Language Barriers in Analyst Reports

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Abstract

This study explores whether language barriers affect investors' reactions to textual information in analyst reports. To this end, we compare the price reaction to the linguistic tone in Japanese and U.S. reports and analyze the effect of an English translation on that reaction. We find that prices react significantly to the linguistic tone in both Japanese and U.S. reports. However, we only observe a statistically significant price underreaction to Japanese reports. Further, the existence of an English translation mitigates this price underreaction. These findings support the view that language barriers induce investors to underreact to textual information.

Keywords: Language barrier; Financial analyst; Textual analysis; Linguistic tone

JEL classification: G10, G14

1. Introduction

This study examines whether and the extent to which language barriers affect investors' reaction to textual opinions in analyst reports. In particular, we compare the price reaction to textual opinions in Japanese reports (i.e., analyst reports of Japanese stocks written in Japanese) and U.S. reports as well as the price reaction to Japanese reports with and without an English translation.

Most finance studies that present textual analyses analyze English text. By contrast, few analyze whether and how the written language influences investors' reactions to qualitative (textual) information. Language barrier effects could be negligible if reports are written in a common business

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language such as English (and, more recently, Chinese). However, if reports are not written in a widely spoken language, such barriers could be sufficiently strong to slow the price reaction to textual information.

To analyze the impact of language barriers, we focus on Japanese reports for the following three reasons. First, according to measurements from the Foreign Services Institute of the U.S. Department of State and the language scores reported by Hart-Gonzalez and Lindemann (1993), Japanese is considered to be the most difficult language to learn. Indeed, unlike English, Japanese is far from a global language and is spoken almost exclusively in Japan. Second, although foreign investors have been gaining presence in the Japanese stock market, the main players remain Japanese investors. Thus, compared with other countries, services for foreign investors are still developing; indeed, local analysts still write a considerable number of reports in Japanese. According to Bae et al. (2008), the ratio of local analysts in Japan is the highest globally (88%), compared with just 9% in China. Similarly, approximately 75% of our sample of Japanese reports are not accompanied by an English translation. Finally, 25% of the sample are provided with an English translation, which is expected to lowers language barriers significantly. Therefore, analyzing the effect of an English translation on the price underreaction is expected to provide robust evidence on the influence of language barriers.

Since analysts are crucial to propagating negative information (Huang et al., 2014), we focus on the price reaction to negative textual opinions. Such opinions could contain incremental information, regardless of whether the report is issued in a common business language. Hence, prices could significantly react to such opinions regardless of the written language and existence of an English translation. However, foreign investors cannot react quickly to textual opinions in reports written in Japanese (especially when an English translation does not accompany the report) due to language barriers. In other words, language barriers amplify the information asymmetry between investors, which induces a price underreaction to textual opinions. Thus, we predict that price drift for negative textual opinions is observed in Japanese reports but not in U.S. reports. As an English translation significantly eases language barriers, the underreaction would be observed only in Japanese reports with no English translation.

To test our prediction of textual opinions in analyst reports, we use the linguistic tone in such reports. Specifically, we use the tone in the summaries of reports rather than that in the entire text. Analyst reports use different styles and formats (i.e., they have no standardized structure) and include considerable redundancy (i.e., irrelevant content). In contrast, as report summaries have a standardized structure and less redundancy, a summary or abstract of analyst reports is used for extracting incremental information on the report text (Ota, 2009).[2] As there are significant differences in the style and format of the text in Japanese and U.S. reports, which could adversely affect the fair comparison of the linguistic tone between samples, we use the summaries of reports obtained from the FactSet database. Analyzing the tone in these summaries could present a precise picture and provide robust evidence on the informational value and price reaction to the linguistic tone in U.S. and Japanese reports.

Overall, the results are consistent with our hypotheses. First, we find that stock prices react significantly to the negative tone in both samples, even after controlling for the price reaction to the quantitative outputs of the report. Moreover, no price correction is observed in the subsequent period. This result indicates that textual opinions add value in both types of reports.

Regarding the price underreaction, we observe long-term price drift for a negative tone in the Japanese sample, while no such price drift is observed in the U.S. sample. Investors react slowly to textual information in Japanese reports, while reacting immediately to it in U.S. reports. This asymmetric price reaction between the Japanese and U.S. samples is observed in qualitative outputs but not in quantitative ones. The result is consistent with the notion that the written language influences investors' reactions to qualitative information. Further, no price drift for a negative tone is observed for Japanese reports with an English translation but is for reports without it. Since language barriers are much higher for the latter, this result indicates that they affect the price reaction to the linguistic tone.

Our findings contribute to the literature on the informational role of financial analysts and the

[2] Consistent with this argument, Huang et al. (2014) reported that the linguistic tone of more concise reports offers more informational value than that of longer reports.

value of textual information in financial markets. Several studies have carried out textual analyses of corporate disclosures (e.g., Henry, 2008; Price et al., 2012; Ferris et al., 2013; Jegadeesh and Wu, 2013; Arslan-Ayaydin et al., 2016; Li et al., 2019), media articles (e.g., Tetlock, 2007; Tetlock et al., 2008; Garcia, 2012), and Internet posts (e.g., Bollen et al., 2011; Bartov et al., 2018; Tsukioka et al., 2018). Despite the burgeoning literature on textual analysis in finance, however, most studies analyze U.S. samples and overlook the importance of their written language. Our study highlights the language factor in textual information by showing that the written language significantly influences investors' reactions to the linguistic tone in analyst reports.

The remainder of this paper is organized as follows. In Section 2, we review the related literature and formulate the hypotheses. Section 3 presents the sample and methodology. In Section 4, we discuss the findings on the price reaction to analysts' textual tone. In Section 5, we discuss the robustness of our findings. Finally, in Section 6, we summarize the findings.

2. Related Literature and Hypotheses Development

2.1. Related Literature on Analyst Reports

Academics and practitioners have long been interested in analysts' research reports as an important source of stock market information. Along with company fundamentals, financial analysts research macroeconomic and microeconomic conditions to predict company performance. They also recommend buying or selling a company's stock based on its outlook. Analyst reports provide quantitative outputs such as stock recommendations, earnings forecasts, and target prices and offer qualitative outputs (textual opinions) such as company performance, business strategy, and business risk.

Previous studies have investigated whether analyst reports contain incremental information on stock valuations. Several studies report that quantitative outputs, including stock recommendations, earnings forecasts, and target prices, contain economically significant information (Stickel, 1995; Womack, 1996; Francis and Soffer, 1997).

However, previous studies show that issuing quantitative outputs is subject to various limitations.

Specifically, quantitative measures are optimistically biased (Das et al., 1998; Libby et al., 2008; Mayew, 2008) due to the incentive to generate underwriting business (Lin and McNichols, 1998) and trading commissions (Jackson, 2005; Irvine et al., 2007). Michaely and Womack (1999) and Barber et al. (2010) demonstrated that these conflicts of interest reduce the quality of quantitative outputs by analysts because they interfere with the reflection of their (honest) negative opinions.

In contrast, the text in analyst reports is subject to fewer restrictions. As highlighted by Tsao (2002) and Ramnath et al. (2008), significant information is present within the report text. Therefore, qualitative information, specifically the textual tone, might reflect analysts' true opinions. These arguments suggest that analysts' textual opinions, specifically negative ones, have informational value. Consistent with this idea, Huang et al. (2014) showed a significant stock price reaction to the negative tone in reports and Twedt and Rees (2012) showed no statistically significant association between report tone and post-event returns (i.e., stock prices react immediately to analysts' textual opinions).

Despite the considerable number of studies of U.S. reports, few analyze the informational value of Japanese reports. Kondo and Ota (2010) suggested that the quantitative outputs of Japanese reports have informational value by showing the significant price reaction to them. In terms of the informational value of qualitative outputs, Ota (2009) analyzed report summaries for Japanese stocks and showed that their textual information has significant informational value. However, as the sample was limited (232 reports issued by one foreign-affiliated security company in 2007) and the linguistic tone was manually determined and could be subjective, the conclusions cannot be generalized. In sum, no study has thus far provided sufficient empirical evidence on the informational value of the qualitative outputs of Japanese reports. Further, few studies clarify whether the written language matters to investors' reactions to textual information. This study fills this gap by analyzing the linguistic tone in Japanese reports and examining whether an English translation affects the price reaction to that linguistic tone.

2.2 Hypotheses Development

Primarily, we predict that language barriers do not affect the informational value of textual opinions in analyst reports, whereas they do affect the speed of investors' reactions to textual opinions. Therefore, we develop the hypothesis on the irrelevance of the written language to the informational value of the textual tone. Then, we develop the hypothesis on the effect of language barriers on the price underreaction to textual opinions.

2.2.1. Informational Value of the Report Tone

Studies (e.g., Das et al., 1998; Libby et al., 2008; Mayew, 2008) have argued that analysts' incentive structures constrain the expression of their bearish views to quantitative outputs. A negative report tone may thus reflect these bearish views that are not explicitly disclosed quantitatively. Additionally, Hong et al. (2000) proposed that analysts are crucial for propagating bad news because managers disseminate good news quickly but are less forthcoming about bad news (Miller, 2002; Kothari et al., 2009). Consistent with this argument, Huang et al. (2014) showed that a negative linguistic tone in U.S. reports has informational value. In terms of the linguistic tone in Japanese reports, Ota (2009) argued that the tone might have informational value,[3] suggesting that the negative linguistic tone also contains incremental information in Japanese reports.

As argued by Twedt and Rees (2012) and Huang et al. (2014), if the textual tone contains incremental information, investors (prices) react to the report tone around the publication date. Further, even if the report is issued in Japanese as opposed to a common business language, Japanese investors react to the tone. Consequently, we are likely to observe a significant price reaction to a negative report tone around the publication date in both Japanese and U.S. reports. This argument leads to the following hypothesis:

H1: Prices respond negatively to a negative linguistic tone in both Japanese and U.S. reports.

2.2.2. Price Correction and Underreaction

Even if H1 is accepted, we cannot conclude that the report tone contains incremental information on stock valuation. Stock prices could change even when investors react inappropriately to analysts' linguistic preferences and biased views. As argued by Tetlock et al. (2008), in this case, returns would

[3] As argued in Section 2.1, as the sample of Ota (2009) is limited, we need to confirm the informational value of the linguistic tone in Japanese reports.

subsequently reverse. Meanwhile, if the report tone contains incremental information, no price correction would occur. Thus, a price correction would not occur in either sample.

Additionally, foreign investors would face language difficulties when reading reports in Japanese. Therefore, while Japanese investors can quickly react to the textual opinions in these Japanese reports, foreign investors cannot due to language barriers. This information asymmetry between Japanese and foreign investors induces a gradual price reaction to the negative textual tone. Thus, prices underreact to the negative linguistic tone in Japanese reports. This argument leads to the following hypothesis:

H2: Prices underreact to the negative tone in Japanese reports.

By contrast, since both U.S. and non-U.S. investors can read U.S. reports written in English, the information asymmetry induced by the written language is marginal for these reports. Thus, although no price correction would occur, prices would be unlikely to underreact to the linguistic tone in U.S. reports. This argument leads to the following hypothesis:

H3: Prices react immediately to the negative tone without a subsequent price correction in U.S. reports.

2.2.3. Effect of an English Translation

Even if H2 and H3 are accepted, we still cannot conclude that language barriers induce a price underreaction to textual information, since the difference in the price underreaction between the two samples could be attributed to factors other than the written language (e.g., the ratio of sophisticated investors and analysts' conservatism). To provide further convincing evidence on the effect of language barriers, we compare Japanese reports with different language barriers. Specifically, we compare Japanese reports with and without English translations.

Non-Japanese speakers can easily understand the content of Japanese reports if an English translation accompanies them. In other words, language barriers are negligible for these reports. However, language hurdles remain significant for reports without translations, suggesting that prices underreact to the linguistic tone of reports without a translation, but not those with an English translation. This argument leads to the following hypothesis:

H4: A price underreaction is often observed in response to a negative tone in Japanese reports not accompanied by an English translation.

3. Data and Methodology

3.1. Samples

The Japanese sample includes research reports on firms listed on the Tokyo Stock Price Index (TOPIX) (in Japanese). Meanwhile, following Huang et al. (2014), the U.S. sample includes reports on S&P 500 companies (in English).

The report summaries are obtained from the FactSet database.[4] FactSet collects report summaries or requests analysts to provide summaries to add to its database. As explained in Section 3.2, the report tone is evaluated by the number of positive (negative) words frequently used in upgraded (downgraded) reports. Thus, since positive-tone (negative-tone) reports with upgraded (downgraded) recommendations are highly likely to reflect analysts' comments on the changes in their recommendations, we only include reports in which recommendations are reiterated.[5] Reports in a non-Japanese language and a non-English language are excluded from the Japanese and U.S. samples, respectively. We also exclude reports in which the summary only describes the purpose of issuing the report. When an analyst issues more than two reports of a stock within a day, only the first report is included in our sample.

Analyst report data and the corresponding prices and accounting data are also obtained from the FactSet database. The stock returns and explanatory variables for the Japanese and U.S. samples are calculated based on the Japanese yen and U.S. dollar, respectively. The study period runs from January 2013 to December 2017 because sufficient historical data for the Japanese sample is available from 2013.

3.2. Tone Measurement for Japanese Reports

To evaluate the tone in Japanese reports, we use the dictionary-based method. Unlike English, no suitable financial dictionary in the Japanese language exists. Therefore, following Kobayashi et al. (2017), who developed tone measures for analyst reports in Japanese, we use the wordlist originally

[4] The summaries of reports are also called report headlines in the FactSet database.
[5] Our sample does not include reports in which an analyst makes no recommendations.

generated from upgraded and downgraded analyst reports. Words frequently and evenly used in upgraded (downgraded) analyst reports are considered to be positive (negative). If the recommendation is reiterated, but the text contains positive (negative) words, the report is considered to be a positive-tone (negative-tone) report.

We extract 1,389 upgraded reports and 1,178 downgraded reports to identify positive and negative words. We calculate the frequency at which word *t* appears in the summaries of upgraded (S_U) and downgraded reports (S_D), denoted by TF (t, S_U) and TF (t, S_D), respectively. Higher TF (t, S_U), and TF (t, S_D) indicate that word *t* frequently appears in upgraded and downgraded reports, respectively.

Further, we calculate the information entropy of word *t* for upgraded (H(t, S_U)) and downgraded reports (H(t, S_D)). To examine whether the word appears evenly in every upgraded (downgraded) report, we calculate the information entropy, which is defined as follows:

$$\mathrm{H}(\mathrm{t}, S_U) = -\sum_{s \in S_U} P_U(t,s) log_2 P_U(t,s),$$

$$\mathrm{H}(\mathrm{t}, S_D) = -\sum_{s \in S_D} P_D(t,s) log_2 P_D(t,s),$$

$$P_U(t,s) = \frac{tf(t,s)}{\sum_{s \in S_U} tf(t,s)} \quad P_D(t,s) = \frac{tf(t,s)}{\sum_{s \in S_D} tf(t,s)},$$

where, $tf(t,s)$ is the frequency with which word *t* appears in sentence *s*.

Higher H(t, S_U) (H(t, S_D)) implies that word *t* is observed more evenly in upgraded (downgraded) reports. Positive (negative) words are expected to be observed frequently and evenly in every positive-tone (negative-tone) report. Therefore, following Kobayashi et al. (2017), we select positive (negative) words from upgraded (downgraded) reports based on frequency TF (t, S_U) (TF (t, S_D)) as well as information entropy H(t, S_U) (H(t, S_D)). We then calculate the degree of positivity or negativity of each word, which is denoted as W_P(t) and W_N(t), respectively:

$$W_P(\mathrm{t}) = \mathrm{TF}(\mathrm{t}, S_U)\mathrm{H}(\mathrm{t}, S_U),$$

$$W_N(\mathrm{t}) = \mathrm{TF}(\mathrm{t}, S_D)\mathrm{H}(\mathrm{t}, S_D).$$

As analysts prefer to use more positive words rather than negative words in their reports, $W_P(\mathrm{t})$ tends to be higher than $W_N(\mathrm{t})$. Indeed, $\sum W_P(\mathrm{t})$ is approximately 1.5 times higher than $\sum W_N(\mathrm{t})$ in our Japanese sample. To adjust for this bias, we calculate the adjusted W_N(t) (denoted as W_N^*(t)):

$W_N{}^*(\mathrm{t}) = \left(\frac{\sum \mathrm{W}_P(\mathrm{t})}{\sum \mathrm{W}_N(\mathrm{t})}\right) * \mathrm{W}_N(\mathrm{t})$

Following Kobayashi et al. (2017), we define positive and negative words as follows:

Word *t* is included in the positive wordlist if $W_P(\mathrm{t}) > 2W_N{}^*(\mathrm{t})$.

Word *t* is included in the negative wordlist if $W_N{}^*(\mathrm{t}) > 2W_P(\mathrm{t})$.

For convenience, we define the tone of word *t*, denoted as IT (t), as follows:

$$\mathrm{IT(t)} = \begin{cases} W_P(\mathrm{t}) - W_N{}^*(\mathrm{t}) & W_P(\mathrm{t}) > 2W_N{}^*(\mathrm{t}) \; or \; W_N{}^*(\mathrm{t}) > 2\mathrm{W}_P(\mathrm{t}) \\ 0 & elsewhere \end{cases}$$

Positive (negative) IT(t) indicates that word *t* is categorized as a positive (negative) word. We define the tone of the report's summary *s* (denoted as TONE) as

$\mathrm{TONE}(s) = \sum_{t \in s} \mathrm{IT(t)}$,

where, $t \in s$ represents word t that appears in summary *s*. Finally, we define the positive (negative) tone of a report, denoted as $\mathrm{TONE_P}$ and $\mathrm{TONE_N}$, respectively, as follows:

$$\mathrm{TONE_P} = \begin{cases} \mathrm{TONE} & if \; \mathrm{TONE} > 0 \\ 0 & elsewhere \end{cases}$$

$$\mathrm{TONE_N} = \begin{cases} \mathrm{TONE} & if \; \mathrm{TONE} < 0 \\ 0 & elsewhere \end{cases}$$

3.3. Tone Measurement for English Reports

To compare the tone in the Japanese sample with that in the U.S. sample, the method used to calculate the textual tone should be similar. Hence, the textual tone for the U.S. sample is first measured based on the dictionary for the Japanese sample. Specifically, as shown in the column "English Translation" in Table 1 (a) and (b), we translate the wordlist into English. Then, $\mathrm{TONE_P}$ and $\mathrm{TONE_N}$ for the U.S. sample are measured based on the translated dictionary, following the methodology explained in Section 3.2.

However, despite the similarity of the methodology, this method is uncommon and might not be the optimal one to evaluate tone in English reports. Therefore, we also use well-known tone measures based on the dictionary-based method proposed by Loughran and McDonald (2011). Each summary of an analyst's report is processed to identify each word, and we examine whether the word is included in the positive or negative wordlist. This process generates raw word counts of positive ($Positive_s$)

and negative words ($Negative_s$) in summary s. We then take the difference in the opposing categories and divide them by the sum of the two, ($Positive_s$ $- Negative_s$) / ($Positive_s$ $+$ $Negative_s$), and construct a measure for the linguistic tone ($TONE\_LM$) of each summary$_j$. This ratio is bounded between –1 and +1 and provides a metric for the relative positivity (and negativity) of the summary. Finally, we define the positive (negative) tone in a report, $TONE\_LM_P$, and $TONE\_LM_N$,[6] as

$$TONE\_LM_P = \begin{cases} TONE\_LM & if\ TONE\_LM > 0 \\ 0 & elsewhere \end{cases}$$

$$TONE\_LM_N = \begin{cases} TONE\_LM & if\ TONE\_LM < 0 \\ 0 & elsewhere \end{cases}$$

3.4. Research Design

We analyze the price reaction to the report tone to determine its informativeness for market participants. To test H1, we analyze a short-window market reaction to a negative tone ($TONE_N$). Based on the regression model of Huang et al. (2014), the following regression is estimated to determine the extent to which investors respond to the tone in analyst reports upon publication:

$$CAR = \alpha_0 + \beta\ TONE_N + \gamma_1 TONE_P + \gamma_2 EPS\_REV + \gamma_3 TP\_REV + \gamma_4 REC + (Controls) + \varepsilon. \quad (1)$$

Here, EPS_REV = change in earnings per share forecasted for the current fiscal year relative to that of the previous report (issued by the same analyst) deflated by the stock price 50 days before the report date.

TP_REV = change in the target price relative to that of the previous report (issued by the same analyst) deflated by the stock price 50 days before the report date.

REC = stock recommendation coded as buy = 1, hold = 0, and sell = -1.

Additionally, we include the following control variables and year dummies:

SUE = earnings surprise for days t-1 through t. This is equal to each firm's standardized unexpected quarterly earnings (Bernard and Thomas, 1989), which use a seasonal random walk with a trend model for each firm's quarterly earnings provided there is an earnings announcement for days t-1 through t (0 otherwise).

[6] We define $TONE\_LM_N$ so that a more negative value means a more negative textual opinion.

PCAR = the market-adjusted return for the last 10 trading days, skipping the most recent day.

MV = the logarithm of the market value of equity at the most recent end of June.

BM = the book-to-market ratio for the most recently ended year.

Additionally, the regression includes the industry and year dummies, where industry indicator variables are based on the Tokyo Stock Exchange's 10-industry classification scheme for the Japanese sample and the Standard Industrial Classification Division for the U.S. sample.

The dependent variable (CAR) is CAR[0,1] which is the cumulative two-day market-adjusted returns starting from the current report date. In Equation (1), we include the level of recommendation (REC), revisions in earnings forecasts (EPS_REV), and target prices (TP_REV) because previous research shows that these quantitative measures are informative for investors (Jegadeesh et al., 2004; Barber et al., 2010). The regression also includes several control variables. As analysts may piggyback on recent news and events, we include the market-adjusted returns of the last 10 trading days, skipping the most recent day (PCAR), to control for any potential short-term momentum or reversal of event returns. Additionally, to control for the price reaction to earnings surprises around the publication date, we include earnings surprises for days t-1 through t (SUE). To control for investors' reactions to firm characteristics, we also include firm size (MV), measured as the logarithm of the market value of equity, the book-to-market ratio (BM), industry indicator variables, and year dummies in Equation (1). As multiple analysts can follow the same firm and multiple reports for the same firm might be issued on the same date, the standard errors in all empirical tests are estimated with a two-way cluster control at the firm and publication date levels.

The significant and positive coefficient of $TONE_N$ (β) for CAR[0,1] indicates that prices react to a negative report tone, thus supporting H1. Furthermore, to test H2 and H3, we analyze the post-event (post-publication) market reaction to the report tone. Accordingly, the market-adjusted returns for days t+2 through t+50 denoted as CAR[2,50] are regressed on the same explanatory variables as in Equation (1). We first examine whether the coefficient of $TONE_N$ for CAR[2,50] is significantly positive for the Japanese sample. The significant and positive β results for CAR[2,50] indicate a significant underreaction to the negative tone, supporting H2. Then, we test if β is insignificant for CAR[2,50] in the U.S. sample. If so, prices react immediately to the negative tone in the U.S. reports without a subsequent price correction (H3 is supported).

To test H4, we separate the Japanese reports based on whether they are issued with an English translation from the FactSet database. Specifically, we split $TONE_N$ into $TONE\_E_N$ and $TONE\_J_N$, where $TONE\_E_N$ is a negative tone in reports with an English translation and $TONE\_J_N$ is a negative tone in reports without an English translation. Therefore, we define the dummy variable for being accompanied by an English translation as follows:

$$\text{ENG} = \begin{cases} 1 & \textit{if the report is accompanied by an English Translation} \\ 0 & \textit{elsewhere} \end{cases}$$ [7]

Next, we split the negative-tone measures (TONE_N) into those of reports with an English translation (TONE_E_N) and those of reports without (TONE_J_N) as follows:

$$\text{TONE\_E}_N = Eng * \text{TONE}_N$$

$$\text{TONE\_J}_N = (1 - Eng) * \text{TONE}_N$$

The decomposition of $TONE_N$ into $TONE\_E_N$ and $TONE\_J_N$ enables us to separately analyze the price reaction to the tone with and without English translations, respectively. To determine the extent to which investors respond to TONE_E_N and TONE_J_N, we run the following regression model for CAR[0,1] and CAR[2,50]:

$$CAR = \alpha_0 + \beta_J TONE\_J_N + \beta_E TONE\_E_N + \gamma_1 TONE_P + \gamma_2 EPS\_REV + \gamma_3 TP\_REV + \gamma_4 REC + (Controls) + \varepsilon. \quad (2)$$

We first examine whether the coefficients of TONE_E_N and TONE_J_N for CAR[0,1] are significantly positive to determine whether a negative tone is informative regardless of the existence of a translation. Then, to test H4, we compare the statistical significance between the coefficients of TONE_J_N and TONE_E_N for CAR[2,50].

4. Empirical Results

[7] We identify the existence of a translation by whether the report translated into English are issued on the same day.

4.1 Descriptive Statistics and Correlations

Regarding the dictionary for the Japanese sample, as described in Section 3.2, positive and negative words are selected using analyst reports for which recommendations were upgraded or downgraded. As shown in Table 1, 28 positive words and 33 negative words are selected to measure the report tone. Fourteen translated words from our positive wordlist (half of all the positive words) are also included in the positive wordlist of Loughran and McDonald (2011). Twenty-six translated words from our negative lists (78.8% of all the negative words) are also considered to be negative in their negative wordlist.

As shown in Table 2(a), the Japanese sample consists of 36,995 reports, of which 14,032 reports (37.9%) were recommendations to buy, while 3,340 reports (9.0%) were recommendations to sell. The earnings forecasts of 11,308 reports (30.6%) were revised upward, while 8,093 reports (21.9%) were revised downward. The target prices of 9,744 reports (26.3%) were revised upward, while 4,838 reports (13.1%) were revised downward. Regarding tone measures, 3,742 reports (10.1%) were negative-tone reports ($TONE_N < 0$), while 8,156 reports (22.0%) were positive ($TONE_P > 0$).

As shown in Table 2(b), the U.S. sample consists of 66,780 reports, out of which 32,452 reports (48.6%) were recommendations to buy, while 4,124 reports (6.2%) were recommendations to sell. The earnings forecasts of 9,669 reports (14.5%) were revised upward, while 7,795 reports (11.7%) were revised downward. The target prices of 7,128 reports (10.7%) were revised upward, while 3,258 reports (4.9%) were revised downward. Regarding the tone measures based on the translated wordlist, 6,064 reports (9.1%) were negative-tone reports ($TONE_N < 0$), while 12,212 reports (18.3%) were positive ($TONE_P > 0$). These ratios are similar to those in the Japanese sample. In contrast, regarding the tone measures based on the wordlist of Loughran and McDonald (2011), 17,371 reports (26.0%) were negative-tone reports ($TONE\_LM_N < 0$), while 15,697 reports (23.5%) were positive ($TONE\_LM_P > 0$). The ratio of negative-tone reports (26.0%) is much higher than the ratio when using the translated wordlist (9.1%) and the ratio in the Japanese sample (10.1%).[8]

[8] Loughran and McDonald (2011) designed their wordlists to identify more negative tone reports by increasing the number of negative wordlists. The increased number of negative words could result in a high ratio of negative reports.

Table 3 shows the correlation of the $TONE_N$ measures with the other variables. In both the Japanese and the U.S. samples, $TONE_N$ is weakly correlated with recommendations (REC), while it has no strong association with the other quantitative outputs (e.g., revisions in earnings forecasts and target prices). Additionally, there is no strong association with the other control variables (SUE, PCAR, MV, and BM).

There is a certain correlation between the two negative tone measures for the U.S. sample ($TONE_N$ and $TONE\_LM_N$). However, as the level is not substantial (0.279), both can be considered to be different identifiers of a negative tone. Finally, as shown in Table 2(a), 24.5% of the Japanese reports were accompanied by an English translation. Additionally, ENG has no strong association with the quantitative outputs or other control variables (Table 3(a)).

[Table 1]

[Table 2]

[Table 3]

4.2. Price Reaction around the Publication Date

Table 4 shows the price reaction to the report tone in the Japanese sample. The table presents the results of the regression estimations in Equation (1). First, the results reported in column "CAR[0,1]" reveal that the estimated coefficients of REC (stock recommendations), EPS_REV (earnings forecast revisions), and TP_REV (target price revisions) are significant and positive at the 1% level, indicating that stock prices positively react to these quantitative outputs. These findings are consistent with those of previous studies (Stickel, 1991, 1995; Womack, 1996; Francis and Soffer, 1997; Jegadeesh et al., 2004; Barber et al., 2010) that show the informational value of these quantitative outputs. Regarding reactions to the report tone, the estimated coefficient of $TONE_N$ (0.0945) is statistically significant. On average, a one standard deviation decrease in $TONE_N$ decreases the short-window return (CAR[0,1]) by 30 basis points.[9] Hence, stock prices react significantly to the negative tone in Japanese reports.

The analysis of the U.S. sample shows that prices significantly react to the negative tone in U.S.

[9] Lower $TONE_N$ indicates a more negative tone.

reports. As shown in Table 5(a), the estimated coefficient of $TONE_N$ for CAR[0,1] (0.0495) is statistically significant.[10] A one standard deviation decrease in $TONE_N$ decreases CAR[0,1] by 12 basis points. Further, prices significantly react to the tone, despite calculating the tone based on Loughran and McDonald (2011). As shown in Table 5(b), the estimated coefficient of $TONE\_LM_N$ for CAR[0,1] (0.0423) is statistically significant. These results are consistent with the findings of Twedt and Rees (2012) and Huang et al. (2014), supporting H1, which posits that stock prices react significantly to a negative tone.

[Table 4]

[Table 5]

4.3. Post-Event Returns

Tables 4 and 5 also show the effect of the report tone on post-event returns (market-adjusted returns for days t+2 through t+50). As shown in column "CAR[2,50]" of these tables, which presents the estimated results for the regression for CAR[2,50], stock recommendations (REC), earnings forecast revisions (EPS_REV), and target price revisions (TP_REV) have no significant association with post-event returns in either sample[11]. This indicates that stock prices immediately incorporate the information contained in these quantitative outputs (stock recommendations, earnings forecasts, and target prices) in both samples.

Table 4 shows that the coefficient of $TONE_N$ for CAR[2,50] (0.0481) is positive, indicating that no price correction is observed in Japanese reports. In contrast, this positive coefficient indicates that prices significantly underreact to the negative tone in Japanese reports. On average, a one standard deviation decrease in $TONE_N$ (stronger negative tone) decreases CAR[2,50] by 15 basis points. The results support H2.

Table 5 shows that the coefficients of $TONE_N$ and $TONE\_LM_N$ for CAR[2,50] (-0.0075 and 0.0110) are insignificant, indicating that no price correction is observed in U.S. reports. In other words, the report tone has a permanent impact on stock prices. Simultaneously, these insignificant coefficients

[10] The result also indicates that our translated wordlist is effective in identifying the tone of U.S. reports.
[11] The association are insignificant at the 1% level.

also indicate no price underreaction to the negative report tone in the U.S. sample. This finding supports H3 and is consistent with the findings of Twedt and Rees (2012).

4.4. Effect of an English Translation

Table 6 shows the regression results of Model (2) for the Japanese sample on whether the existence of a translation affects the price underreaction to the textual tone. Column "CAR[0,1]" shows that the coefficients of both $\mathrm{TONE\_J}_N$ and $\mathrm{TONE\_E}_N$ (0.0981 and 0.0807) are significantly positive, indicating that prices react to the tone in the Japanese reports regardless of the existence of a translation. In other words, the tone is informative regardless of whether a translation is provided.

Nonetheless, column "CAR[2,50]" reveals that the coefficient of $\mathrm{TONE\_J}_N$, which represents the negative tone in Japanese reports without any translation, is significantly positive, while the coefficient of $\mathrm{TONE\_E}_N$, which represents the negative tone in Japanese reports accompanied by an English translation, is insignificant. These results suggest that a price underreaction is observed only in Japanese reports not accompanied by an English translation, although the tone has informational value regardless of the existence of a translation. As the translation significantly eases language barriers in analyst reports, the result supports H4 and suggests that language barriers are a driving factor of the price underreaction to the textual tone.

[Table 6]

5. Robustness Tests

5.1. Abnormal Tone

This study evaluates the tone in report summaries by counting positive and negative words. However, some positive (negative) words might explain the positive (negative) quantitative outputs. A positive and negative tone might reflect information already incorporated into the quantitative outputs. Considering that no price underreaction is observed for the quantitative outputs, the existence of these words might result in underestimating the price underreaction to the incremental information in the textual tone. Specifically, the absence of an underreaction in the U.S. sample could be attributed to the underestimation. We address this by identifying the abnormal (incremental) tone by regressing the report tone on the quantitative outputs as follows:

$$TONE_N = \alpha_N + \beta_{N\_1}EPS\_REV + \beta_{N\_2}TP\_REV + \beta_{N\_3}REC + \varepsilon_N$$

$$TONE_P = \alpha_P + \beta_{P\_1}EPS\_REV + \beta_{P\_2}TP\_REV + \beta_{P\_3}REC + \varepsilon_P$$

Further, using the estimated coefficients ($\widehat{\beta_{N\_1}}$, $\widehat{\beta_{N\_2}}$, $\widehat{\beta_{N\_3}}$, $\widehat{\beta_{P\_1}}$, $\widehat{\beta_{P\_2}}$, and $\widehat{\beta_{P\_3}}$), we define an abnormal tone:

$$A\_TONE_N = TONE_N - \widehat{\beta_{N\_1}}EPS\_REV - \widehat{\beta_{N\_2}}TP\_REV - \widehat{\beta_{N\_3}}REC$$

$$A\_TONE_P = TONE_P - \widehat{\beta_{P\_1}}EPS\_REV - \widehat{\beta_{P\_1}}TP\_REV - \widehat{\beta_{P\_3}}REC$$

This adjustment is performed for the non-zero TONE measures ($TONE_P$, $TONE_N \neq 0$) to control for the positive and negative words used in the explanations of their quantitative outputs. Table 7(a) shows the regression results after replacing the TONE measures ($TONE_N$ and $TONE_P$) with the abnormal ones (A_TONE_N and A_TONE_P) for the Japanese sample. First, as shown in column "CAR[2,50]" the coefficient of A_TONE_N for CAR[2,50] (0.0411) is still significantly positive, indicating that prices significantly underreact to the negative tone in Japanese reports even after the adjustment. Table 7(b) reveals that A_TONE_N for the U.S. sample (the adjusted negative tone measures based on the translated wordlist) is not significantly associated with CAR[2,50]. Even after controlling for the negative tone attributed to the quantitative outputs, no price underreaction to the tone in the U.S. sample is observed.

[Table 7]

5.2. Small-cap U.S. samples

As the U.S. sample (S&P 500 listed firms) consists of larger-cap stocks than the Japanese sample (TOPIX index listed firms), the difference in the underreaction between the Japanese and U.S. samples could be attributed to differences in firm size. Therefore, we also analyze reports on small-cap U.S. stocks, i.e., listed firms of the S&P MidCap 400 Index and of the S&P SmallCap 600 Index. Subsequently, we compare the result with the results for S&P 500 listed firms and the small-cap stocks. The regression results for CAR[2,50] in Table 8 reveal that the coefficient of $TONE_N$ (-0.0194) is still statistically insignificant. No price underreaction to the report tone is observed for small-cap stocks, and the statistical significance does not increase by focusing on them. This result rejects the possibility that the difference in the price underreaction in U.S. and Japanese reports is attributed to differences in firm size.

[Table 8]

5.3. Unsophisticated Investors and Analysts' Cautiousness

In this study, we argue that language barriers in analyst reports induce the price underreaction to textual opinions on Japanese reports. However, the difference in the underreaction between the two samples could be attributed to differences in other factors that induce the price underreaction to such information. This section discusses two additional factors: unsophisticated investors and analysts' cautiousness in writing negative reports.

First, as unsophisticated investors cannot react to information immediately, the price underreaction could be attributed to unsophisticated investors in the Japanese market. However, historically, the ownership ratio of individual investors, regarded as unsophisticated investors, is much smaller for the Japanese market than for the U.S. market (Takamura, 2006). Considering that no price underreaction is observed in the U.S. market, where the ratio of individual investors is higher than that in the Japanese market, the price underreaction in the Japanese market is unlikely to be attributed to unsophisticated investors.

Second, we consider whether Japanese analysts' cautiousness in issuing negative reports may explain the underreaction to the negative tone, as such cautiousness the incorporation of negative information into stock prices. However, the descriptive statistics in Table 2(a) and (b) show that Japanese analysts issue more sell recommendations (9%) than U.S. analysts (6.2%), indicating that they are less reluctant to write negative reports. Considering that no price underreaction is observed in the U.S. market, where analysts are more reluctant to issue negative reports, the price underreaction is unlikely to be attributed to analysts' cautiousness in writing negative reports.

6. Conclusion

Previous studies have primarily analyzed textual information in U.S. reports written in English, which is a common business language, and rarely focused on the effect of the written language on investors' reactions to such textual information. We empirically examine this effect by comparing the informational value and price reaction to the linguistic tone in Japanese and U.S. reports as well as analyzing whether the existence of an English translation mitigates the price underreaction to the report tone.

The empirical results reveal that a negative textual tone in both samples has informational value; stock prices react significantly to such a tone without a subsequent price correction. Further, a statistically significant underreaction to the textual tone is observed in the Japanese sample, while no significant underreaction is observed in the U.S. sample. Finally, no price underreaction is observed for Japanese reports with an English translation but a price underreaction is shown for those without a translation. This result indicates that the existence of an English translation mitigates the price underreaction to the textual tone. In sum, these findings support the view that language barriers slow investors' reactions to textual information.

The contributions of our findings to the body of knowledge on this topic can be summarized as follows. First, our study provides evidence of the informational value of textual opinions not written in a common business language (Japanese), while most studies analyze those written in English. Second, the findings imply that the written language significantly affects the price reaction to qualitative (textual) information by showing that language barriers delay investors' reactions to textual opinions in analyst reports.

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Table 1

Wordlists

These tables present the 28 positive words and 33 negative words selected to measure the textual tone. Column "On LM list" shows whether the translated word is included in Loughran and McDonald's wordlist.

a) Positive words (28 words)

	Word (in Japanese)	English Translation	Weight	On LM List
1	改善	Improving, Improvement	0.294	✔
2	拡大	Expansion, Expanding, Expand	0.211	
3	注目	Attention	0.115	
4	継続	Continuation, Continue	0.107	
5	割安	Cheap, Undervalued	0.101	
6	増益	Profit increase, Increased profit	0.073	✔
7	安定	Stability, Stable	0.065	✔
8	加速	Acceleration, Accelerate, Accelerating	0.064	
9	底	Bottom	0.061	
10	向上	Improvement, Improve, Improving	0.061	✔
11	好調	Prosperous, Good	0.059	✔
12	ポジティブ	Positive	0.041	✔
13	持続	Persistent, Sustainable	0.040	
14	増額	Boost, Growth	0.033	✔
15	トレンド	Trend	0.026	
16	強い	Strong	0.026	✔
17	強気	Bullish	0.025	✔
18	還元	Premium redemption	0.024	
19	恩恵	Benefit	0.020	✔
20	抑制	Suppression	0.019	
21	印象	Impression, impress	0.019	✔
22	好転	Recovery	0.019	
23	進展	Progress	0.019	✔
24	増配	Increase in dividend, Increased dividend	0.013	
25	好機	Opportunity, Chance	0.013	✔
26	力強い	Powerful	0.008	
27	コストダウン	Cost reduction	0.008	
28	進む	Advance	0.008	✔

b) Negative words (33 words)

	Word (in Japanese)	English Translation	Weight	On LM List
1	懸念	Concern	-0.200	✔
2	低下	Decline	-0.161	✔
3	悪化	Worsening, Worsen	-0.117	✔
4	織り込み	Incorporated	-0.110	
5	鈍化	Slowdown	-0.094	✔
6	競争	Competition. Content	-0.094	✔
7	ネガティブ	Negative	-0.088	✔
8	減益	Fall in profit, Declining profit, Profit decline	-0.085	
9	不透明	Unpredictable, Uncertain	-0.076	✔
10	減速	Slowdown	-0.076	✔
11	縮小	Shrinkage, Shrinking, Shrink	-0.070	✔
12	格下げ	Downgrade	-0.041	✔
13	減額	Reduction, Reduce, Reduced	-0.041	
14	遅れ	lagging, lag, arrears	-0.039	✔
15	下回る	Miss	-0.031	✔
16	低迷	Slump, Downturn	-0.031	✔
17	低調	Sluggish	-0.031	✔
18	乖離	Divergence, Gap	-0.028	
19	踊り場	Temporal lull	-0.021	
20	激化	Escalation, Escalating	-0.021	✔
21	遅延	Delay	-0.021	✔
22	停滞	Stagnation	-0.021	✔
23	尚早	Premature	-0.021	✔
24	困難	Difficulty	-0.021	✔
25	厳しい	Difficult	-0.014	✔
26	過熱	Overheating	-0.013	
27	警戒	Caution	-0.013	✔
28	問題	Problem	-0.013	✔
29	軟調	Weak	-0.013	✔
30	不在	Absence	-0.013	✔
31	不振	Slackness	-0.013	✔
32	織り込む	Incorporate	-0.005	
33	伸び悩む	Stagnate	-0.005	✔

Table 2

Descriptive Statistics

Panels (a) and (b) report the descriptive statistics for the Japanese and U.S. samples, respectively. "Mean," "Std. Dev.," and "Median" show the average value, standard deviation, and median value, respectively; "5th," "25th," "75th," and "95th" show the 5th, 25th, 75th, and 95th percentiles, respectively; and "Ratio(>0)," "Ratio(<0)," and "Ratio(=0)" show the probability of the value being greater than zero, negative, or equal to zero, respectively. Note that MV, PCAR, CAR[0,1], and CAR[2,50] for the Japanese and U.S. samples are calculated on yen and U.S. dollar bases, respectively.

(a) Japanese sample

	Mean	Std. Dev.	Median	5th	25th	75th	95th	Ratio (<0)	Ratio (=0)	Ratio (>0)
$TONE_N$	-0.007	0.032	0.000	-0.070	0.000	0.000	0.000	0.101	0.899	0.000
$TONE_P$	0.026	0.069	0.000	0.000	0.000	0.000	0.180	0.000	0.780	0.220
REC	0.289	0.621	0.000	-1.000	0.000	1.000	1.000	0.090	0.530	0.379
EPS_REV	0.000	0.038	0.000	-0.011	0.000	0.001	0.013	0.219	0.476	0.306
TP_REV	0.014	0.098	0.000	-0.115	0.000	0.020	0.173	0.131	0.606	0.263
SUE	0.012	0.985	0.000	-1.106	0.000	0.000	1.111	0.163	0.663	0.174
PCAR	0.002	0.052	0.000	-0.073	-0.027	0.028	0.085	0.503	0.000	0.497
MV	5.744	0.559	5.732	4.840	5.365	6.147	6.634	-	-	-
BM	0.757	0.422	0.683	0.222	0.454	0.983	1.534	-	-	-
ENG	0.245	0.430	0.000	0.000	0.000	0.000	1.000	0.000	0.755	0.245
CAR[0,1]	0.003	0.042	0.001	-0.061	-0.016	0.020	0.070	0.485	0.000	0.515
CAR[2,50]	0.007	0.120	0.000	-0.155	-0.062	0.068	0.187	0.500	0.000	0.500

(b) U.S. sample

	Mean	Std. Dev.	Median	5th	25th	75th	95th	Ratio (<0)	Ratio (=0)	Ratio (>0)
$TONE_N$	-0.005	0.025	0.000	-0.031	0.000	0.000	0.000	0.091	0.909	0.000
$TONE_P$	0.010	0.038	0.000	0.000	0.000	0.000	0.041	0.000	0.817	0.183
$TONE\_LM_N$	-0.036	0.069	0.000	-0.167	-0.071	0.000	0.000	0.260	0.740	0.000
$TONE\_LM_P$	0.041	0.068	0.000	0.000	0.000	0.091	0.167	0.000	0.765	0.235
REC	0.429	0.607	0.000	-1.000	0.000	1.000	1.000	0.062	0.452	0.486
EPS_REV	0.000	0.003	0.000	-0.001	0.000	0.000	0.002	0.117	0.738	0.145
TP_REV	0.004	0.040	0.000	0.000	0.000	0.000	0.064	0.049	0.844	0.107
SUE	0.014	1.138	0.000	-1.635	0.000	0.095	1.621	0.245	0.488	0.266
PCAR	0.001	0.045	0.002	-0.067	-0.021	0.024	0.070	0.472	0.000	0.513
MV	4.442	0.471	4.370	3.798	4.085	4.761	5.314	-	-	-
BM	0.372	0.299	0.295	0.037	0.161	0.496	0.988	-	-	-
CAR[0,1]	0.001	0.039	0.001	-0.055	-0.014	0.016	0.059	0.479	0.000	0.507
CAR[2,50]	0.009	0.093	0.007	-0.131	-0.044	0.057	0.154	0.456	0.000	0.531

Table 3

Correlations

Panels (a) and (b) show the Pearson correlations between the variables for the Japanese and U.S. samples, respectively.

(a) Japanese sample

	$TONE_P$	REC	EPS_REV	TP_REV	SUE	PCAR	MV	BM	ENG
$TONE_N$	0.019	0.083	-0.020	-0.032	0.016	0.004	0.012	-0.009	0.013
$TONE_P$		0.051	-0.045	-0.159	0.014	-0.026	-0.039	0.020	-0.026
REC			0.005	0.039	0.010	0.009	0.087	-0.099	-0.027
EPS_REV				0.108	0.029	0.040	0.016	-0.047	0.005
TP_REV					0.022	0.205	0.022	-0.096	0.001
SUE						0.025	0.007	-0.023	0.007
PCAR							0.012	-0.021	-0.008
MV								-0.220	0.023
BM									0.003

(b) U.S. sample

	$TONE_P$	$TONE\_LM_N$	$TONE\_LM_P$	REC	EPS_REV	TP_REV	SUE	PCAR	MV	BM
$TONE_N$	0.053	0.279	0.059	0.061	0.027	0.037	0.038	0.042	0.016	-0.031
$TONE_P$		0.092	0.247	0.022	0.019	0.025	0.020	0.031	-0.016	0.014
$TONE\_LM_N$			0.317	0.110	0.051	0.077	0.064	0.078	0.012	-0.034
$TONE\_LM_P$				0.062	0.037	0.057	0.042	0.050	-0.019	0.011
REC					0.004	0.015	0.012	0.026	0.166	-0.036
EPS_REV						0.276	0.112	0.060	0.017	-0.009
TP_REV							0.091	0.132	0.022	-0.039
SUE								0.048	0.010	-0.037
PCAR									0.022	-0.006
MV										-0.074

Table 4

Market Reaction to Analyst Reports: Japanese Sample

This table shows the results of estimating Equation (1): $CAR = \alpha_0 + \beta TONE_N + \gamma_1 TONE_P + \gamma_2 EPS\_REV + \gamma_3 TP\_REV + \gamma_4 REC + (Controls) + \varepsilon$ (results for the industry indicators and year dummies are not reported). Columns "CAR[0,1]" and "CAR[2,50]" indicate the regression results when the dependent variables are market-adjusted returns for days t through t+1 and t+2 through t+50, respectively. The values reported in parentheses are t-statistics estimated using two-way cluster-robust standard errors. ** and *** indicate statistical significance at the 0.05 and 0.01 levels, respectively.

	Dependent Variables					
	CAR[0,1]			CAR[2,50]		
$TONE_N$	0.0945	***	(10.22)	0.0481	***	(2.71)
$TONE_P$	0.0155	***	(4.47)	-0.0068		(0.84)
REC	0.0038	***	(9.42)	-0.0015		(0.97)
EPS_REV	0.0456	***	(3.02)	-0.0348		(1.57)
TP_REV	0.0617	***	(16.61)	-0.0038		(0.45)
SUE	0.0018	***	(4.21)	0.0034	***	(3.42)
PCAR	-0.0228	***	(3.55)	-0.0224		(1.21)
MV	-0.0016	***	(3.31)	-0.0106	***	(4.20)
BM	0.0033	***	(3.58)	0.0041		(1.22)
Controls for Industry and Year Effects	Yes			Yes		
Intercept	0.0154	***	(3.30)	0.0467		(1.83)
Adjusted R2	3.40%			0.62%		
N	36943			36943		

Table 5

Market Reaction to Analyst Reports: U.S. Sample

Panel (a) shows the results of estimating Equation (1) for the U.S. sample. Panel (b) shows the results of estimating Equation (1) when we use $TONE\_LM_N$ and $TONE\_LM_P$ instead of $TONE_N$ and $TONE_P$, respectively. Columns "CAR[0,1]" and "CAR[2,50]" indicate the regression results when the dependent variables are market-adjusted returns for days t through t+1 and t+2 through t+50, respectively. The values reported in parentheses are t-statistics estimated using two-way cluster-robust standard errors. ** and *** indicate statistical significance at the 0.05 and 0.01 levels, respectively.

(a) Tone based on the translated wordlist

	Dependent variables					
	CAR[0,1]			CAR[2,50]		
$TONE_N$	0.0495	***	(5.82)	-0.0075		(0.39)
$TONE_P$	0.0261	***	(6.17)	-0.0013		(0.12)
REC	0.0017	***	(5.59)	0.0011		(0.85)
EPS_REV	0.8674	**	(2.45)	0.7868	**	(2.02)
TP_REV	0.2464	***	(11.03)	0.0139		(0.74)
SUE	0.0024	***	(7.77)	0.0020	***	(2.82)
PCAR	-0.0306	***	(3.58)	0.0029		(0.13)
MV	-0.0013	**	(1.96)	-0.0109	***	(3.69)
BM	0.0038	***	(3.20)	0.0121	**	(2.28)
Controls for Industry and Year Effects	Yes			Yes		
Intercept	0.0010		(0.31)	0.0530	***	(4.06)
Adjusted R2	8.97%			1.16%		
N	64999			64999		

(b) Tone based on the wordlist of Loughran and McDonald

	Dependent variables					
	CAR[0,1]			CAR[2,50]		
$TONE\_LM_N$	0.0423	***	(12.94)	0.0110		(1.57)
$TONE\_LM_P$	0.0225	***	(8.35)	0.0132		(1.86)
REC	0.0012	***	(3.89)	0.0008		(0.64)
EPS_REV	0.8397	**	(2.46)	0.7720	**	(1.97)
TP_REV	0.2420	***	(10.98)	0.0118		(0.63)
SUE	0.0023	***	(7.58)	0.0019	***	(2.71)
PCAR	-0.0346	***	(4.01)	0.0008		(0.04)
MV	-0.0011		(1.79)	-0.0108	***	(3.68)
BM	0.0041	***	(3.51)	0.0123	**	(2.31)
Controls for Industry and Year Effects	Yes			Yes		
Intercept	0.0011		(0.34)	0.0526	***	(4.06)
Adjusted R2	9.68%			1.19%		
N	64999			64999		

Table 6

Market Reaction to Analyst Reports: Existence of a Translation (Japanese Sample)

This table shows the results of estimating Equation (2) for the Japanese sample: $CAR = \alpha_0 + \beta_J TONE\_J_N + \beta_E TONE\_E_N + \gamma_1 TONE_P + \gamma_2 EPS\_REV + \gamma_3 TP\_REV + \gamma_4 REC + (Controls) + \varepsilon$. Columns "CAR[0,1]" and "CAR[2,50]" show the regression results when the dependent variables are market-adjusted returns for days t through t+1 and t+2 through t+50, respectively. The values reported in parentheses are t-statistics estimated using two-way cluster-robust standard errors. ** and *** indicate statistical significance at the 0.05 and 0.01 levels, respectively.

	Dependent Variables					
	CAR[0,1]			CAR[2,50]		
$TONE\_J_N$	0.0981	***	(9.49)	0.0524	***	(2.71)
$TONE\_E_N$	0.0807	***	(4.30)	0.0313		(0.83)
$TONE_P$	0.0155	***	(4.47)	-0.0068		(0.84)
REC	0.0038	***	(9.42)	-0.0015		(0.97)
EPS_REV	0.0456	***	(3.02)	-0.0348		(1.57)
TP_REV	0.0617	***	(16.60)	-0.0039		(0.45)
SUE	0.0018	***	(4.21)	0.0034	***	(3.43)
PCAR	-0.0228	***	(3.55)	-0.0224		(1.20)
MV	-0.0016	***	(3.32)	-0.0106	***	(4.20)
BM	0.0033	***	(3.58)	0.0041		(1.22)
Controls for Industry and Year Effects	Yes			Yes		
Intercept	0.0154	***	(3.33)	0.0468		(1.83)
Adjusted R2	3.40%			0.62%		
N	36943			36943		

Table 7

Abnormal Tone

Panels (a) and (b) show the results of estimating Equation (1) for the Japanese and U.S. samples, respectively, after replacing the TONE measures ($TONE_N$ and $TONE_P$) with the abnormal ones (A_TONE_N and A_TONE_P). Columns "CAR[0,1]" and "CAR[2,50]" show the regression results when the dependent variables are market-adjusted returns for days t through t+1 and t+2 through t+50, respectively. The values reported in parentheses are t-statistics estimated using two-way cluster-robust standard errors. ** and *** indicate statistical significance at the 0.05 and 0.01 levels, respectively.

(a) Japanese sample

	Dependent Variables					
	CAR[0,1]			CAR[2,50]		
A_TONE_N	0.0766	***	(9.93)	0.0411	***	(2.86)
A_TONE_P	0.0137	***	(3.95)	-0.0072		(0.87)
REC	0.0038	***	(9.60)	-0.0015		(0.98)
EPS_REV	0.0456	***	(3.01)	-0.0347		(1.57)
TP_REV	0.0617	***	(16.56)	-0.0037		(0.43)
SUE	0.0019	***	(4.24)	0.0034	***	(3.42)
PCAR	-0.0227	***	(3.52)	-0.0224		(1.20)
MV	-0.0017	***	(3.35)	-0.0106	***	(4.20)
BM	0.0033	***	(3.54)	0.0041		(1.22)
Controls for Industry and Year Effects	Yes			Yes		
Intercept	0.0155	***	(3.31)	0.0468		(1.83)
Adjusted R2	3.31%			0.62%		
N	36943			36943		

(b) U.S. sample

	Dependent variables					
	CAR[0,1]			CAR[2,50]		
A_TONE_N	0.0500	***	(6.01)	-0.0076		(0.40)
A_TONE_P	0.0263	***	(6.23)	-0.0015		(0.14)
REC	0.0017	***	(5.64)	0.0011		(0.84)
EPS_REV	0.8712	**	(2.47)	0.7864	**	(2.02)
TP_REV	0.2466	***	(11.04)	0.0139		(0.74)
SUE	0.0025	***	(7.79)	0.0020	***	(2.82)
PCAR	-0.0306	***	(3.58)	0.0029		(0.13)
MV	-0.0013	**	(1.96)	-0.0109	***	(3.69)
BM	0.0038	***	(3.20)	0.0121	**	(2.28)
Controls for Industry and Year Effects	Yes			Yes		
Intercept	0.0010		(0.30)	0.0530	***	(4.06)
Adjusted R2	8.97%			1.16%		
N	64999			64999		

Table 8

Market Reaction to Analyst Reports: U.S. Small-cap Sample

This table shows the results of estimating Equation (1) for the U.S. small-cap sample. Columns "CAR[0,1]" and "CAR[2,50]" show the regression results when the dependent variables are market-adjusted returns for days t through t+1 and t+2 through t+50, respectively. The values reported in parentheses are t-statistics estimated using two-way cluster-robust standard errors. ** and *** indicate statistical significance at the 0.05 and 0.01 levels, respectively.

	Dependent variables					
	CAR[0,1]			CAR[2,50]		
$TONE_N$	0.1018	***	(7.12)	-0.0194		(0.49)
$TONE_P$	0.0368	***	(3.70)	0.0087		(0.46)
REC	0.3437	**	(2.32)	-1.1987	**	(2.45)
EPS_REV	0.2066	***	(7.77)	0.0043		(0.11)
TP_REV	0.0019	**	(2.32)	0.0019	**	(1.97)
SUE	0.0038	***	(6.91)	0.0016		(0.69)
PCAR	-0.0337	***	(3.56)	-0.0403		(0.91)
MV	0.0003		(0.25)	-0.0593	***	(8.65)
BM	0.0049	***	(3.17)	0.0078		(1.27)
Controls for Industry and Year Effects	Yes			Yes		
Intercept	-0.0080		(1.49)	0.1874	***	(7.97)
Adjusted R2	8.65%			4.51%		
N	25302			25302		