in a favorable tone. In addition, we find that the coefficient for *LENGTH* is negative but statistically insignificant ($t = -1.54$). Our forecast revision variable (ΔEST) shows a significantly positive coefficient, suggesting that the market reacts positively to revisions in analyst reports. Our analyst control variables, *IND_COV* and *GEN_EXP*, each yield marginally significant negative coefficients, suggesting that analysts who cover fewer industries and who are at earlier stages in their careers may generate higher abnormal returns from their reports. Finally, for our firm variables, we find a positive coefficient for *MOMENTUM*, suggesting a positive association between the market's reaction to analyst reports and returns made before the reports (e.g., Gleason and Lees, 2003). The coefficients of *AGE*, *M&A*, and *NOSEGMT* suggest that analyst reports generate higher abnormal returns for firms that are older, are less active in mergers and acquisitions or have fewer segments.

We conduct two additional tests on whether the premium of readability depends on the news in an analyst report. First, we examine whether the "bad news" firms with more-readable analyst reports suffer more negative returns (i.e., an "amplifier" effect). We run the subsample test for the reports with $\Delta EST < 0$ and find that the coefficient of *READABILITY* (untabulated) is significantly positive at the 5% level (coef. = 0.0239; $t = 2.38$). This suggests that better readability leads to less negative returns for "bad news" firms. We then test whether our findings are driven by the correlation between readability and revision news ΔEST. We add an interaction term, $READABILITY \times \Delta EST$, to the regression and the results (untabulated) suggest that its coefficient is not significant ($t = -1.26$). Furthermore, we find that the coefficient of *READABILITY* (coef. = 0.0185; $t = 2.91$) in the regression model is insignificantly different (p-value = 0.22) from that reported in column (B) of Table 3. This finding further confirms that the effect of readability is less likely to be associated with earnings news.

Table 3

Market Reaction and Analyst Report Readability

CAR[–1, +1] = a + b READABILITY + c*CONTROLS + Industry fixed effects + Year fixed effects + Brokerage fixed effects + ε (1)*

	(A) *Coef.*	*(B)* *Coef.*
Intercept	–0.0347	–0.0336
	(–1.31)	(–0.78)
READABILITY	0.0209***	0.0201***
	(2.92)	(3.09)
ΔEST		7.4583***
		(5.37)
TONE		0.0416***
		(6.59)
LENGTH		–0.0038
		(–1.54)
FIRM_EXP		0.0035
		(1.00)
FIRM_COV		0.0105
		(1.64)
FREQUENCY		–0.0021
		(–0.86)
IND_COV		–0.0084*
		(–1.83)
GEN_EXP		–0.0070*
		(–1.83)
FERROR		0.0047
		(0.56)
MVE		0.0011
		(0.43)
AGE		0.0061*
		(1.70)
M&A		–0.0125*
		(–1.90)
NOSEGMT		–0.0147**
		(–2.46)
RET_VOL		–0.1374
		(–1.60)
EPS_VOL		–0.0002
		(–0.03)
EGROWTH		0.0030
		(1.08)
LOSS		–0.0003
		(–0.02)
MTB		–0.0015
		(–0.82)
MOMENTUM		0.0412***
		(4.23)
LEVERAGE		–0.0005
		(–0.11)
RELEASE_NEWS		–1.8628***
		(–3.33)

(*Continued*)

Table 3 (Continued)

	(A) *Coef.*	*(B)* *Coef.*
Industry fixed effects	Included	Included
Year fixed effects	Included	Included
Brokerage fixed effects	Included	Included
N	2,930	2,930
Adj. R^2	0.04	0.19

Note:
This table reports the regression results for the association between report readability and market returns. T-values are reported in parentheses and standard errors are adjusted for firm clustering. Industry fixed effects are based on four-digit SIC codes. ***, ** and * represent significance at the 1%, 5% and 10% levels (two-tailed), respectively. Please refer to Appendix B for variable definitions.

6. THE EFFECT OF READABILITY ON THE LEVEL AND UNCERTAINTY OF EARNINGS EXPECTATIONS

(i) Denominator vs. Numerator Effect

The prediction that readability is positively related to stock returns is based on the idea that greater readability decreases investor uncertainty of future earnings, which in turn lowers the discount rate and increases the stock price of a firm. However, as discussed earlier, an increase in earnings expectations (i.e., the numerator) may also lead to higher stock returns. To better understand the positive relationship between readability and stock returns, we examine the two channels (denominator vs. numerator) through which the former may affect the latter. We examine the effect of readability on the changes in both uncertainty and the level of earnings expectations, respectively. Based on section 2(ii)(a), we expect that readability is negatively related to changes in uncertainty. As we discuss in section 2(ii)(b), whether readability is associated with the change in earnings expectations remains an empirical question.

We use Δ*UNCERTAINTY*, the change in implied volatility as determined from exchange-traded option prices, to measure the change in uncertainty. As Rogers et al. (2009) discuss, implied volatility is the market's expectation of a firm's average stock return volatility from option time to expiration; thus, it provides a relatively direct measure of uncertainty.[11] We use Δ*EXPECTATION*, the change in the most recent consensus forecasts at the time of report issuance, to measure the change in the level of earnings expectations. It is calculated as the mean forecast 1 month after the report date minus the mean forecast 1 month before the report date, scaled by the stock price 10 days before the report date. We calculate our consensus forecasts based on the forecasts of at least three analysts covering the firm in the same fiscal period.[12] To enable comparisons between and to linearize the two variables, we convert Δ*UNCERTAINTY* and Δ*EXPECTATION* into standardized rankings across the sample.[13]

11 We calculate the variable as the average implied volatilities from days 2 to 4 minus the average implied volatilities from days –4 to –2, divided by the average implied volatilities from days –4 to –2.
12 Only 2% of our sample observations consist of an analyst who wrote the sample reports and are also included in the consensus forecast calculation. Our results are robust if we remove those reports from our sample.
13 We define Δ*UNCERTAINTY* and Δ*EXPECTATION* by using *ex-post* information to decompose the effect of readability on market expectations. This may introduce forward-looking bias into the test.

Our multi-variant analysis is based on the following regressions:

$$\Delta UNCERTAINTY = a_1 + b_1 * READABILITY + c_1 * CONTROLS + Industry\ fixed\ effects + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon \text{ and} \tag{2a}$$

$$\Delta EXPECTATION = a_2 + b_2 * READABILITY + c_2 * CONTROLS + Industry\ fixed\ effects + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon. \tag{2b}$$

Table 2 reports the univariate correlations between Δ*UNCERTAINTY,* Δ*EXPECTATION* and *READABILITY.* Panel B of Table 2 shows a negative coefficient between *READABILITY* and Δ*UNCERTAINTY* (correlation coef. = –0.15), which is consistent with our expectation that more-readable reports are associated with lower uncertainty. In contrast, the correlation between *READABILITY* and Δ*EXPECTATION* is insignificant. These univariate findings suggest that more-readable reports are associated with a lower discount rate (the denominator).

Table 4 presents the results for equations (2a) and (2b). The results in the first and second columns show a significantly negative coefficient for *READABILITY* when Δ*UNCERTAINTY* is the dependent variable. This finding holds in both the simple and fully controlled regression models, with little difference in coefficient or *t*-statistic magnitude. Furthermore, we find a significantly negative *READABILITY* coefficient (coef. = –0.1900, t = –6.72) in the full model with control variables, consistent with our prediction that more-readable reports lead to a greater reduction in uncertainty. This result gives us more confidence that the positive relationship between readability and stock returns is not purely driven by omitted variables related to information content.

The results in the third and fourth columns of Table 4 show an insignificant coefficient for *READABILITY* when Δ*EXPECTATION* is the dependent variable (t = 0.68 and 0.56 for the simple and fully controlled models, respectively). Compared with the second column, in which Δ*UNCERTAINTY* is the dependent variable, the coefficient of *READABILITY* in the fourth column is 12.8 times smaller in terms of magnitude. These findings suggest that report readability is more strongly associated with the reduction in uncertainty than with the change in expectations related to future earnings.[14] Furthermore, the coefficients of Δ*EST, RELEASE_NEWS* and *TONE* are each significantly positive, consistent with the idea that Δ*EXPECTATION* captures changes in the level of earnings expectations and is positively associated with earnings surprises and a tone that is favorable to the firm.

The findings in this section support our prediction that readability is negatively related to uncertainty of future earnings. However, the results do not support a positive association between readability and changes in earnings expectations.

14 An insignificant coefficient of *READABILITY* when Δ*EXPECTATION* is the dependent variable suggests weak evidence of no association between the two variables. Caution should be exercised when interpreting the findings.

Table 4
Readability and Changes in Uncertainty/Earnings Expectations

$$\Delta UNCERTAINTY = a_1 + b_1 * READABILITY + c_1 * CONTROLS + Industry\ fixed\ effects + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon \quad (2a)$$

$$\Delta EXPECTATION = a_2 + b_2 * READABILITY + c_2 * CONTROLS + Industry\ fixed\ effects + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon \quad (2b)$$

	(A) ΔUNCERTAINTY		(B) ΔEXPECTATION	
	Coef.	*Coef.*	*Coef.*	*Coef.*
Intercept	0.7561***	1.2947***	0.5147***	0.4962***
	(4.92)	(5.56)	(3.63)	(3.36)
READABILITY	–0.1731***	–0.1900***	0.0203	0.0148
	(–6.29)	(–6.72)	(0.68)	(0.56)
ΔEST		–10.7407***		51.6621***
		(–2.68)		(12.72)
TONE		–0.0773***		0.0708***
		(–3.78)		(4.86)
LENGTH		–0.0403***		–0.0084
		(–3.07)		(–0.91)
FIRM_EXP		0.0075		0.0013
		(0.56)		(0.11)
FIRM_COV		–0.0561**		0.0400**
		(–2.03)		(2.10)
FREQUENCY		0.0158		0.0026
		(1.34)		(0.20)
IND_COV		0.0192		0.0045
		(0.85)		(0.24)
GEN_EXP		0.0452**		–0.0356***
		(2.46)		(–2.85)
FERROR		–0.0358		–0.0087
		(–1.21)		(–0.26)
MVE		–0.0146		0.0043
		(–1.38)		(0.49)
AGE		–0.0017		–0.0054
		(–0.11)		(–0.45)
M&A		0.0507**		–0.0240
		(2.06)		(–1.59)
NOSEGMT		0.0559*		–0.0338
		(1.94)		(–1.39)
RET_VOL		–1.1394***		–0.4033
		(–3.11)		(–1.18)
EPS_VOL		–0.0355		0.0169
		(–0.78)		(0.62)
EGROWTH		0.0024		0.0007
		(0.24)		(0.12)
LOSS		0.0321		0.0870*
		(0.60)		(1.79)
MTB		0.0171**		–0.0088
		(2.29)		(–1.36)
MOMENTUM		0.0278		0.1822***
		(0.59)		(6.15)

(*Continued*)

Table 4
Continued

	(A) Δ *UNCERTAINTY*		(B) Δ *EXPECTATION*	
	Coef.	*Coef.*	*Coef.*	*Coef.*
LEVERAGE		−0.0349*		0.0043
		(−1.69)		(0.29)
RELEASE_NEWS		0.0028		5.5274***
		(0.00)		(3.55)
Industry fixed effects	Included	Included	Included	Included
Year fixed effects	Included	Included	Included	Included
Brokerage fixed effects	Included	Included	Included	Included
N	2,164	2,164	2,164	2,164
Adj. R^2	0.11	0.17	0.09	0.36

Note:
This table reports the regression results for the association between report readability and changes in the level of or uncertainty of earnings expectations. T-values are reported in parentheses and standard errors are adjusted for firm clustering. Industry fixed effects are based on four-digit SIC codes. ***, ** and * represent significance at the 1%, 5% and 10% levels (two-tailed), respectively. Please refer to Appendix B for variable definitions.

(ii) Linking Market Reactions, Earnings Expectations and Readability

We further explore whether the market's positive reaction to readability reflects a reduction in uncertainty by examining whether the inclusion of changes in the implied volatility in our model decreases the explanatory power of *READABILITY* in our stock return test. We empirically estimate the following equation:

$$CAR\,[-1,+1] = a + b * READABILITY + c * X + e * CONTROLS + Industry\ fixed\ effects + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon, \quad (3)$$

where $X = \Delta$ *UNCERTAINTY*, Δ *EXPECTATION* or both.

If the market's positive reaction to readability reflects a reduction in uncertainty, then we expect the coefficient of *READABILITY* to be insignificant after including Δ *UNCERTAINTY* in the regression. Table 5 shows the result of this model. In column (A), $X = \Delta$ *EXPECTATION*, and in column (B), $X = \Delta$ *UNCERTAINTY*. Column (C) reports the findings of equation (3) with both Δ *UNCERTAINTY* and Δ *EXPECTATION* included. Columns (A) and (C) therefore differ in that the latter includes Δ *UNCERTAINTY* and no such variable is included in the former. When we compare columns (A) and (C), we find that the significance of *READABILITY* disappears if Δ *UNCERTAINTY* is included in column (C). We use the Chow test to compare the coefficients across regression models. The *p*-value reported in the last row (*p*-value = 0.0000) suggests that the difference in *READABILITY* between columns (A) and (C) is statistically significant. When we compare columns (B) and (C), both of which include Δ *UNCERTAINTY*, we find that the inclusion of Δ *EXPECTATION* in column (C) does not affect the coefficient of *READABILITY* (*p*-value for the Chow test = 0.9757). The results suggest that the positive stock returns for report readability are attributed to decreased uncertainty.

Table 5

Market Reaction and Analyst Report Readability: Changes in Uncertainty/Earnings Expectations

$$CAR[-1,+1] = a + b{*}READABILITY + c{*}\Delta UNCERTAINTY + d{*}\Delta EXPECTATION + e{*}CONTROLS + \text{Industry fixed effect} + \text{Year fixed effect} + \text{Brokerage fixed effect} + \varepsilon \quad (3)$$

	(A) Coef.	(B) Coef.	(C) Coef.
Intercept	−0.0795*	0.0421	0.0122
	(−1.91)	(0.96)	(0.28)
READABILITY	0.0127*	−0.0002	−0.0001
	(1.90)	(-0.03)	(-0.02)
Δ UNCERTAINTY		−0.0721***	−0.0680***
		(−7.90)	(−7.75)
ΔEXPECTATION	0.0570***		0.0498***
	(5.91)		(5.41)
ΔEST	3.5001**	5.6721***	3.1453**
	(2.33)	(4.04)	(2.31)
TONE	0.0259***	0.0244***	0.0212***
	(4.70)	(4.56)	(4.09)
LENGTH	−0.0060**	−0.0094***	−0.0088***
	(−2.56)	(−3.77)	(−3.61)
FIRM_EXP	0.0023	0.0029	0.0028
	(0.66)	(0.84)	(0.83)
FIRM_COV	0.0064	0.0047	0.0029
	(0.95)	(0.66)	(0.42)
FREQUENCY	0.0000	0.0013	0.0011
	(0.00)	(0.42)	(0.36)
IND_COV	−0.0039	−0.0023	−0.0026
	(−0.81)	(−0.50)	(−0.55)
GEN_EXP	−0.0024	−0.0012	0.0004
	(−0.57)	(−0.28)	(0.11)
FERROR	0.0085	0.0054	0.0060
	(0.85)	(0.55)	(0.61)
MVE	0.0030	0.0022	0.0021
	(1.38)	(1.08)	(1.01)
AGE	0.0024	0.0020	0.0023
	(0.75)	(0.57)	(0.66)
M&A	−0.0085	−0.0062	−0.0052
	(−1.56)	(−1.23)	(−1.06)
NOSEGMT	−0.0150***	−0.0129**	−0.0115**
	(−2.68)	(−2.47)	(−2.18)
RET_VOL	−0.0286	−0.1337	−0.1090
	(−0.35)	(−1.60)	(−1.30)
EPS_VOL	0.0017	0.0001	−0.0006
	(0.25)	(0.01)	(−0.11)
EGROWTH	0.0014	0.0016	0.0016
	(0.67)	(0.82)	(0.84)
LOSS	−0.0077	−0.0004	−0.0048
	(−0.52)	(−0.03)	(−0.38)
MTB	−0.0049**	−0.0042**	−0.0038**
	(−2.54)	(−2.14)	(−1.99)

(*Continued*)

Table 5
Continued

	(A) Coef.	(B) Coef.	(C) Coef.
MOMENTUM	0.0252***	0.0376***	0.0284***
	(2.73)	(4.46)	(3.30)
LEVERAGE	–0.0024	–0.0047	–0.0048
	(–0.59)	(–1.12)	(–1.15)
RELEASE_NEWS	–2.6616***	–2.3462***	–2.6212***
	(–5.51)	(–4.78)	(–5.42)
Industry fixed effects	Included	Included	Included
Year fixed effects	Included	Included	Included
Brokerage fixed effects	Included	Included	Included
N	2,164	2,164	2,164
Adj. R^2	0.19	0.23	0.25
Compare *READABILITY*	(A) – (C)	(B) – (C)	
p-value (Chow test)	0.0000	0.9757	

Note:
This table reports the regression results for the association between report readability and market returns after controlling for the change in uncertainty, level of expectations, or both. T-values are reported in parentheses and standard errors are adjusted for firm clustering. Industry fixed effects are based on four-digit SIC codes. ***, ** and * represent significance at the 1%, 5% and 10% levels (two-tailed), respectively. Please refer to Appendix B for variable definitions.

7. CROSS-SECTIONAL EVIDENCE

In this section, we present the results of our cross-sectional tests of how firm, investor and analyst characteristics influence the effect of readability on market pricing.

(i) Measures of the Importance of Readability in Firm Valuation

We begin by examining whether investors find report readability more useful for firms with greater proportions of intangible assets. Although intangible assets reveal critical information about firm value, the difficulty involved in measuring them creates greater uncertainty. For example, Aboody and Lev (2000) suggest that R&D is a major contributor to the level of uncertainty about firm information. Barth et al. (2002) and Barron et al. (2002) provide evidence that investors demand more information from securities analysts for firms exhibiting higher growth and a larger proportion of intangible assets. Based on this research, we expect that readability has a greater effect on the reduction of uncertainty for firms that engage in more R&D.

In addition to firm characteristics, we test whether the effect of readability on uncertainty is greater when the level of *ex-ante* information asymmetry is higher. We expect that the reduction in uncertainty of future earnings is more pronounced for uninformed investors. Uninformed investors benefit more from a readable report because they have an easier time understanding and processing the information. In contrast, as informed investors already incur lower information processing costs, they are therefore less likely to be confused by reports with poor readability. Thus, we expect a greater effect of report readability when the level of *ex-ante* information asymmetry is higher.

We also examine the effect of readability for different types of investors.[15] If less-sophisticated investors are more likely to benefit from more-readable reports, then more-readable reports should have a greater effect for firms with greater proportions of less-sophisticated investors.

Finally, we test whether analyst experience influences the effect of readability on discount rates. Studies suggest that the forecasts issued by experienced analysts produce stronger market reactions (Mikhail et al., 1997, 1999). If investors are more likely to act on the forecasts of experienced analysts, then more-readable reports should have a larger effect when they are written by seasoned analysts.

(ii) Design and Findings of Cross-sectional Tests

We use the following regression to test the preceding predictions:

$$\begin{aligned} CAR\,[-1,\ +1] = {} & a + b * READABILITY + c * PART + d * READABILITY \\ & * PART + e * CONTROLS + Industry\ fixed\ effects \\ & + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon, \end{aligned} \tag{4}$$

where *PART* is a partition variable that is defined differently as follows.

To test whether our effect is magnified for firms that engage in more R&D, we measure *PART* as the most recent quarterly R&D expenditure scaled by the total amount of operating expenses. The results in the first column of Table 6 show a significantly positive coefficient for *READABILITY*×*PART* (t = 2.51; p-value < 0.05), which is consistent with our prediction that readability has a greater effect on stock returns when the level of R&D is higher. Moreover, the insignificant coefficient of *READABILITY* and significantly positive coefficient of *READABILITY* + *READABILITY*×*PART* (F-statistic = 8.23) suggest that the results are mainly driven by high-R&D firms.

We also examine the variation in our results depending on the degree of information asymmetry across a firm's investors. Following Brennan and Subrahmanyam (1996) and Coller and Yohn (1997), we use the bid-ask spread (*BA_Spread*) as our partition variable for information asymmetry, measured at the analyst's report-issuing month, scaled by the month-end stock price. *BA_Spread* is coded as 1 if the bid-ask spread surrounding the analyst reports is greater than or equal to the sample median, and 0 otherwise. The results in the second column of Table 6 show a significantly positive coefficient for *READABILITY*×*PART* at the two-tailed 5% level (t-statistic = 2.55). This pattern is consistent with the prediction that stock returns for readable reports are higher when the bid-ask spread is greater (i.e., when the degree of information asymmetry is higher).

We also examine the influence of investor sophistication on our results. Using intraday transaction data from TAQ, we follow Mikhail et al. (2007) and define dollar

15 The literature recognizes that unsophisticated investors are important consumers of analyst reports (e.g., Hirst et al., 1995; Frankel et al., 2006; Mikhail et al., 2007; Hui and Yeung 2013). Our evidence suggests that unsophisticated investors benefit more from reading analyst reports. Many investors including both institutional and retail investors have access to these reports (http://www.dummies.com/how-to/content/how-to-access-analyst-reports-online.html). For example, E-trade allows users to browse through analysis. In practice, some professional investment research agencies (e.g., Zacks or Morningstar) provide easy access to analyst reports free of charge or at a low subscription cost.

Table 6

Market Reaction and Analyst Report Readability: Cross-sectional Tests

$$CAR[-1, +1] = a + b*READABILITY + c*PART + d*READABILITY*PART + e*CONTROLS + Industry\ fixed\ effects + Year\ fixed\ effects + Brokerage\ fixed\ effects + \varepsilon \quad (4)$$

	PART =			
	(A) R&D Coef.	(B) BA_Spread Coef.	(C) Uninformed Coef.	(D) F_Experience Coef.
Intercept	–0.0324	–0.0169	–0.0588	–0.0231
	(–0.65)	(–0.39)	(–1.28)	(–0.54)
READABILITY	–0.0111	0.0061	0.0083	0.0097
	(–0.81)	(1.18)	(0.95)	(1.40)
PART	–0.0853	–0.0200***	–0.0085	–0.0144**
	(–1.49)	(–3.06)	(–1.22)	(–2.24)
READABILITY× PART	0.1455**	0.0281**	0.0237**	0.0195**
	(2.51)	(2.55)	(2.02)	(2.03)
ΔEST	7.6451***	7.4634***	7.6765***	7.4714***
	(5.10)	(5.54)	(5.45)	(5.42)
TONE	0.0420***	0.0409***	0.0395***	0.0416***
	(5.77)	(6.51)	(6.78)	(6.60)
LENGTH	–0.0027	–0.0041	–0.0034	–0.0040
	(–0.95)	(–1.63)	(–1.34)	(–1.62)
FIRM_EXP	0.0021	0.0035	0.0043	0.0057
	(0.58)	(1.02)	(1.18)	(1.30)
FIRM_COV	0.0079	0.0101	0.0103	0.0112*
	(1.13)	(1.59)	(1.55)	(1.74)
FREQUENCY	–0.0013	–0.0022	–0.0019	–0.0022
	(–0.50)	(–0.91)	(–0.71)	(–0.88)
IND_COV	–0.0050	–0.0078*	–0.0089*	–0.0086*
	(–0.91)	(–1.69)	(–1.76)	(–1.86)
GEN_EXP	–0.0049	–0.0069*	–0.0067*	–0.0070*
	(–0.98)	(–1.80)	(–1.70)	(–1.83)
FERROR	0.0015	0.0051	0.0047	0.0048
	(0.18)	(0.61)	(0.57)	(0.58)
MVE	0.0015	0.0009	0.0030	0.0010
	(0.54)	(0.36)	(1.05)	(0.41)
AGE	0.0102**	0.0058	0.0056	0.0051
	(2.60)	(1.65)	(1.49)	(1.41)
M&A	–0.0124	–0.0129**	–0.0141**	–0.0132**
	(–1.52)	(–2.03)	(–2.11)	(–2.03)
NOSEGMT	–0.0190***	–0.0148**	–0.0170***	–0.0152**
	(–3.14)	(–2.54)	(–2.70)	(–2.50)
RET_VOL	–0.1388	–0.1253	–0.0772	–0.1354
	(–1.60)	(–1.46)	(–0.79)	(–1.57)
EPS_VOL	0.0003	–0.0012	–0.0010	0.0000
	(0.04)	(–0.18)	(–0.12)	(0.00)
EGROWTH	0.0025	0.0032	0.0029	0.0030
	(0.95)	(1.15)	(1.05)	(1.09)
LOSS	0.0015	–0.0001	–0.0037	0.0001
	(0.11)	(–0.01)	(-0.27)	(0.01)
MTB	–0.0013	–0.0014	–0.0015	–0.0014
	(–0.72)	(-0.81)	(–0.77)	(-0.75)
MOMENTUM	0.0359***	0.0411***	0.0384***	0.0408***
	(3.36)	(4.23)	(3.99)	(4.24)
LEVERAGE	–0.0009	–0.0005	0.0016	0.0000
	(–0.17)	(–0.09)	(0.28)	(0.00)

(*Continued*)

Table 6
Continued

	PART =			
	(A) *R&D* *Coef.*	*(B)* *BA_Spread* *Coef.*	*(C)* *Uninformed* *Coef.*	*(D)* *F_Experience* *Coef.*
RELEASE_NEWS	–2.0197***	–1.8606***	–1.8792***	–1.8871***
	(–3.40)	(–3.37)	(–3.32)	(–3.38)
Industry fixed effects	Included	Included	Included	Included
Year fixed effects	Included	Included	Included	Included
Brokerage fixed effects	Included	Included	Included	Included
N	2,527	2,930	2,905	2,930
Adj. R^2	0.20	0.19	0.19	0.19
READABILITY+ *READABILITY* × *PART*				
(F-Statistics)	8.23***	9.83***	15.59***	10.52***

Note:
This table reports the regression results for the association between report readability and market returns, partitioned by variables that measure the importance of analyst report readability. T-values are reported in parentheses and standard errors are adjusted for firm clustering. Industry fixed effects are based on four-digit SIC codes. ***, ** and * represent significance at the 1%, 5% and 10% levels (two-tailed), respectively. Please refer to Appendix B for variable definitions.

trades greater (less) than US$ 30,000 (US$ 7,000) as large (small) trades. We then calculate the percentage of small trades for each firm during the *CAR* window [–1, 1]. We define *Uninformed* as 1 if the percentage of a firm's small trades is equal to or greater than the sample median, and 0 otherwise. The results in the third column show a significantly positive coefficient for *READABILITY*×*PART* ($t = 2.02$), suggesting that less-sophisticated investors benefit more from higher analyst report readability.

Finally, we examine the effect of analyst experience by defining *F_Experience* as a dichotomous variable that equals 1 if an analyst's firm experience is greater than or equal to the sample median, and 0 otherwise. An analyst's firm experience is the number of years through year t for which the analyst i supplied at least one forecast during year t for firm j. The results in the fourth column show a significantly positive coefficient for *READABILITY*×*PART* ($t = 2.03$; p-value < 0.05), suggesting that the market reacts more positively to the readability of reports written by experienced analysts.

After controlling for the partition variables, the main effect of *READABILITY* is no longer significant, and the F-statistics of *READABILITY* + *READABILITY*×*PART* are significant at the 1% level in all of the columns. Our results suggest that investors value analyst report readability in their investment decisions in situations where report readability is more likely to lower uncertainty.

8. ADDITIONAL TESTS

(i) Control for Report Information

Including forecast revision as a control variable may not fully capture the information in an analyst report. As such, we perform two tests that address this issue. First, we match the sample reports in pairs by firm and (the closest level of) analyst forecast

Table 7
Market Reaction and Analyst Report Readability: Additional Tests

$$CAR[-1,+1] = a + b^{*} READABILITY + c^{*}CONTROLS + \text{Industry fixed effects} + \text{Year fixed effects} + \text{Brokerage fixed effects} + \varepsilon \quad (1)$$

	(A) Matched sample Coef.	(B) More controls Coef.
Intercept	–0.0266	–0.1550**
	(–0.54)	(–2.01)
READABILITY	0.0240***	0.0334**
	(3.23)	(2.49)
ΔEST	8.3163***	0.0180***
	(5.24)	(3.33)
ΔREC		0.1741***
		(4.81)
ΔTP		6.5393***
		(3.63)
TONE	0.0408***	0.0344***
	(6.11)	(3.12)
LENGTH	–0.0015	0.0016
	(–0.55)	(0.26)
FIRM_EXP	0.0032	0.0014
	(0.78)	(0.23)
FIRM_COV	0.0145*	–0.0103
	(1.79)	(–0.79)
FREQUENCY	–0.0050*	0.0031
	(–1.74)	(0.62)
IND_COV	–0.0073	–0.0118
	(–1.31)	(–1.08)
GEN_EXP	–0.0066	–0.0078
	(–1.42)	(–1.08)
FERROR	0.0123	0.0119
	(1.20)	(0.84)
MVE	0.0000	0.0006
	(–0.01)	(0.11)
AGE	0.0087**	0.0041
	(2.15)	(0.73)
M&A	–0.0138*	–0.0142
	(–1.78)	(–1.30)
NOSEGMT	–0.0162***	–0.0197**
	(–2.68)	(–2.26)
RET_VOL	–0.1675	–0.1617
	(–1.52)	(–1.09)
EPS_VOL	–0.0036	–0.0156
	(–0.46)	(–1.19)
EGROWTH	0.0025	–0.0020
	(0.72)	(–0.41)
LOSS	0.0036	–0.0375*
	(0.19)	(–1.69)
MTB	–0.0006	–0.0045
	(–0.22)	(–1.54)
MOMENTUM	0.0507***	0.0372**
	(4.15)	(2.41)

(*Continued*)

Table 7
Continued

	(A) Matched sample Coef.	(B) More controls Coef.
LEVERAGE	−0.0015	−0.0014
	(−0.20)	(−0.17)
RELEASE_NEWS	−2.1599***	−1.6965*
	(−3.31)	(−1.97)
Industry fixed effect	Included	Included
Year fixed effect	Included	Included
Brokerage fixed effect	Included	Included
N	2,167	852
Adj. R^2	0.23	0.42

Note:
Column (A) of this table reports the regression results for the association between report readability and market returns using the matched sample. Column (B) reports the regression results for the association between report readability after controlling for the changes in recommendations and target prices. T-values are reported in parentheses and standard errors are adjusted for firm clustering. Industry fixed effects are based on four-digit SIC codes. ***, ** and * represent significance at the 1%, 5% and 10% levels (two-tailed), respectively. Please refer to Appendix B for variable definitions.

revision (ΔEST). The "matched sample" test provides better control of report news and unobservable firm characteristics. We choose a matching report based on the following criteria. First, the reports should be issued for the same company and forecasting period. Second, as the measurement window is 3 days, there should be more than 3 days between the two reports to differentiate the cumulative abnormal returns. Third, following the first two criteria, we keep only the match that has the smallest difference in ΔEST compared with the report. We delete the reports that lack a match. The criteria yield a sample size of 2,167 observations. The median value of the difference in ΔEST is 0.0003. This shows that the sample and control reports are close in terms of revision news. (Note that these reports are from the same firm and forecasting period.) The result is reported in column (A) of Table 7. The coefficient of *READABILITY* is again positive and significant (coef. = 0.0240, $t = 3.23$). Moreover, our result holds even after we place stricter restrictions on the number of days between two reports and the magnitude of the difference in ΔEST.

Second, we identify items that are likely to be discussed in an analyst report and thus affect the information content. Following Asquith et al. (2005), we include the changes in stock recommendations (ΔREC) and target prices (ΔTP) as controls. We obtain the data of stock recommendations and target prices from I/B/E/S. These additional data requirements substantially decrease our sample size from 2,930 to 852. Although the sample size is much smaller, *READABILITY* continues to exhibit a positive and significant coefficient. As shown in column (B) of Table 7, the coefficient is 0.0334 and significant at the 5% level ($t = 2.49$). Note that our current information content control is based on possible analyst outputs that have been examined in the literature, including analyst earnings forecasts (ΔEST), target prices (ΔTP) and stock recommendations (ΔREC). Overall, the two additional tests suggest that our results are robust.

Table 8

Market Reaction and Analyst Report Readability: Bundled Reports

CAR[–1, +1] = a + b READABILITY + c*CONTROLS + e*

	(A) Non-bundled Reports Coef.	*(B) Control for Bundled Indicator Coef.*	*(C) Control for Earnings Surprises Coef.*
Intercept	–0.0239	–0.0366	–0.0337
	(–0.50)	(–0.85)	(–0.83)
READABILITY	0.0169**	0.0182***	0.0146**
	(2.22)	(2.77)	(2.24)
BUNDLED		0.0065	
		(1.22)	
SURPRISE			10.6093***
			(5.45)
ΔEST	8.4597***	7.4263***	6.5779***
	(6.00)	(5.36)	(5.13)
TONE	0.0448***	0.0416***	0.0379***
	(6.44)	(6.59)	(6.03)
LENGTH	–0.0049*	–0.0039	–0.0044*
	(–1.68)	(–1.57)	(–1.80)
Firm and analyst controls	Included	Included	Included
Industry fixed effects	Included	Included	Included
Year fixed effects	Included	Included	Included
Brokerage fixed effects	Included	Included	Included
N	2,439	2,930	2,930
Adj. R^2	0.21	0.19	0.21

Note:

This table reports the regression results for the association between report readability and market returns, taking the bundled reports into consideration. T-values are reported in parentheses and standard errors are adjusted for firm clustering. Industry fixed effects are based on four-digit SIC codes. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-tailed), respectively. Please refer to Appendix B for variable definitions.

(ii) Other Tests

We perform other robustness tests. First, we control for the market effect of earnings announcements. We begin by testing whether our findings are robust for a subsample of analyst reports not issued concurrently around the earnings announcement date (non-bundled reports). The results in column (A) of Table 8 show a significantly positive coefficient for *READABILITY* at the 5% two-tailed level, suggesting that the bundling of analyst reports with earnings announcements does not drive our main findings. We also add an indicator variable (*BUNDLED*) that equals 1 if a report is issued concurrently with an earnings announcement in column (B), and control for the earnings news from concurrent earnings announcement (*SURPRISE*) in column (C). The variable *SURPRISE* equals the actual earnings minus the most recent analyst forecast scaled by the closing price 3 days before earnings announcement date if the earnings release occurs within 2 days around the analyst report issuance, and 0 otherwise. As shown in the table, the inclusion of these variables does not affect the significance of our findings.

9. CONCLUSION

This study examines the effect of analyst report readability on market pricing. We find that the market reacts positively to better readability, as more-readable reports decrease uncertainty of future earnings expectations. This reduction in uncertainty translates into lower discount rates when pricing future earnings.

To solidify our confidence in these findings, we examine how readability affects uncertainty and find that it decreases uncertainty of future earnings. We also explore the cross-sectional variation of the market's reaction to report readability and find that readability has a positive influence on stock prices when firms spend more on R&D, the bid-ask spread is wider, firms have a larger group of less-sophisticated investors, and the analysts writing the reports are more experienced. This provides important insights that analyst report readability only matters when there is high information asymmetry in the market. Finally, we conduct a series of robustness tests to further strengthen our conclusion that the market reacts positively to more-readable reports.

This study contributes to the financial analyst literature by establishing an important link between analyst report readability, the discount rate for a firm and subsequent market pricing. First, we find important evidence of how readability affects market pricing beyond the forecast revisions presented in the reports. Second, our evidence suggests that readability decreases uncertainty of earnings expectations. However, the evidence does not suggest a significant relationship between readability and changes in the level of earnings expectations. Although other studies of analyst reports focus on the tone of the reports, this study finds that report readability is a cleaner measure of how analyst reports affect the discount rate. Third, this study helps to clarify the role of analysts as information intermediaries. We find that stock returns are positive when the associated reports are more readable, which suggests that investors value the written presentation of analysts' research. Our study provides insights into how investors respond to analyst reports by outlining the relationship between report readability and market pricing.

This paper also leaves research opportunities for future studies. First, although we adopt several methods to control for the effect of information content and our results hold across all the tests, future studies may consider better controls for the information content of the analyst reports and explore the interactions among report components and their impact on investors. Second, we focus on a sample of firms in the high-tech industries. Future studies may expand the scope of their sample and provide more generalizable evidence covering other industries.

APPENDIX A

Examples of Analyst Report Readability (Two Analyst Reports on Citrix Systems Inc., July 20, 2006)

Example 1

"CTXS posted a solid quarter, although unlike recent quarters in which they were firing on all cylinders CTXS in 2Q06 suffered some blemishes which weren't bad but which didn't make for the kind of out-performance the stock's premium valuation seemed to be discounting.

Higher costs absorbed higher revenues leading to inline EPS and guidance.

We don't think the quarter reflected a marked change in CTXS' business, though it could suggest that the positive benefit to license revs from end-of-life programs is largely over. It highlights though a willingness by CTXS to sacrifice near term profitability (or upside) for faster future growth that investors likely haven't fully appreciated.

We do believe the company will pursue additional investments/acquisitions which could prove dilutive, with WAN optimization companies topping the list, though CTXS' past success should give them better credibility with investors.

Near term though the stock is likely to remain under pressure as 'whisper expectations' of higher than consensus estimates get reigned in."

Readability Indices	
Number of words	155
Average syllables per word	1.79
Average words per sentence	25.83
Fog index	17.82

Example 2

"CTXS reported strong revenue, but increased expenses led to inline EPS. We remain buyers into what we believe will be weakness from these results. We decrease our price target from $45 to $42.

Revenue of $275.5M exceeded our and consensus estimate of $266M and above the range of guidance of $254m to $266m. EPS of $0.33 was inline with consensus and at the top end of guidance. Expenses were higher due to an increase in headcount additions and the Reflectent acquisition, which closed in the quarter and was mildly dilutive.

Guidance was above street estimates, but only modestly above for EPS.

Guidance for Q3 was for revenue between $275m and $280m, with EPS between $0.33 and $0.34.

Guidance for FY 2006 was for revenue between $1.105B and $1.12B with EPS between $1.36 and $1.39.

Consensus revenue and EPS estimates for Q3 had been $273m and $0.34, and for FY 2006 $1.1B and $1.38.

We are making revisions to our estimates. For Q3, we increase our revenue estimate from $272m to $281m, and maintain our EPS estimate of $0.34. For CY 2006, we are increasing our revenue estimate from $1.09B to $1.11B and increase our EPS estimate from $1.38 to $1.39. For CY 2007, we are increasing our $1.22B revenue estimate to $1.23B and decreasing our $1.55 EPS estimate to $1.54.

We are reiterating our Buy rating but lowering our price target from $45 to $42, which reflects a 27x multiple on C'07 EPS (a slight premium to the group but a decrease from our previous 29 multiple)."

Readability Indices	
Number of words	258
Average syllables per word	1.5
Average words per sentence	17.2
Fog index	12.8

APPENDIX B

Variable Definitions

CAR[–1, +1] is the cumulative abnormal return from days –1 to +1. Day 0 is the analyst report date. The estimation is based on the market model using returns from days –131 to –31.

Δ*UNCERTAINTY* is calculated as the average implied volatilities from days 2 to 4, minus the average implied volatilities from days –4 to –2, divided by the average implied volatilities from days –4 to –2. Day 0 is the analyst report date. This variable is converted to a standardized ranking between 0 and 1 in regression analysis.

Δ*EXPECTATION* is calculated as the consensus mean forecast 1 month after the report date, minus the consensus mean forecast 1 month before the report date, scaled by the stock price 10 days before the report date. This variable is converted to a standardized ranking between 0 and 1 in regression analysis.

READABILITY is calculated as ***Fog_Index*** times (–1) and standardized between 0 and 1. ***Fog_Index*** refers to the *Fog* readability index of a report.

Δ*EST* is the difference between the analyst's EPS forecast on the report date and his or her last forecast for the same period, scaled by the stock price at the end of the last quarter.

TONE is a dichotomous variable that equals 1 if the percentage of words with positive emotion in a given report, *PCT_POS*, minus the percentage of words with negative emotion, *PCT_NEG*, is equal to or greater than 0; otherwise *TONE* equals 0. The emotions of the words used are defined according to the Linguistic Inquiry and Word Count (LIWC) 2007 dictionary.

LENGTH is the logarithm of the number of words in an analyst report.

FIRM_EXP is the logarithm of the number of years through year *t* for which analyst *i* supplied at least one forecast during year *t* for firm *j*.

FIRM_COV is the logarithm of the number of companies that analyst *i* followed in year *t*.

FREQUENCY is the logarithm of analyst *i*'s forecast frequency for firm *j* during year *t*.

IND_COV is the logarithm of the number of industries that analyst *i* followed in year *t*.

GEN_EXP is the logarithm of the number of years through year *t* for which analyst *i* supplied at least one forecast during year *t*.

FERROR is measured as the standardized ranking of the analyst's average forecast errors (|FE|) for firm *j* between 1986 and year *t* in each firm. |FE| is calculated as the absolute value of the difference between actual earnings and most recent forecast from analyst *i* for firm *j* before the earnings release, scaled by the stock price at the end of the last quarter. The standardized ranking of forecast errors for analyst *i* for firm *j* is calculated as the maximum forecast error for firm *j* in period *t* minus the forecast error of analyst *i* for firm *j* in period *t*, scaled by the maximum forecast error for firm *j* in period *t* minus the minimum forecast error for firm *j* in period *t*.

MVE is the logarithm of the market value of equity for the most recent quarter before the analyst report date.

AGE is the logarithm of firm age before the analyst report date.

M&A is a dichotomous variable that equals 1 if a firm engages in mergers and acquisitions in the quarter before the analyst report date, and 0 otherwise.

NOSEGMT is the logarithm of the number of business segments before the analyst report date.

RET_VOL is the standard deviation of the 15-month stock returns up to the most recent quarter before the analyst report date.

EPS_VOL is the standard deviation of EPS over a 16-quarter window up to the most recent quarter before the analyst report date.

EGROWTH is the quarterly growth (in percentage) of income before extraordinary items for the most recent quarter before the analyst report date.

LOSS is a dichotomous variable that equals 1 if the analyst's predicted earnings are negative, and 0 otherwise for the quarter before the analyst report date.

MTB is the market value of equity plus the book value of liabilities scaled by the total assets for the most recent quarter before the analyst report date.

MOMENTUM is the 180-day buy-and-hold return up to a report date.

LEVERAGE is the ratio of total assets to stockholders' equity for the most recent quarter before the analyst report date.

RELEASE_NEWS is the quarterly EPS from the most recent earnings release before the analyst report date minus the actual quarterly EPS from 1 year prior, scaled by the quarter-end stock price.

R&D is the R&D expense of the most recent quarter before the analyst report date, scaled by the total operating expenses of the same quarter.

BA_Spread is a dichotomous variable that equals 1 if the bid-ask spread is greater than or equal to the sample median, and 0 otherwise. The bid-ask spread is measured at the analyst's report-issuing month, scaled by the month-end stock price.

F_Experience is a dichotomous variable that equals 1 if an analyst's firm experience is greater than or equal to the sample median, and 0 otherwise. An analyst's firm experience is the number of years through year *t* for which the analyst supplied at least one forecast during year *t* for firm *j*.

Uninformed is a dichotomous variable that equals 1 if the percentage of small trades is greater than or equal to the sample median, and 0 otherwise. The percentage of small trades is calculated as the number of small trades scaled by the total number of trades occurring from days –1 to 1. Day 0 is the analyst report issuance date. Small trades are defined as trades whose dollar amount is less than US$ 7,000.

Δ*TP* is calculated as the target price on the report date divided by the most recent target price announced by the same analyst, minus 1.

Δ*REC* is calculated as the most recent recommendation (recommendation code from I/B/E/S) from the same analyst minus the recommendation on the report date.

BUNDLED is a dichotomous variable that equals 1 if the analyst report is issued on the same day as the earnings announcement, and 0 otherwise.

SURPRISE equals the actual earnings minus the most recent analyst forecast scaled by the closing price 3 days before earnings announcement date if the earnings release occurs within 2 days around the analyst report issuance, and 0 otherwise.

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