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Katsuhiko MURAMIYA

Kazuhisa OTOGAWA

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Research Institute for Economics and Business Administration

Kobe University

2-1 Rokkodai, Nada, Kobe 657-8501 JAPAN

How Do Investors Trade When Actual Earnings Are Reported with Management Forecasts?*

Katsuhiko Muramiya† and Kazuhisa Otogawa‡

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Abstract: We use trade size to distinguish between individuals and institutions and then examine their trading behaviors around earnings announcements using data from the Tokyo Stock Exchange. Japanese listed firms have a distinctive financial reporting system in that they report actual earnings for prior and current years, and in addition, almost all of them release management earnings forecasts for the next year. Under this unique setting, we test whether individuals respond differently from institutions to the same earnings news. We document the following results: (1) With regard to current earnings, individuals (institutions) strongly respond to simplistic random walk forecast errors (analyst forecast errors), while do not always respond to analyst forecast errors (simplistic random walk forecast errors). (2) With regard to management earnings forecasts, both individuals and institutions use them, but individuals react to them literally. In contrast to naïve trading by individuals, institutions rationally respond to them with their predicted optimistic bias in mind. Overall, our results suggest that individuals' trading is so naïve as if they use nothing other than the information released at the time of earning announcement, while institutions' trading is so sophisticated.

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†Corresponding author. Research Institute for Economics and Business Administration, Kobe University.

Address 2-1, Rokkodai, Nada, Kobe 657-8501 JAPAN.

Tel. & Fax +81 78-803-7039; *E-mail address* muramiya@rieb.kobe-u.ac.jp (Muramiya).

‡Graduate School of Business Administration, Kobe University

1 Introduction

Prior research in accounting and finance tends to view individual and institutional traders differently; in particular, institutions are regarded as more sophisticated traders than individuals on the basis of the examination of their trading behavior. Earnings announcement is one of the events wherein researchers have documented the differential trading behavior between individuals and institutions.

In a pioneering paper, Lee [1992] finds that individuals buy stocks with both positive and negative surprises while institutions' trading directions generally correspond to the directions of earnings surprises. He suggests that the result is consistent with the hypothesis that individuals typically rely on a very different set of information sources from institutions and spend far less time on investment analysis, and therefore, these two investor groups trade differently even when they receive identical earnings news. We examine whether the trading behavior in response to identical earnings news is different between individuals and institutions using data from the Tokyo Stock Exchange (TSE).

Firms listed on the TSE have a unique practice of annual earnings announcements[1]. The TSE requires listed firms to report not only the actual earnings of the previous year and the current year but also the management earnings forecasts for the following year at the earnings announcements so as to provide information that is useful in investment decisions. Furthermore, these forecasts are released in the form of point estimates, because firms are recommended not to issue range or qualitative estimates (e.g., TSE [2006a]). Actually, almost all the firms report both the actual earnings for the two years and the point estimates of the management earnings forecasts for the next year in accordance with the TSE requirement. This fact implies that the contemporaneous discloses of the actual earnings and the management earnings forecasts are effectively mandated in Japan. This situation raises interesting questions about what information do individuals and institutions respond to and how to. Thus, we address this question by examining the investor-level reactions to simultaneously disclosed actual earnings and management earnings forecasts.

Before examining the investor-level reactions, we begin by investigating the market-level reactions,

[1]There are two reasons why we focus on not quarterly earnings announcements but annual earnings announcements. The first reason is that quarterly earnings announcements are not required by the TSE during the first half of our sample period (1999–2006). It was only in 2003 that the TSE made it mandatory for the listed firms to report quarterly earnings. Another, more important reason is that the TSE does not require the listed firms to report management earnings forecasts for the forthcoming quarter or the same quarter of the next year at the time of quarterly earnings announcements (e.g., TSE [2006a]). Since the purpose of this study is to examine the investor-level reactions to earnings announcements that include both actual earnings and management earnings forecasts, we do not focus on quarterly earnings announcements.

which are measured as abnormal stock returns, to earnings announcements. With regard to market-level reactions to current earnings, we find that the stock market reaction is strongly associated with analyst earnings forecasts errors as if the stock market forms an earnings expectation of the current year's earnings based on the latest analyst earnings forecasts. Because of the timing advantage (i.e., access to more recent information) and information advantage (i.e., access to a greater amount of available information), analyst earnings forecasts are more accurate than time-series statistical models including the random walk model (e.g., Brown and Rozeff [1978]), that is, they are the best available estimate at the earnings announcements. Therefore, such market reaction indicates that market participants, on average, integrate costly predisclosure information—analyst earnings forecasts—when forming earnings expectations.

However, we also find that the stock market reacts to the simplistic random walk forecasts errors (i.e., the difference between the actual earnings of the current year and the previous year), though the analyst forecasts errors are more strongly associated with the stock market reaction than the simplistic random walk forecasts errors. The firms listed on the TSE report not only the actual earnings of the current year but also the actual earnings of the prior year at the earnings announcements, and therefore, investors who only rely on the limited piece of information set that is easily available at the time are likely to hold naïve expectations based on the simplistic random walk model. The result suggests the possibility that certain groups of investors in the stock market depend on the readily available simplistic random walk model even though predictions based on it are significantly less accurate than the latest analyst earnings forecasts.

With regard to market-level reactions to the management earnings forecasts, we find that the stock market strongly reacts to the management earnings forecasts. It is well known that the management earnings forecasts issued at the time of earnings announcement, on average, are systematically upward biased and we can also observe such a tendency in our sample. Therefore, our finding indicates that the management earnings forecasts have information content for the stock market in spite of the general optimistic bias, which is consistent with Kato, Skinner, and Kunimura [2009].

Another important feature of the management earnings forecasts in Japan is that the forecast bias have a strongly positive autocorrelation structure: the forecast bias is positively associated with lag one. As long as the stock price is set by rational investors who are aware of the autocorrelation structure of the bias, the positive relationship between stock returns during the earnings announcement period and good news forecasts (bad news forecasts) should be weaker (stronger) when the managers have issued optimistic earnings forecasts in the previous year. Consistent with this prediction, we find that the stock market discounts good news forecasts if the managers issued optimistic forecasts at the earnings announcements of the previous year. This result suggests that for firms with good news forecasts, the stock market responds less positively to the management earnings forecasts with higher anticipated optimism by taking into account the autocorrelation structure of the forecast bias. In contrast, we find no evidence to support the prediction for firms with bad news forecasts. Since we find that bad news forecasts are less optimistically biased than good news forecasts, the result for bad news forecasts indicates that the stock market recognizes bad news forecasts as being inherently credible, and is thus literally responsive to bad news forecasts.

As the above analyses based on stock returns, which is an aggregate measure, implicitly assume that market participants are homogeneous (e.g., Lee [1992]), what information do individuals and institutions respond to and how to at the time of earnings announcement remain unsolved. Thus, we investigate the investor-level reactions to the earnings announcements. Following Lee [1992] and other studies, we use trade size to distinguish between individuals and institutions, and measure directional volume (i.e., signed order imbalance) in each investor group so as to capture their trading behavior. We suppose that individuals (institutions) make small (large) trades more frequently[2].

Regarding current earnings, we find that unusually the buying/selling activity of individuals during the earnings announcement period is positively associated with the simplistic random walk forecast errors, whereas has little association with the analyst forecast errors. The trading behavior in response to the current earnings depends on the earnings expectation that each investor has prior to the earnings announcements. Hence, this result suggests that individuals regard the actual earnings of the previous year as prior earnings expectations even though significantly better earnings expectations in the form of analyst earnings forecasts are available if they are willing to incur costs in acquiring the information. They form less costly earnings expectation based on the last year's earnings as though they only read the earnings reports and/or the financial press.

With regard to the management earnings forecasts, we find that the relation with the unusual buying/selling activities of individuals during the earnings announcement period is a purely mechanical one: they respond to the management earnings forecasts literally without considering the positive autocorrelation structure of the management earnings forecasts bias. If they are ready to incur the two types of

[2]Therefore, we use the term individuals (institutions) and small traders (large traders) interchangeably throughout this paper.

costs, that is, the information acquisition cost (obtaining the management earnings forecasts issued at the earnings announcements of the previous year) and the information processing cost (analyzing the bias in them), they could predict the bias in the forecasts issued at the current year's announcement. Actually, however, they ignore the autocorrelation structure, and hence, trade on the management earnings forecasts at face value. In sum, the individuals' trading behavior in response to the contemporaneous announcements of actual earnings and management earnings forecasts is so naïve as if they use nothing other than the information released at the time of earnings announcement. Individuals seem to avoid incurring the costs of gathering and processing information.

In contrast to naïve trading by individuals, we find that the institutional trading behavior is more sophisticated. For current earnings, the abnormal buy/sell order imbalance of institutions during the earnings announcement period is strongly positively associated with the analyst forecasts errors, and has a relatively modest positive association with the simplistic random walk forecast errors. This result suggests that institutions actively use the analyst earnings forecasts that are costly predisclosure information when they form earnings expectations.

As far as the management earnings forecasts are concerned, consistent with the movement in stock returns around earnings announcements, we find that institutions adjust their trading in response to the good news forecasts by taking into account the autocorrelation structure of the management forecasts bias: the abnormal buy/sell order imbalance of institutions during the earnings announcement period is more (less) positively associated with the good news forecasts if the managers issued pessimistic (optimistic) forecasts at the time of earnings announcement in the previous year. In other words, for the good news forecasts, institutions discount them with higher anticipated optimism by reference to the previous year's management earnings forecasts bias. In contrast to the good news forecasts, we find that the institutions' reaction to bad news forecasts does not depend on the prior management forecasts bias. This result is also consistent with the movement in stock returns around the earnings announcements. Recall that the bad news forecasts are less optimistically biased than the good news forecasts. Therefore, the result for the institutional trading behavior in response to the bad news forecasts indicates that institutions recognize the bad news forecasts as being inherently credible, and thus, take the bad news forecasts at face value even when the previous management forecasts are optimistically biased. Our results suggest that institutions are more willing to incur additional costs for gathering and processing information as compared to individuals: they tend to actively use costly predisclosure information such as analyst earnings forecasts and prior management earnings forecasts, and then properly unscramble the earnings information released at the time of earnings announcement in combination with such costly information.

Finally, we provide the evidence that the individuals' (institutions') unusual buy/sell order imbalance during the earnings announcement period is positively (negatively) associated with the post-announcement returns over a sixty-day period. This result indicates that institutions earn positive returns from their rational trading in response to earnings announcements, while individuals receive negative returns from their naïve trading.

Overall, our empirical results suggest that in the Japanese setting, institutions make better use of the earnings announcement information including the management earnings forecasts. This is consistent with prior research in the sense that institutions are more sophisticated traders than individuals.

Our study makes three contributions. First, our study contributes to the existing literature on management forecasts by providing new evidence of how individuals and institutions respond to the management earnings forecasts when the information is mandatorily disclosed at the time of earnings announcement. Although Patell [1976], which is one of the pioneering studies in management forecasts research, finds that a forecasts disclosure is accompanied by a significant price adjustment and concludes that the management forecasts convey useful information to investors, he states the following limitation of the research, "... since I deal only with voluntary disclosure, the question of investor ... response to mandated forecasting procedures remain unresolved." Kato, Skinner, and Kunimura [2009] answered this unsolved question using data from the TSE in which disclosing management forecasts is effectively mandatory. They find that the management earnings forecasts are significantly associated with the stock returns during the announcement period, and then, conclude that the management forecasts are informative. They, however, only investigate the aggregate market reaction to effectively mandated management forecasts, and hence, who responds to the information and how are still unresolved. Our research design allows us to answer this question and we reveal that individuals and institutions respond to the mandated management earnings forecasts differently.

Second, we provide additional evidence on the stock market reactions to the predicted bias in the management earnings forecasts. Rogers and Stocken [2005] investigate the stock market's response to the predicted bias and show that the stock market filters out the predictable bias in the management earnings forecasts but this filtering is more pronounced when the manager reports good news forecasts. We measure the predicted bias using the autocorrelation structure of the management forecasts bias and reveal that the stock market filters out the predicted bias in the good news forecasts but not in the bad news forecasts, which is consistent with Rogers and Stocken [2005]. Our contribution is to investigate not only the market-level reactions but also the investor-level reactions to the predicted bias in the management earnings forecasts. We find that the institutional trading behavior in response to the predicted bias resembles the stock market reaction, while the individuals' trading behavior does not. Our findings suggest that the filtering behavior is observed for institutions but not for individuals.

Third, we corroborate and extend Lee's [1992] findings regarding the differential trading behavior between individuals and institutions in response to earnings news. Prior works provide some evidence that individuals and institutions differ systematically in their reactions to earnings news (e.g., Lee [1992]; Bhattacharya [2001]; Battalio and Mendenhall [2005]). However, as to why their responses vary is yet to be properly answered. Our results suggest that the attitudinal difference for the cost of gathering and processing information appears to be the plausible reason. Individuals prefer to use easily available information at low cost and spend far less time on analyzing the earnings information. Therefore, they ignore the analyst forecasts when they react to the current earnings and also ignore the autocorrelation structure of the management forecasts bias when they react to the management earnings forecasts. In contrast, institutions tend to willingly use the costly predisclosure information and unscramble the earnings information released at the time of earnings announcement in combination with such these costly predisclosure information, so that they use the analyst forecasts and anticipate the autocorrelation structure of the management forecasts bias. Thus, we claim that the information cost might fully explain the differential trading behavior between individuals and institutions under the Japanese earnings announcement setting.

The paper proceeds as follows. The next section explains the institutional background of the management earnings forecasts in Japan and develops our hypotheses. In Section 3, we present the research design and data description. Section 4 reports the empirical results using the data from the TSE. Finally, Section 5 presents the summary and conclusion.

2 Institutional Background and Hypotheses Development

2.1 Financial reporting system in Japan: Overview

In Japan, there is a distinctive financial reporting system in that the listed firms simultaneously report not only several current financial items but also the management forecasts of these items at the annual earnings announcement. The Securities Listing Regulations, promulgated by the TSE, have requested the firms to disclose the financial results for a fiscal year in a prescribed form. This earnings report is called *Kessan-Tanshin*, and includes space for management forecasts. Therefore, the listed firms are expected to report the management forecasts for the next fiscal year along with the current financial performance.

However, there are cases for not reporting the management forecasts. The TSE allows the firms that are very uncertain about their future prospects to not report the management forecasts so that investors do not make decisions based on misleading information (TSE [2006a])[3]. Thus, there are some exceptions, but most firms report the management forecasts in accordance with this requirement. In fact, Kato, Skinner, and Kunimura [2009] show that 93.7% of the firm-years in their sample period (1997–2007) have management forecasts data. This result suggests that the contemporaneous announcements of the current and future financial performance are common, and there is no doubt that the practice of reporting both the current performance and the management forecasts is effectively mandated in Japan.

The listed firms are required by the TSE to submit a non-audited overview of some financial measures (i.e., earnings report) as soon as possible[4]. The submission deadline is 45 days after the end of the fiscal year. The financial information in the earnings report is disseminated through the disclosure network system (Timely Disclosure network; TDnet) immediately after submission. The actual earnings for the previous and current years and the management earnings forecasts for the following year are also published in the *Nihon Keizai Shimbun* (a major financial press in Japan) in the next morning. Thus, investors can easily receive the firms' financial information through TDnet, the newspaper, or other information channels at the latest within one day after the earnings announcements.

Table 1 shows the typical format of an earnings report that Nintendo Co., Ltd (one of the most famous videogame console and handheld device makers in Japan) announced as part of its annual financial results as of March 2009 on May 7, 2009. The document briefly reports the sales, operating income, earnings from continuing operation, net income, earnings per share, and dividend per share for the previous and current years[5]. Furthermore, the management's point estimates of these financial items for the following year are also reported.

In the U.S., there are safe harbor rules for forward looking information so that the managements cannot be easily sued for forecasts that did not materialize. As in the U.S., the managers will not be held

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[3]Indeed, most security firms do not provide management forecasts for the reason that their future financial performance is liable to volatility in the stock market. However, the TSE requires even these firms to report the management forecasts during the fiscal year shortly after ambiguity is clarified (TSE [2006a]).

[4]After announcing this earnings report, the firms also have to submit audited financial statements, such as the balance sheet, income statement, and cash flow statement, within three months after the fiscal year's end. The investors can access these statements on the firms' web sites or on the Electronic Disclosure for Investors' NETwork (EDINET) system, which is similar to the Electronic Data-Gathering, Analysis, and Retrieval (EDGAR) system in the U.S.

[5]Since 2007, the TSE requires the listed firms to report the management forecasts of operating income because of its growing importance for investors.

liable for falling short of their forecasts in Japan. The Securities Listing Regulations require the managers to publicize the updated forecasts during the fiscal year as soon as they realize the significant revisions in the initial management forecasts announced at the beginning of the fiscal year[6]. In addition, once they revise their forecasts, they should report the updated forecasts again if there are significant revisions in the previously announced revised forecasts. In other words, this regulation requests the managers to report the updated forecasts immediately after they realize a wide divergence between the latest forecasts and the updated forecasts[7]. As long as they follow this rule, they will never be blamed for falling short of their forecasts (e.g., Ota [2010]).

This environment gives the managers incentives to issue biased forecasts at the beginning of the fiscal year, because they have only to issue updated forecasts during the fiscal year even if they issue misrepresented forecasts at that time. Indeed, Kato, Skinner, and Kunimura [2009] find that the managers in Japan, on average, bias their initial forecasts upward but then revise their forecasts downward during the fiscal year in order to avoid negative earnings surprises. Ota [2006] examines the association between the specific firm characteristics and the initial forecasts bias. He shows that while the managers of small firms, OTC listed firms, and financially distressed firms tend to issue optimistic forecasts, those of firms in price-regulated industries (e.g., electricity and gas industries) tend to release pessimistic forecasts. These studies suggest that the initial forecasts announced at the time of earnings announcement might be intentionally distorted by some managers.

2.2 Trading behavior of small and large traders to current earnings information

In this section, we develop our hypotheses about the trade reaction to current earnings around the earnings announcement separately for small and large traders.

The trading behavior in response to the current earnings around that time depends on the prior earnings expectation of each investor. When the reported actual earnings are higher (lower) than the investors' expectation prior to the earnings announcement, they revise their belief about the firm's future prospect upward (downward) and therefore buy (sell) shares of the stock following the announcement.

There may be two earnings expectations that investors are likely to have. One is the expectation

[6]Similar regulations also exist in the Securities and Exchange Act (now called the Financial Instruments and Exchange Act), imposed by the Japanese government.

[7]The Securities Listing Regulations indicate that the difference between the latest forecasts and the updated forecasts is significant when the updated sale (earnings) forecasts increase or decrease by more than 10% (30%) of the former forecasts, or the dividend per share forecasts are changed.

following a simplistic random walk model (i.e., the expected earnings are simply the earnings for the previous year). As mentioned above, not only the current earnings but also the previous year's earnings are reported in the earnings report and the major financial press. Therefore, investors who rely exclusively on the information reported at the time of earnings announcement tend to hold the earnings expectation that follows the random walk model. Such investors' primary focus is on a comparison of the earnings of the current year with those of the previous year and they would buy (sell) stocks with positive (negative) random walk forecasts error. In the example in Table 1, because the random walk forecasts error is positive (22 billion yen, calculated by subtracting the previous year's net income (257 billion yen) from the current year's net income (279 billion yen)), such investors are expected to buy the stock[8].

The second is the expectation following the analysts' forecasts. Financial analysts incorporate into their earnings forecasts all the interim information reported by the firm and the economic news in a timely fashion. In addition, because they collect information not only from public but also from private sources, their earnings forecasts also reflect private information (e.g., Healy and Palepu [2001]). Because of the timing advantage (i.e., access to more recent information) and information advantage (i.e., access to a greater amount of available information), their earnings forecasts are more accurate than the time-series statistical models including the random walk model (Brown and Rozeff [1978]; Brown, Hagerman, Griffin, and Zmijewski [1987])[9]. Therefore, considering the forecasts accuracy, rational investors should use the analysts forecasts that are the best available forecasts at the time of earnings announcement in forming expected earnings. The major concern of such investors is whether the reported current earnings exceed the latest analysts forecasts; they would buy (sell) stocks with positive (negative) analyst forecast errors. Taking the case of Nintendo for example, if the latest analyst earnings forecast is 290 billion yen, the analyst forecast error is negative (minus 11 billion yen, calculated by subtracting the latest analysts earnings forecast (290 billion yen) from the current year's net income (279 billion yen)). Consequently, the reported earnings are lower than expectations—the latest analysts forecasts—and therefore, such investors would sell the stock.

Given the analysts superiority in predicting the firm's earnings to the simplistic random walk model, most of the investors probably use the analysts earnings forecasts as their prior expectations. However, previous studies examining stock returns around the quarterly earnings announcements in the U.S. do

[8]Some firms reporting losses do not report earnings per share, and hence, we use earnings on a total amount basis in this example and also in our empirical analyses.

[9]We can observe a similar result in Japan when we compare the accuracy of the analyst forecasts to that of the random walk forecasts. See section 3.5 for details.

not always support this notion. Several studies find that some investors hold naïve expectations based on a seasonal random walk model. For example, Bernard and Thomas [1990] provide the evidence that the stock prices at least partially reflect the earnings expectations based on the seasonal random walk model.

A few recent studies investigate what type of investor tends to hold naïve expectations more directly using high frequency data. Bhattacharya [2001] reveals that small traders' trading activity around the earnings announcements is increasing in the absolute seasonal random walk forecast errors. Battalio and Mendenhall [2005] find that small traders are likely to buy (sell) stocks when the current quarterly earnings are higher (lower) than those of the same fiscal quarter of the previous year. Shanthikumar [2004] examines the association between the trading behavior of small traders around the earnings announcements and the seasonal random walk forecast errors[10]. She shows that the buying activity of small traders is not associated with the seasonal random forecast error in the few days before the earnings announcement, while it is positively associated with the error once the earnings are made pubic. These studies reach the same conclusion that small traders, represented by individuals, appear to hold earnings expectations based on an inferior and unsophisticated model (i.e., a seasonal random walk model) despite the availability of a more accurate and sophisticated forecast (i.e., the analysts forecast). Such traders' activity is consistent with the assumption that they only rely on limited piece of information that is available at lower cost; they behave as if they only read the "Digest of Earnings Reports" in the *Wall Street Journal* including the year-to-year change in the quarterly earnings, and therefore, regard the earnings for the corresponding quarter of the previous year as the expected earnings (see also, Bernard and Thomas [1990]; Bartov, Radhakrishnan, and Krinsky [2000]). Prior research in the U.S. suggests that small traders tend to ignore costly predisclosure information as represented by analyst forecasts and use the seasonal random walk model in reference to the less costly incomplete information set available at the time of earnings announcement.

Further in Japan, investors can access to both the current earnings and the previous year's earnings through the TDnet or the major financial press at a low cost as described above. If the implication of prior research in the U.S. is applicable to the annual earnings announcements in Japan, small traders will ignore important predisclosure information and rely exclusively on less costly information in forming expected earnings. In such a case, the earnings expectation of small traders will most likely reflect the

[10]Shanthikumar [2004] uses both the simplistic seasonal random walk model and the seasonal random walk model with drift. Her result is not sensitive to the choice of the expectation model.

random walk forecast, and therefore, the positive (negative) random walk forecast error triggers buying (selling) activity in the trades initiated by them. Hence, we formalize our first hypothesis, in alternative form, as follows:

Hypothesis 1: The buying/selling activities of small traders around earnings announcements are positively associated with the random walk forecast errors and are not positively associated with the analyst forecast errors.

On the other hand, several studies in the U.S. find that large traders, represented by institutions, tend to use a more accurate prediction, an analyst forecast, in forming their earnings expectations. For example, Walther [1997] assumes that the institutional ownership captures the degree of sophistication of the marginal investor and then examines the association between the institutional holding and the information used to form expected earnings. She shows that the stock returns around earnings announcements are more strongly associated with the analyst forecast errors for stocks for which the marginal investor is more likely to be sophisticated. Her result indicates that the institutions' earnings expectations resemble the analysts forecasts more closely than the naïve forecasts.

By using high frequency data, Battalio and Mendenhall [2005] investigate what type of investors' earnings expectation follows the analysts forecasts more directly. They find that large traders, represented by institutions, use the earnings prediction based on analyst forecasts. Shanthikumar [2004] shows that large traders respond more strongly to earnings surprises based on analyst forecasts than do small traders throughout the event period from 3 days before to 3 days after the earnings announcement date. These results suggest that large traders actively incorporate even costly predisclosure information such as analyst forecasts into their earnings expectations regardless of the cost of information acquisition. Therefore, large traders rely much more on the analysts forecasts that are the best available estimates at the time of earnings announcement than the seasonal random walk model forecasts in forming expected earnings, and they behave as if they hold the earnings expectations that resemble analyst forecasts.

If the implication of the U.S. research is applicable to the Japanese setting, large traders will strongly react to the analyst earnings forecast errors around the annual earnings announcements. In other words, when the reported actual earnings are higher (lower) than the most recent analyst forecasts, large traders should revise their beliefs upward (downward) and then buy (sell) the stocks following the announcement. Hence, the second hypothesis (stated in alternative form) is developed as follows:

Hypothesis 2: The buying/selling activities of large traders around earnings announcements are positively associated with the analyst forecast errors and are not positively associated with the random walk forecast errors.

In the next section, we develop our hypotheses about the trade reaction to the management earnings forecasts released under the unique earnings announcement setting in Japan separately for small and large traders.

2.3 Trading behavior of small and large traders in response to the management earnings forecasts

Numerous researchers have investigated the stock market reaction to the voluntarily disclosed management forecasts in the U.S. since the 1970s. For instance, early studies show that disclosing management forecasts triggers significant changes in the stock price and/or increases in the trading volume (e.g., Foster [1973], Patell [1976], Penman [1980]). In addition, the following studies find that the stock returns around the management forecasts announcements are positively associated with the unexpected component of management forecasts in terms of both the sign and magnitude (Ajinkya and Gift [1984], Waymire [1984]). These papers conclude that the management forecasts convey information to investors, and that investors revise their expectations following the management forecasts. However, these results are mostly based on the stand-alone voluntarily management forecasts, and these studies do not examine the market reaction to the management earnings forecasts when market participants contemporaneously receive information about the historical earnings and future earnings forecasts.

In contrast, several studies examine the Japanese stock market reaction to the management earnings forecasts when the firms mandatorily and concurrently report not only their current performance but also management forecasts at the earnings announcement. Goto and Sakurai [1993] report that the unexpected component of the management forecasts can explain the cross-sectional variation in the stock returns around the earnings announcements, even after controlling for the current earnings surprises (see also, Kato, Skinner, and Kunimura [2009]). Ota [2010] examines the value relevance of the book values of equity, current earnings, and management earnings forecasts, and then finds that the management earnings forecasts contain more value-relevant information than the other two items. Overall, these results indicate that the management earnings forecasts are informative to investors even when the managers simultaneously announce their current earnings and their earnings forecasts at the time of earnings announcement.

These findings are not surprising, given that a stock is priced based on the firm's future prospect. Because the managers are the most familiar with the future prospects for their firms, the information about the future earnings as reported by the managers should be relevant to any investor. However, while the management earnings forecasts are relevant, these forecasts are less reliable information for the investors as compared to the current earnings information. This is because the current earnings are based on past transactions, but the management earnings forecasts are based on possible future transactions and are discretionary (Atiase, Li, Supattarakul, and Tse [2005]).

It is well known that the initial management forecasts for the next year as reported at the earnings announcement are, on average, systematically upward biased (Herrmann, Inoue, and Thomas [2003]; Kato, Skinner, and Kunimura [2009])[11]. In addition, one of the most important features of the management earnings forecasts in Japan is that the forecast errors are positively associated with lag one in terms of sign and magnitude. Kato, Skinner, and Kunimura [2009] find that the possibility of reporting optimistic forecasts at the current year's earnings announcements increases with that of reporting optimistic forecasts in the previous year. Shimizu [2007] shows that the management earnings forecast errors have a first-order autocorrelation coefficient of 0.38 ($p < 0.01$) when are pooled all observations, and that such a highly autocorrelated structure is observed for each sample year (1997–2006). These results suggest that the management forecast biases in Japan have a positive autocorrelation structure.

How do investors trade on the basis of these management earnings forecasts with such tendency? Rational investors who are aware of the autocorrelation structure of management earnings forecasts will adjust their trades for the expected optimistic bias, when they receive the next year's earnings forecasts reported by the managers who have reported very optimistically-biased forecasts in the previous year.

On the other hand, naïve investors who do not understand the autocorrelation structure of the management earnings forecasts bias should trade on the information regardless of whether or not the managers have issued optimistically biased forecasts. Such investors will systematically buy (sell) stocks with positive (negative) news in the management earnings forecasts around the earnings announcements. The functional fixation hypothesis predicts that this type of investors corresponds to individuals (e.g., Watts and Zimmerman [1986]; Hand [1990]). This maintains that individuals do not properly unscramble the accounting-related information, and hence, react to the information literally. Several researchers in the

[11] Herrmann, Inoue, and Thomas [2003] show that 61.4% of observations for their sample (1993–1997) report optimistically biased management earnings forecasts at the earnings announcement, and Kato, Skinner, and Kunimura [2009] show that 57.6% of observations for their sample (1997–2006) do so.

U.S. investigate the trading behavior of individuals to well known biased information, analysts' stock recommendations, and then provide evidence supporting this notion.

It is well demonstrated that as the financial analysts are unwilling to issue unfavorable recommendations, their recommendations exhibit a strong upward bias, and that the upward bias is more pronounced for the analysts whose employer is affiliated with a firm through an underwriting relationship (e.g., Lin and McNichols [1998]; Michaely and Womack [1999]). The rational investors who are aware of such tendency of analyst recommendations are expected to adjust their trades for the general upward bias as well as the additional distortion induced by the affiliated analysts. However, prior research shows that individuals do not take such rational behaviors in response to the analyst recommendations. Malmendier and Shanthikumar [2007] find that individuals react to recommendations literally; they exert buy pressure following strong buy/buy recommendations and zero pressure following hold recommendations. They also find that individuals fail to take into account the additional distortion arising from the underwriting affiliation (see also, Mikhail, Walther, and Willis [2007]). These findings are consistent with the functional fixation hypothesis suggesting that individuals take the information they receive at face value without deeply considering its context. That is, individuals tend to not bother incurring the information analyzing cost.

Applying the implication of Malmendier and Shanthikumar [2007] to the individuals' behavior in response to the management earnings forecasts, individuals are expected to ignore the autocorrelation structure and react to the information literally. This is because individuals tend to avoid incurring the information analyzing cost, and hence, are reluctant to analyze the bias contained in the management earnings forecasts. As in Kato, Skinner, and Kunimura [2009], assuming that the news in the management earnings forecasts is an expected future earnings change based on the forecast, individuals are likely to react to the expected future earnings change regardless of the prior managements' forecast bias. In the example in Table 1, it is expected that individuals react literally to the figure of 21 billion yen, which is calculated by subtracting the current year's earnings (279 billion yen) from the next year's management forecast (300 billion yen) even if the manager of the firm has provided an overly-optimistic earnings forecast in the last year[12]. Therefore, we predict that small traders' reaction to the management

[12]Indeed, the manager of Nintendo issued an overly-optimistic earnings forecast in the last year. He estimated fiscal year 2009's net income to be 325 billion yen at the earnings announcement of fiscal year 2008. Then, he revised his earnings forecast upward to 410 billion yen at the earnings announcement of the first quarter of 2009, and downward to 345 and 230 billion yen at the earnings announcement of the second quarter and third quarter of 2009, respectively. Eventually, the actual earnings of fiscal year 2009 was 279 billion yen and fell short of the initial management forecast (i.e., 325 billion

earnings forecasts at the earnings announcements is not associated with the optimistic bias of the prior management earnings forecast. Thus, our third hypothesis, stated in alternative form, is as follows:

Hypothesis 3: The buying/selling activities of small traders in response to the management earnings forecasts around the earnings announcements are unrelated to the optimistic bias of management earnings forecasts in the previous year.

This hypothesis is consistent with the underlying notion of Hypothesis 1. As stated in the previous section, individuals who tend to ignore the costly predisclosure information would also not pay attention to the previous year's management forecasts despite the fact that the lagged bias indicates the bias in the management forecasts issued at the time of the current year's earnings announcements. In other words, they would be unwilling to incur the information gathering cost (i.e., the cost for collecting the management earnings forecasts issued at the earnings announcement of the previous year) and hence do not use the lagged bias when they react to the current year's management earnings forecasts.

In contrast to the naïve trading by individuals in response to the analysts' recommendations, prior research finds that institutions anticipate upward the bias in stock recommendations and the additional distortion induced by the affiliated analysts, and then adjust their trades to these biases. Malmendier and Shanthikumar [2007] show that institutions tend to exhibit a positive abnormal trade reaction to strong buy recommendations, no reaction to buy recommendations, and significant selling pressure following hold recommendations. This result suggests that institutions adjust their trade to buy and hold recommendations downwards, since they anticipate a general upward bias in the stock recommendations. In addition, they find that such discounting behavior of institutions to the stock recommendations is more pronounced when the analyst is affiliated with an underwriter. This result implies that institutions are aware of the tendency of affiliated analysts to issue upward biased recommendations, and more significantly, discount the favorable recommendations when they are provided by affiliated analysts. Overall, the results of Malmendier and Shanthikumar [2007] indicate that the trading behavior of institutions corresponds to that of a rational investor. Institutions are willing to incur the information analyzing cost, and then, appropriately react to analysts' recommendations.

If we apply the implication of Malmendier and Shanthikumar [2007] to the trading behavior of institutions in response to the management earnings forecasts, then they would anticipate the autocorrelation

yen) made at the earnings announcement of fiscal year 2008. This suggests that the initial management forecast is overly optimistic.

structure, and therefore, adjust their trade reactions to the forecast biases. This is because institutions would be willing to incur the information analyzing cost, and therefore, filter out and appropriately react to the bias contained in the management earnings forecasts issued at the earnings announcements of the current year. In the example in Table 1, institutions would be unwilling to buy the stock even if the expected future earnings change is positive (21 billion yen) when the managers of the firm have provided a very optimistically-biased forecast in the last year. On the other hand, for bad news forecasts (i.e., the earnings forecasts for the next year fall below the actual earnings of the current year), institutions will engage in vigorous selling activity if the managers have provided a very optimistic forecast in the previous year. The reasoning behind this is that institutions anticipate that the managers who have issued optimistic forecasts will again deliver poorer performance than expected. These arguments suggest that for good (bad) news in the management earnings forecasts, large traders, represented by institutions, would respond less positively (more negatively) to the management earnings forecasts with more optimistic bias in the last year. We therefore develop the following directional hypothesis:

Hypothesis 4: The buying/selling activities of large traders in response to good news (bad news) in the management earnings forecasts around the earnings announcements are less positive (more negative) when the managers have issued optimistic earnings forecasts in the previous year.

This hypothesis reflects the fundamental concept of Hypothesis 2. Hypothesis 2 predicts that institutions actively use costly predisclosure information. Consistent with this prediction, when institutions trade on the current year's management forecasts, they who understand the autocorrelation structure of the management forecast bias should pay attention to the last year's management earnings forecasts. Institutions will be willing to incur the information gathering cost (i.e., cost for acquiring the management earnings forecast issued at the earnings announcements of the previous year) and then use it for anticipating the bias contained in the management earnings forecasts issued at the earnings announcements of the current year.

3 Method and Data

3.1 Distinguishing between individuals and institutions

The transaction data set used in this study does not contain any information on whether a trade is initiated by individuals or institutions. To distinguish between individuals and institutions, we use trade size in accordance with Lee and Radhakrishna [2000], because they show the usefulness of trade size as a proxy for separating the trades initiated by individuals from those initiated by institutions. Lee and Radhakrishna [2000] and other studies (e.g., Bhattacharya [2001]; Barber, Odean, and Zhu [2009a]) use the following criterion: the trades less than $5,000 are used as a proxy for the individuals trading. Since $1 is roughly equal to 100 Japanese yen through our sample period, we define the trades less than or equal to 500,000 Japanese yen as the ones initiated by individuals (small trades)[13].

However, this criterion is somewhat problematic for stocks with a high price. In Japan, the round lot—the lowest number of stocks that investors can buy or sell—is different among listed firms. As many Japanese firms adopt 1,000 shares as the round lot, the amount necessary for investors to buy or sell the lowest number of stocks is more than 500,000 Japanese yen if the stock price is higher than 500 Japanese yen. Because it is assured that there can be small trades no matter how high the stock price, we set an additional criterion to identify the small trades. In sum, we define (i) a trade less than or equal to 500,000 Japanese yen or (ii) a trade of one round lot as a small trade. These low value thresholds minimize the possibility of including the institutional investors' activity in the small trades (see Lee [1992]).

On the other hand, the large trades mainly initiated by institutions are the ones that meet the following criteria: (i) a trade is more than or equal to 2,000,000 Japanese yen and (ii) a trade is more than one round lot. Lee and Radhakrishna [2000] demonstrate that in separating the two investor groups, individuals and institutions, by a single cut-off value, the result makes very noisy. Therefore, as in prior studies, we eliminate a buffer zone of medium-sized trades to improve the accuracy of trade classification[14].

[13] This criterion is also consistent with the definition of individuals as the TSE suppose. In September 2001, five Japanese stock exchanges including the TSE and the Japan Securities Dealers Association issued a joint statement for the purpose of encouraging many more individuals to participate in stock trading. The statement said that the listed firms should keep a minimum trading size, that is, the amount necessary for the investors to buy or sell the lowest number of stocks, to be less than 500,000 Japanese yen. The statement assumes that individuals are likely to trade stocks in amounts of less than 500,000 Japanese yen.

[14] As one thinks that these criteria to distinguish the trades between individuals and institutions might be rather arbitrary, we repeat the following analyses by using another criteria: a trade less (more) than or equal to 1,000,000 (4,000,000) Japanese yen is classified as a trade initiated by small (large) traders. The results will be discussed in Section 4.4.

3.2 *Market microstructure of the TSE and measuring the trading reaction*

As in Lee [1992], we use the directional volume, that is, the order imbalance (*OIB*), to explain the trading behavior of large and small traders around the earnings announcements. To measure the *OIB* of each stock, we need to classify each trade as either a buyer- or seller-initiated trade. If the earnings announcements have information content, then good (bad) news triggers heavy buying (selling) activities, and buy/sell *OIB* is strongly associated with the news in the earnings.

The previous studies in the U.S. use the Lee and Ready [1991] algorithm, i.e., the combination of quote and tick tests to classify the trades as buys or sells (e.g., Lee [1992]). The quote test is the method where if a trade is executed at a price above (below) the quote midpoint, it is classified as a buy (sell). The trades at the quote midpoint are classified using the tick test—if the last price change was positive (negative), then the trade is deemed as a buy (sell).

The mechanism for trading stocks in the TSE differs from that in the NYSE and the AMEX that is managed by exchange-designated specialists. The specialists collect the public limit orders (which are maintained in a private limit order book that is not readily available to the public), match incoming buy and sell orders, and purchase and sell securities for their own account (Lehmann and Modest [1994]).

Contrary to the U.S. stock markets, the TSE is an order-driven market. Within continuous double auction trading called the "Zaraba," any trader may submit limit orders or market orders[15]. All liquidity is supplied by the traders who submit the limit orders. The lowest limit order to sell becomes the best ask price and the highest limit order to buy becomes the best bid price. As a result of this structure, it is extremely improbable that the executed price is different from the last quoted ask or bid price. We therefore use the simple quote test, in which a trade at the ask (bid) price is classified as a buy (sell). In fact, the percentage of trades unclassified by using the quote test is no more than 2 percent of the total trades during our sample period.

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[15] TSE trading takes place in two different trading sessions. The morning session, called the "Zemba," begins at 9:00 a.m. and ends at 11:00 a.m., while the afternoon session, called the "Goba," begins at 12:30 p.m. and ends at 3:00 p.m. Trade at the beginning of each session is initiated through a single-price auction called the "Itayose." Following this, trades occur under the Zaraba mechanism until the session closes, at which the orders are also executed through the Itayose mechanism. For the opening and closing trades of each trading session executed through a single-price auction, we do not specify their directions because of the difference in mechanism. Lehmann and Modest [1994] report that 65 to 70 percent of the total trading volume occurs under the Zaraba mechanism for all firms regardless of their size deciles for their sample period (1991–1993). Meanwhile, we find that the ratio of total trading volume executed under the Zaraba mechanism is from 75 to 90 percent for our sample period (1999–2006).

After classifying each trade as either a buyer- or seller-initiated trade by the quote test, we develop the buy/sell imbalance measure for large and small traders in each stock to explain the trading behavior of each type of traders around the earnings announcements. If we set the earnings announcement period as from days k to l relative to the earnings announcement date (day 0), then the buy/sell OIB during the period is defined as follows:

$$OIB_i^z[k,l] = \frac{\sum_{t=k}^{l} B_{it}^z - \sum_{t=k}^{l} S_{it}^z}{\sum_{t=k}^{l} B_{it}^z + \sum_{t=k}^{l} S_{it}^z},$$

where B_{it}^z (S_{it}^z) is the number of shares under the buyer- (seller-) initiated trades for firm i and trader type z ($z \in \{large, small\}$) at day t. However, this measure does not capture unusual buying/selling activity in response to the earnings announcement. To examine the investor-level reaction to the earnings announcements, we should examine the association between the abnormal component of OIB during the announcement period and the unexpected components in the earnings news. This approach is essentially similar to that in prior research analyzing the association between the abnormal return around the earnings announcements and the unexpected earnings to examine the market-level reaction to the earnings announcements. To obtain an estimate of the magnitude of the abnormal OIB ($AOIB$) during the announcement period, we normalize this measure by subtracting the average of the daily OIB during the non-earnings announcement period and dividing by its standard deviation, separately for each type of traders. We set the non-earnings announcement period as 100 days from days -130 to -31. The daily OIB is defined as follows:

$$OIB_{it}^z = \frac{B_{it}^z - S_{it}^z}{B_{it}^z + S_{it}^z}.$$

Finally, for each trader group, we calculate $AOIB$ as follows:

$$AOIB_i^z[k,l] = \frac{OIB_i^z[k,l] - \overline{OIB_{i,-130:-31}^z}}{SD(OIB_{i,-130:-31}^z)},$$

where $\overline{OIB_{i,-130:-31}^z}$ and $SD(OIB_{i,-130:-31}^z)$ are the average and standard deviation of the daily OIB during the non-earnings announcement period ($t = -130$ to -31) for firm i and trader type z.

3.3 Construction of the earnings-related variables

3.3.1 Current earnings-related variables

Figure 1 describes the timeline that underlies the measurement of the earnings-related variables used in this study[16]. Because the investors trade on the unexpected component of earnings around the earn-

[16]In this study, the earnings refers to the bottom-line net income. The TSE, however, requires the firms to report the earnings from continuing operation, which approximately corresponds to the earnings before special items in the U.S., as

ings announcements, positive (negative) earnings surprises should trigger high buying (selling) activity. Regarding the actual current earnings, there are two possible measures of the unexpected earnings: (1) random walk forecast error and (2) analyst forecast error. We define the random walk forecast error as the difference between the actual current earnings and the previous year's earnings, deflated by the market value of equity that is the stock price times the number of shares outstanding as of the end of fiscal year t:

$$RWFE_{i,t} = \frac{e_{i,t} - e_{i,t-1}}{MVE_{i,t}},$$

where $RWFE_{i,t}$ is the random walk forecast error for firm i in period t, $e_{i,t}$ is the actual earnings for firm i in period t, and $MVE_{i,t}$ is the market value of equity at the end of fiscal year t. Hypothesis 1 predicts that $AOIB$ (i.e., unusual buying/selling activity) for small traders during the earnings announcement period is positively associated with $RWFE$.

In addition to $RWFE$, we calculate another possible measure of the unexpected current earnings surprise, the analyst forecast error. We define it as the difference between the actual current earnings and the latest analyst forecast, deflated by the market value of equity as of the end of fiscal year t:

$$AFE_{i,t} = \frac{e_{i,t} - af_{i,t}}{MVE_{i,t}},$$

where $AFE_{i,t}$ is the analyst forecast error for firm i in period t and $af_{i,t}$ is the most recent analyst forecast for year t before the earnings announcement. If Hypothesis 2 is true, then $AOIB$ for large traders during the earnings announcement period would be positively associated with AFE.

3.3.2 Management earnings forecast-related variables

A questionnaire survey of individuals conducted by the TSE yields that more than two-thirds of individuals use the management earnings forecasts reported in earnings reports (TSE [2006c]). In addition, an interview survey of institutions (TSE [2006b]) indicates that they regard the management earnings forecasts as essential information among the several items in the earnings reports and use them as reference. These surveys suggest the importance of the management earnings forecasts for both individuals and institutions. In other words, the management earnings forecasts are likely to be informative for both types of traders. Our Hypotheses 3 and 4 predict that individuals and institutions use the manage-

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well as the net income. Thus, we replicate all the following analyses by using the earnings from continuing operation as an alternative definition of earnings, but our study's inferences from the analyses remain unchanged. Therefore, our results are not sensitive to the definition of earnings.

ment earnings forecasts differently, and therefore, trade differently; however, both use it at the earnings announcement time.

Hypothesis 3 implies that small traders do not properly unscramble the management earnings forecasts, and therefore, ignore the autocorrelation structure of the management forecast bias. If this hypothesis is correct, we should observe a positive relation between $AOIB$ for small traders and the unexpected component of management earnings forecast, irrespective of the bias of the previous year's management earnings forecast. Following Kato, Skinner, and Kunimura [2009], we define the expected future earnings changes as unexpected component of management earnings forecasts. We calculate it as follows:

$$EFEC_{i,t} = \frac{fe^{t}_{i,t+1} - e_{i,t}}{MVE_{i,t}},$$

where $EFEC_{i,t}$ is the expected future earnings change for firm i in period t and $fe^{t}_{i,t+1}$ is the management forecast of period $t+1$ earnings made at the earnings announcement of period t. We define the previous year's management forecast bias in the initial earnings forecast ($BIAS_{t-1}$) as the difference between the initial management earnings forecast of period t made at the earnings announcement of period $t-1$ and the actual current earnings, deflated by the market value of equity as of the end of fiscal year t:

$$BIAS_{t-1} = \frac{fe^{t-1}_{i,t} - e_{i,t}}{MVE_{i,t}}.$$

The positive (negative) value of this variable implies that the initial management earnings forecast issued in the last year is optimistic (pessimistic). Hypothesis 3 predicts that $AOIB$ for small traders during the announcement period is positively associated with the expected future earnings changes regardless of $BIAS_{t-1}$.

In contrast to naïve trading by individuals in Hypothesis 3, Hypothesis 4 predicts that institutions behave in a rational manner. They understand the autocorrelation structure of the management forecast bias, and then, trade based on the management earnings forecasts after making the necessary adjustment to the bias. It is expected that although $AOIB$ for large traders is positively associated with the expected future earnings change, such an association would be weaker (stronger) for the firms with a larger $BIAS_{t-1}$ if $EFEC$ is positive (negative).

3.4 Sample Selection

We obtained the trade and quote data from the Nikkei NEEDS TICK database. This database is basically the same as the Trade and Quote (TAQ), which is provided by the NYSE and used by several U.S. studies. We also obtained several accounting data reported at the time of earnings announcement from the Nikkei

NEEDS-BULK management forecasts database, and other accounting data from the Nikkei NEEDS-FinancialQUEST. Market data, such as market prices, number of shares outstanding, and stock returns, is from the Nikkei daily returns database[17]. To calculate the analyst forecast error, we use the Nikkei daily financials database. This database includes a history of earnings forecasts estimated by analysts affiliated with the *Nihon Keizai Shimbun* regarding the individual firms on a specific trading day[18]. The analyst earnings forecasts are revised frequently during the fiscal year so as to reflect the updated management forecasts, changes in economic circumstances, and so on in a timely fashion[19].

This study includes annual earnings announcements from 1999 to 2006 for the firms listing on the TSE. The sample observation meets the following sample selection criteria:

1. The previous year's and current year's actual earnings data and management earnings forecasts data for the next year are available. To calculate the previous year's management forecast bias, the initial management earnings forecasts data made at the announcement of the last year's financial results is also required.

2. The sample includes the observations that allow us to estimate the abnormal returns around the earnings announcements to examine not only the investor-level reactions but also the market-level reactions to the earnings announcement. We use the size-adjusted abnormal returns for our analyses[20].

3. We require a minimum of 20-day trading data during the non-earnings announcements period to

[17]The Nikkei daily returns database basically corresponds to the CRSP in the U.S.

[18]It may not be appropriate to use the I/B/E/S or the Value Line database for calculating the analyst forecast errors, because they tend to include the forecasts only for larger firms. In contrast, the Nikkei daily financials database includes the forecasts for not only large firms but also small firms, because the analysts affiliated with the *Nihon Keizai Shimbun* cover more Japanese listed firms. To minimize the sample selection bias arising from the availability of analyst forecasts, we use the Nikkei daily financials database.

[19]In the case of Nintendo, for example, the analyst forecast was updated six times during the fiscal year 2009 so that it reflects the most recent management earnings forecast or other information.

[20]We calculate the abnormal returns using the following procedure. We begin by constructing 10 portfolios. In the September of each year t, all TSE stocks on the Nikkei daily stock return database are ranked on the basis of the market capitalization, which is measured as stock price times the number of shares outstanding for a stock. These decile breakpoints for the market capitalization are used to allocate all stocks listed on the TSE and other stock exchanges to the market capitalization deciles. In this way, we construct the 10 portfolios and calculate the value-weighted returns on the portfolios from the October of year t to the September of year $t+1$. The abnormal return on a particular stock is then calculated by subtracting the value-weighted portfolio's return from the individual stock's return.

avoid the problems arising from thinly traded issues and to calculate the appropriate *abnormal* order imbalance around the earnings announcements.

4. We also exclude the observations that do not have several firm characteristic-related variables required in the later analysis. We describe these variables and their measurements in more detail in Section 4.2.

These criteria yield the final sample of 10,258 annual earnings announcements from 1999 to 2006 with the number of observations per year ranging from 978 in 1999 to 1,734 in 2005.

3.5 Descriptive statistics

Panel A of Table 2 reports the descriptive statistics on the news in the current earnings and management earnings forecast and the previous year's management forecast bias in the initial earnings forecast. The 25th percentile of $EFEC$ is non-negative. This suggests that less than 25% of the managers estimate negative future earnings changes, and that the managers in Japanese firms are unwilling to report bad news forecasts at the time of earnings announcement. The mean and median of $BIAS_{t-1}$ are both positive. This evidence indicates that the management earnings forecasts, on average, have a systematically upward bias, which is consistent with Herrmann, Inoue, and Thomas [2003] and Kato, Skinner, and Kunimura [2009]. In our sample, 55.0% of the observations have optimistically biased earnings forecasts (i.e., $0 < BIAS_{t-1}$).

Panel B of Table 2 reports the mean and median absolute value of $RWFE$ and AFE to confirm the analyst forecast's superiority relative to the simplistic time-series model forecast in our sample. The mean (median) absolute AFE is 0.014 (0.002) while the absolute $RWFE$ is 0.092 (0.015). The absolute $RWFE$ is significantly larger than the absolute AFE ($t = 19.2$; $z = 79.2$). The untabulated results yields that the analyst forecast tends to superior for each sample year (1999–2006). This result indicates that the analyst earnings forecast is a more superior predictor than the expected earnings based on the random walk model in Japan, which is also consistent with the U.S. evidence (e.g., Brown and Rozeff [1978]; Brown, Hagerman, Griffin, and Zmijewski [1987]).

3.6 Autocorrelation structure of the management forecast bias

Kato, Skinner, and Kunimura [2009] find that the *sign* of the bias in the initial management earnings forecast is dependent on the *sign* of the lagged bias. Shimizu [2007] shows that the *magnitude* of the bias is positively autocorrelated with the *magnitude* of the lagged bias. These studies indicate that in Japan, the bias in the initial management earnings forecast has a strong autocorrelation structure in term of both its *sign* and *magnitude*. In this section, we confirm the autocorrelation structure for our sample. For this analysis, we use 9,945 observations for which $BIAS_t$ is available in our sample, and then examine the autocorrelation between the previous year's bias (i.e., $BIAS_{t-1}$) and the current year's bias (i.e., $BIAS_t$).

Panel A of Table 3 reports the contingency table of the signs of $BIAS_{t-1}$ and $BIAS_t$. The table indicates that 58.5% of the firms with a negative forecast error (i.e., a pessimistic forecast) in the last year issue a pessimistic forecast again this year, and that 63.3% of the firms with a positive forecast error (i.e., an optimistic forecast) in the last year issue an optimistic forecast again this year. We can easily reject the null hypothesis that the signs of $BIAS_{t-1}$ and $BIAS_t$ are independent ($\chi^2 = 472.74$, $p < 0.01$). This means that the sign of the forecast bias in this year depends on that in the last year.

Panel B of Table 3 shows the mean and median of $BIAS_t$ as well as the percentage of observations with a positive forecast error for the decile portfolios formed by $BIAS_{t-1}$ to examine whether the bias has an autocorrelation structure in terms of its *magnitude*. To construct this table, we sort the sample firms into deciles based on their annual $BAIS_{t-1}$ rank. The mean of $BIAS_t$ for all deciles is positive, which reflects that the managers in Japan, on average, bias their forecasts upward. The means of $BIAS_t$ are 0.041 and 0.190 for the lowest decile and highest decile, respectively. The difference is statistically significant (t-stat. $= 5.09$, $p < 0.01$), while the mean value does not increase monotonically between the lowest and highest deciles. On the other hand, the median is monotonically increasing across the deciles. The median of $BIAS_t$ for the highest decile is 0.015 compared to -0.003 in the lowest decile, and a Wilcoxon rank-sum test rejects the null of equal medians at the 1% level. These results suggest that the degree of the previous year's forecast bias can be a signal for the bias in the current year's management earnings forecast.

Overall, the results in Table 3 indicate that the bias in the initial management forecast has an autocorrelation structure in terms of both its *sign* and *magnitude* for our sample. Therefore, if institutions realize that $BAIS_t$ is positively associated with the lagged bias (i.e., $BIAS_{t-1}$), they would take into account the degree of $BIAS_{t-1}$ and adjust their trading behavior in response to the management earnings forecast made at the time of earnings announcement of fiscal year t. On the other hand, individuals who are unlikely to realize such an autocorrelation structure would trade on the initial management forecast literally.

4 Empirical Results

4.1 Market-level reaction to the earnings announcement

We start by specifying the earnings announcement period for our empirical analyses. To specify the period, we compare the abnormal returns around the earnings announcement date between the firms releasing extremely good news and the ones releasing extremely bad news. We define the extremely good (bad) news as the earnings announcements in which $RWFE$, AFE, and $EFEC$ are all non-negative (negative). In all, 2,903 (257) observations are extracted as extremely good (bad) news sample. Figure 2 shows the behavior of the mean size-adjusted return for each extreme sample over the period from 5 days before to 5 days after the earnings announcement date (day 0). Obviously, the significant response to the earnings announcements concentrates on days 0 and +1 (i.e., the day on which the summary of the earnings report is published in a major financial press). We observe strongly positive (negative) abnormal returns for extremely good (bad) news sample on both days. The difference in the abnormal returns between these two samples is statistically significant at the 1% level or better on both days, while it is not significant on the other days. These results suggest that the stock market reacts strongly to the earnings announcements on days 0 and +1. Therefore, we set days 0 and +1 as the earnings announcement period, and then, examine the trading behavior of individuals and institutions in this period.

Next, we investigate in detail the market-level reaction to the simultaneously announced current earnings and management earnings forecasts before examining the investor-level reaction. The market-level reaction is measured as the size-adjusted abnormal return during the earnings announcement period. Table 4 reports the results of the univariate relationship between the news variables (i.e., the two news variables for current earnings, $RWFE$ and AFE, and one news variable for the management earnings forecasts, $EFEC$) and the cumulative abnormal return (CAR) over the earnings announcement period. To construct this table, we independently sort the sample firms into quintiles based on the annual rank of each variable, and then, compute the average $CAR[0,+1]$ for each portfolio. Panel A of Table 4 indicates that the average $CAR[0,+1]$ does not relate to $RWFE$. On the other hand, Panel B of Table 4 shows that $CAR[0,+1]$ is monotonically increasing across AFE quintiles. These results suggest that the market, on average, tends to respond more strongly to AFE than $RWFE$. With regard to the market reaction to the news in the management forecasts presented in Panel C of Table 4, the average $CAR[0,+1]$ of the lowest $EFEC$ quintiles is -1.40% while that of the highest $EFEC$ quintiles is 1.95%. The difference of 3.35% is statistically significant at the 1% level. This result suggests that the managers' earnings forecasts convey useful information to the stock market.

In sum, both *AFE* and *EFEC* are the unexpected components of the current earnings and management earnings forecasts, respectively, for the market, and thus, the market reaction to the earnings announcements is significantly associated with these variables. However, this analysis ignores the potential impact of the correlations among the three news variables. Indeed, the correlation matrix documented in Panel A of Table 5 indicates that *EFEC* is strongly negatively correlated with both *RWFE* and *AFE*. More importantly, the univariate analysis is not able to examine whether the stock market response to the management earnings forecasts anticipates the autocorrelation structure of the management forecasts bias. Therefore, we estimate the following multivariate regression to address these issues:

$$\begin{aligned} CAR[0,+1]_{i,t} &= \alpha_0 + \sum_{\tau=2000}^{2006} \alpha_{\tau-1999} YD_{\tau,i,t} + \beta_1 RWFE_{i,t} + \beta_2 AFE_{i,t} + \beta_3 EFEC_{i,t} + \beta_4 BIAS^{dec}_{i,t-1} \\ &\quad + \beta_5 EFEC_{i,t} \times GN_{i,t} \times BIAS^{dec}_{i,t-1} + \beta_6 EFEC_{i,t} \times BN_{i,t} \times BIAS^{dec}_{i,t-1} + \mu_{i,t}, \end{aligned} \qquad (1)$$

where YD_τ represents the annual indicator variable for year τ. We include an interaction term of the *EFEC* and $BIAS_{t-1}$ in this model to examine whether the market anticipates the autocorrelation structure of management forecasts bias. To allow the coefficients on the good and bad news forecasts to be separately estimated, two interaction terms, $EFEC \times GN \times BIAS^{dec}_{t-1}$ and $EFEC \times BN \times BIAS^{dec}_{t-1}$, are included in the model. *GN* (*BN*) is an indicator variable set equal to one for the firm with $0 \leq EFEC$ ($EFEC < 0$), and zero otherwise. For $BIAS_{t-1}$, we do not use the raw value, but the annual decile rank, scaled to range between 0 and 1, to mitigate the effect of outliers and to facilitate the interpretation of the coefficients on the interaction terms. In our regression model, this coding scheme has the advantage that the coefficient on *EFEC* (i.e., β_3) can be interpreted as the slope coefficient for the firms whose management issued the most pessimistic earnings forecasts at the earnings announcement of last year. The sum of the coefficients on *EFEC* and $EFEC \times GN \times BIAS^{dec}_{t-1}$ (i.e., $\beta_3 + \beta_5$) can be interpreted as the slope coefficient for the firms that release good news forecasts (i.e., $0 \leq EFEC$) at the earnings announcement of current year and issued the most optimistic earnings forecasts at the announcement of last year. $\beta_3 + \beta_6$ can also be interpreted as the slope coefficient for the firms with bad news forecasts for the next year ($EFEC < 0$) and issuing the most optimistic forecasts at the announcement of last year. As long as the stock prices reflect the autocorrelation structure of the management forecast bias, the coefficient on $EFEC \times GN \times BIAS^{dec}_{t-1}$ should be negative, because the stock market anticipates the optimistically biased forecasts to be issued again, and discounts it. On the other hand, the coefficient on

$EFEC \times BN \times BIAS_{t-1}^{dec}$ should be positive, as the firms which issued overly optimistic forecasts in the last year will repeatedly exhibit poorer performance than the initial management forecasts.

Panel B of Table 5 reports the OLS coefficient estimates and White [1980] heteroscedasticity consistent t-statistics in parentheses[21]. Regression 1 shows the market reaction to the earnings announcements without considering the prior management forecast bias. The coefficient on $EFEC$ is positive and significant at the 1% level. The result of this simple model confirms the finding of Kato, Skinner, and Kunimura [2009] that the initial management earnings forecast is informative to the market in spite of the general optimistic bias.

The conditional test is reported in Regression 2. For the market reaction to the current earnings, AFE is positively associated with $CAR[0, +1]$ (coefficient = 0.142, t-stat. = 3.61), which is consistent with the above univariate analysis. Surprisingly, we also find that $RWFE$ is positively associated with $CAR[0, +1]$ (coefficient = 0.020, t-stat. = 3.70), although its magnitude is statistically smaller than the coefficient on AFE (F-stat. = 9.57, $p < 0.01$). This result indicates that the stock prices partially reflect the naïve earnings expectations and that some investors trade on "stale" earnings news.

In regard to the market reaction to the management earnings forecast, we find that the coefficient on $EFEC$ is positive (= 0.293) and statistically significant ($p < 0.01$) while the coefficient on $EFEC \times GN \times BIAS_{t-1}^{dec}$ is negative (= −0.262) and statistically significant ($p < 0.01$). This result indicates that for the firms with good news forecasts, the market responds more positively to the management forecasts with higher anticipated pessimism and reponds less positively to the management forecasts with higher anticipated optimism. On the other hand, the coefficient on $EFEC \times BN \times BIAS_{t-1}^{dec}$ is positive as expected, but not significantly different from zero. At the first glance, this result suggests that the market fails to reflect the autocorrelation structure of the management forecast bias for the firms with bad news forecasts. However, this market reaction might be rational given the high credibility of bad news forecasts. Several studies in the U.S. argue that the bad news forecasts are inherently more credible than the good news forecasts (e.g., Jennings [1987]; Hutton, Miller, and Skinner [2003]). Rogers and

[21] We use the following outlier treatment for the regression estimate throughout this paper: we estimate the regression models within the 1st and 99th percentiles of the annual distribution for the respective earnings-related variables (i.e., $RWFE$, AFE, and $EFEC$) and the return-related variable (i.e., CAR) each year to mitigate the influence of outliers. On the other hand, we do not care about the extreme value of $AOIB$, because it is a standardized variable. As a robustness check, we reestimate each regression by using an alternative outlier treatment, that is, the earnings-related variables and the return-related variable are winsorized at the 1% and 99% levels, respectively. The pattern of the estimated coefficients is similar in all analyses under both outlier treatments. Therefore, our results are robust to the outlier treatment.

Stocken [2005] provide weak evidence that the stock market reacts to the bad news forecasts regardless of how predicted the optimistic bias in them is, because the market reckons that the bad news forecasts are more credible (i.e., less optimistically biased) than the good news forecasts[22]. As such, we next examine whether the bad news forecasts are less optimistically biased than the good news forecasts to confirm that the interpretation proposed in the U.S. research is applicable to the market reaction to the bad news forecasts in Japan.

Panel A of Table 6 reports a contingency table of the management forecast news (*EFEC*) and the actual forecast errors in the management earnings forecast (i.e., $BIAS_t$) based on the 9,945 observations with $BIAS_t$ in our sample. According to the table, the null hypothesis that the bias in the forecast is independent of the management forecast news is rejected ($\chi^2 = 67.22$, $p < 0.01$). This means that the *sign* of $BIAS_t$ is associated with the content of news. Panel B of Table 6 reports the mean and median of $BIAS_t$ for the portfolios formed by the sign of the management forecast news to test whether the *magnitude* of $BIAS_t$ is associated with the content of the news. Although the mean difference between the firms with good news forecasts and the ones with bad news forecasts is insignificant, the median for the firms with bad news is significantly smaller than that for the firms with good news ($p < 0.01$)[23]. Overall, the results of Table 6 indicate that the management forecast news are associated with both the *sign* and *magnitude* of the optimistic bias in the forecast. Stated differently, the bad news forecasts are less optimistically biased than the good news forecasts. Therefore, our result that the market reaction to the bad news forecasts is unrelated to the prior management forecast bias holds, not because the market does not ignore the autocorrelation structure of the management forecast bias but because the market recognizes the bad news forecasts as being inherently credible. As the bad news forecasts are likely to be less optimistically biased than the good news forecasts, the market takes the bad news forecasts at face value even when the previous year's management forecasts are optimistically distorted.

[22] Actually, however, Rogers and Stocken [2005] do not find that the bad news forecasts is less biased than the good news forecasts for their sample. In addition, extant literatures in the U.S. (e.g., Jennings [1987]), claiming that the bad news forecast is more credible than the good news forecast, have not established whether the bad news forecast is less biased than the good news forecast.

[23] The reason why the mean for the firms with good news forecasts is smaller than the mean for the ones with bad news forecasts, although the difference is insignificant, is due to the small number of extreme observations for which the management forecast errors exceed the market value of equity (i.e., $1 < BIAS_t$). The mean for the firms with bad news forecasts is smaller than the mean for the ones with good news forecasts (t-stat. $= 2.92$, $p < 0.01$) when we exclude such extreme observations for this analysis.

4.2 Abnormal order imbalance measure and firm characteristics

To capture the unusual buying/selling activity in response to the earnings announcements, we construct an abnormal order imbalance measure (i.e., *AOIB*). If we observe the correlation between our *AOIB* measure and certain firm characteristics, not controlling them in our analyses could lead to erroneous conclusions. Thus, before testing the investor-level reaction to the earnings announcements, it is useful to examine whether or not the *AOIB* measure is correlated with certain firm characteristics.

We choose the following six firm characteristics that are likely to be linked to the trading behavior of small and large traders.

- Market value of equity (*MVE*), book-to-market ratio (B/M), and standard deviation of daily returns (*STDRET*)—if the trading behavior of individuals and/or institutions is dependent of their risk preferences, *AOIB* should be correlated with these three variables. *MVE* and B/M are well known risk factors. *STDRET* captures the total risk of the stock. *MVE* is defined as the market value of equity as of the end of fiscal year t. We define B/M as the book value of equity at the end of fiscal year $t-1$ divided by the market value of equity six months after the end of fiscal year $t-1$. *STDRET* is defined as the standard deviation of the daily returns during the fiscal year t.

- Turnover (*TURNOVER*) and bid-ask spread (*SPREAD*)—Several studies find that institutions prefer to hold liquid stocks (e.g., Gompers and Metrick [2001]). In addition, Amihud and Mendelson [1986] demonstrate that the transaction costs lead to an investor clientele effect whereby the investors with longer holding periods select more illiquid stocks. Investors' demand, therefore, might be correlated with the liquidity of a stock. We use *TURNOVER* and *SPREAD* as the proxy for liquidity. We define *TURNOVER* as the average of daily turnover, which is defined as the daily number of shares traded dividend by daily number of shares outstanding, over the fiscal year t. *SPREAD* is defined as average daily equal-weighted relative spread over the fiscal year t[24]. The relative bid-ask spread is defined as the difference between the ask and bid price in effect at the time of the transaction, divided by the mid point of the ask and bid prices.

- Dividend yield (*YIELD*)—Allen, Bernardo, and Welch [2000] provide a theoretical basis for the prediction that high dividends attract institutions, although Grinstein and Michaely [2005] do not support this prediction in the U.S. Graham and Kumar [2006] find that the low-income investors

[24] We require a minimum of 50-trading day data for calculating *STDRET*, *TURNOVER*, and *SPREAD* to obtain reliable measures. As described in section 3.4, we exclude the observations not meeting this criterion from our sample.

among the retail investors disproportionally own stocks with high-dividend yield. These studies suggest that the dividend payments could affect the trading behavior of individuals and/or institutions. We define *YIELD* as the average dividend yield at the end of month over the fiscal year t.

Panel A of Table 7 reports the results of the univariate relationship between *AOIB* for small traders during the earnings announcement period and the various firm characteristics. To construct this table, we form five portfolios based on the annual $AOIB^{small}[0,+1]$ rank. The lowest (highest) quintile of $AOIB^{small}[0,+1]$ consist of stocks with strong small-trader's selling (buying) pressure. We find that all characteristics, except for B/M, are significantly correlated with $AOIB^{small}[0,+1]$. The difference between the two extreme quintiles (Q5−Q1) is significant at the 1% level for these characteristics. Small traders tend to abnormally buy stocks with larger *MVE*, higher *STDRET*, higher *TURNOVER*, higher *SPREAD*, and lower *YIELD* during the announcement period.

The results of univariate relationship between *AOIB* for large traders and the various firm characteristics are reported in Panel B of Table 7. Contrary to the trading behavior of small traders, that of large traders has not much to do with the firm characteristics. Only B/M is significantly correlated with $AOIB^{large}[0,+1]$ ($p < 0.05$). This implies that large traders exhibit more abnormal buying for growth stocks than for value stocks during the announcement period.

Overall, the results in Table 7 suggest that our *AOIB* measure may partially reflect the specific firm characteristics. In other words, it remains possible that the *AOIB* measure captures not only the unusual buy/sell activity in response to the earnings announcements but also the firm characteristics. Therefore, we control for these six characteristics described when we examine the investor-level reaction to the earnings announcements in the multivariate setting.

4.3 Investor-level reaction to the earnings announcement

In this section, we examine the trading behavior of individuals and institutions around the earnings announcements. Table 8 shows the results of the univariate relationship between the news variables and *AOIB* for each type of traders during the announcement period. Panel A of Table 8 reports the mean of *AOIB* for each portfolios classified by *RWFE*. We can point out that there is a positive relationship between $AOIB^{small}[0,+1]$ and *RWFE*. The average $AOIB^{small}[0,+1]$ is −0.016 for the lowest *RWFE* quintile (Q1) and 0.075 for the highest *RWFE* quintile (Q5). The mean difference between Q5 and Q1 (Q5−Q1) is significantly positive ($p < 0.01$). Moreover, the sign of $AOIB^{small}[0,+1]$ appears to correspond to the sign of $RWFE$. The average $AOIB^{small}[0,+1]$ for Q1 and Q2 (Q3 to Q5) portfolios, which have a negative (positive) mean $RWFE$, is also negative (positive). This result suggests that individuals tend to abnormally buy (sell) stocks with positive (negative) $RWFE$. Contrary to the trading activity of individuals in response to $RWFE$, there is no significant relationship between $AOIB^{large}[0,+1]$ and $RWFE$.

Panel B of Table 8 reports the mean $AOIB$ for each portfolio classified by another news variable for current earnings, AFE. The average $AOIB^{small}[0,+1]$ is not related to AFE quintiles. On the other hand, there is a positive relationship between $AOIB^{large}[0,+1]$ and AFE while the sign of $AOIB^{large}[0,+1]$ is not consistent with the sign of AFE. The mean of $AOIB^{large}[0,+1]$ for the lowest and highest quintiles is 0.058 and 0.163, respectively. The difference in $AOIB^{large}[0,+1]$ between the two extreme portfolios (Q5−Q1) is positive and significant ($p < 0.01$). This result indicates that institutions tend to exhibit more (less) positively unusual buying activity to a positive (negative) AFE during the announcement period.

In sum, regarding the investor-level reaction to the current earnings, Panels A and B of Table 8 indicate that there is a difference in the trading behavior in response to the current earnings between individuals and institutions. We find in the univariate test that the individuals' (institutions') trading behavior is more highly sensitive to $RWFE$ (AFE) than AFE ($RWFE$), which is consistent with our Hypothesis 1 (Hypothesis 2).

With regard to their trading behavior in response to the news in the management earnings forecasts (i.e., $EFEC$), the relationship between $AOIB$ for each trade stratum and $EFEC$ is reported in Panel C of Table 8. The mean of $AOIB^{small}[0,+1]$ does not increase monotonically across $EFEC$ quintiles. The difference between the two extreme portfolios is positive (0.016) but insignificant. This means that abnormal buy/sell trading activity of individuals is not correlated with $EFEC$ in the univariate analysis. In contrast, $AOIB^{large}[0,+1]$ is strongly related to $EFEC$ in terms of both the sign and the magnitude. In keeping with the sign of average $EFEC$, the average $AOIB^{large}[0,+1]$ for the Q1 quintile (Q2 to Q5 quintiles) is negative (positive). In addition, the mean of $AOIB^{large}[0,+1]$ increases monotonically across $EFEC$ quintiles, with the difference between the lowest and highest quintiles being 0.200 (significantly different from zero at the 1% level). This result indicates that the institutions' abnormal buying pressure during the announcement period increases in $EFEC$.

Overall, our result in Panel C of Table 8 shows that sorting by $EFEC$ have significant explanatory power for the unusual buy/sell trading behavior of institutions, but has no explanatory power for that of individuals. However, these univariate tests do not accurately describe how individuals and institutions respond to the news in the earnings announcements. The result that $AOIB^{small}[0,+1]$ is not correlated with *EFEC* might be due to *EFEC* being highly negatively correlated with *RWFE*. (see the correlation matrix in Table 5). More importantly, our concern whether or not individuals and institutions respond to *EFEC* anticipating the autocorrelation structure of management forecast bias remains unsolved in the above univariate analysis. Therefore, we next conduct a multivariate analysis to test our hypotheses.

We estimate the following regressions separately for individuals and institutions to examine their trading behavior in response to the earnings announcements:

$$\begin{aligned} AOIB^{small}_{i,t}[0,+1] &= \alpha_0 + \sum_{\tau=2000}^{2006} \alpha_{\tau-1999} YD_{\tau,i,t} + \beta_1 RWFE_{i,t} + \beta_2 AFE_{i,t} + \beta_3 EFEC_{i,t} \\ &\quad + \beta_4 BIAS^{dec}_{i,t-1} + \beta_5 EFEC_{i,t} \times GN_{i,t} \times BIAS^{dec}_{i,t-1} + \beta_6 EFEC_{i,t} \times BN_{i,t} \times BIAS^{dec}_{i,t-1} \\ &\quad + \beta_7 AOIB^{small}_{i,t}[-30,-1] + \beta_8 AOIB^{large}_{i,t}[-30,-1] + \text{Control variables} + \varepsilon_{i,t} \end{aligned} \quad (2a)$$

$$\begin{aligned} AOIB^{large}_{i,t}[0,+1] &= \delta_0 + \sum_{\tau=2000}^{2006} \delta_{\tau-1999} YD_{\tau,i,t} + \gamma_1 RWFE_{i,t} + \gamma_2 AFE_{i,t} + \gamma_3 EFEC_{i,t} \\ &\quad + \gamma_4 BIAS^{dec}_{i,t-1} + \gamma_5 EFEC_{i,t} \times GN_{i,t} \times BIAS^{dec}_{i,t-1} + \gamma_6 EFEC_{i,t} \times BN_{i,t} \times BIAS^{dec}_{i,t-1} \\ &\quad + \gamma_7 AOIB^{small}_{i,t}[-30,-1] + \gamma_8 AOIB^{large}_{i,t}[-30,-1] + \text{Control variables} + \upsilon_{i,t}. \end{aligned} \quad (2b)$$

According to the previous studies (e.g., Bhattacharya [2001]; Mikhail, Walther, and Willis [2007]), we set up two separate equations for small and large traders. In estimating these equations, we use seemingly unrelated regression (SUR) to improve the estimation efficiency, and compare the parameter estimates across the two equations.

The idea of these equations is basically similar to Eq. (1) for examining the market-level reaction to the earnings announcements, but there are three differences between Eq. (1) and these equations. The first is the dependent variable: we use $AOIB^{small}[0,+1]$ and $AOIB^{large}[0,+1]$ as the dependent variables for each equation, respectively, to examine the investor-level reaction to the earnings announcements. The second is that the abnormal order imbalance during the pre-announcement period (i.e., day -30 to day -1) for both the trade strata are included in these equations. Barber, Odean, and Zhu [2009a,b] find that the individuals' trading is highly persistent and that individuals tend to buy or sell the same stocks one month as they did the previous month. Campbell, Ramadorai, and Schwartz [2009] show that the daily institutional trades are highly persistent. In addition, Chordia and Subrahmanyam [2004] find that the daily total *OIB* of individual stocks is autocorrelated with the lagged total *OIB*. We then add $AOIB^{small}[-30,-1]$ and $AOIB^{large}[-30,-1]$ in these equations to control for their effects on *AOIB* during the announcement period. The third is that the other control variables are also included in these equations. As shown in Section 4.2, our *AOIB* measure may partially reflect the specific firm characteristics. Thus, we include the six variables (i.e., MVE, B/M, $STDRET$, $TURNOVER$, $SPREAD$, and $YIELD$) described in Section 4.2 in these equations. To minimize the influence of the extreme values, we use the natural log transformation of these variables except for $YIELD$.

Table 9 reports the estimation results of these equations. Regression 1 shows the investor-level reaction to the earnings announcements without considering the prior management forecast bias. For small traders, the coefficient on $RWFE$ is positive (= 0.348) and statistically significant ($p < 0.01$) while the coefficient on AFE is positive (= 0.329) but insignificant. In contrast, for large traders, the coefficient on AFE is positive (= 1.107) and statistically significant ($p < 0.01$) while the coefficient on $RWFE$ is positive (= 0.106) but insignificant. These results indicate that, as Hypotheses 1 and 2 predict, the individuals' (institutions') abnormal buying activity during the announcement period increases with $RWFE$ (AFE), but does not increase with AFE ($RWFE$). Regarding their trading behavior in response to management earnings forecasts, $AOIB^{large}[0, +1]$ is positively associated with $EFEC$, which is consistent with the result of the univariate analysis. On the other hand, inconsistent with the univariate result, $AOIB^{small}[0, +1]$ is also positively associated with $EFEC$ after controlling for the news in the current earnings and $AOIB$ during the pre-announcement period. These results, being consistent with Hypotheses 3 and 4, indicate that the management earnings forecast is useful information for both individuals and institutions in the sense that the information leads both traders to revise their expectations, and thus, triggers their trading activity. Turning to control variables, we find that there is a significantly positive coefficient on $AOIB^{small}_{i,t}[-30, -1]$ (= 0.537, $p < 0.01$) and a significantly negative coefficient on $AOIB^{large}_{i,t}[-30, -1]$ (= −0.094, $p < 0.01$) in the $AOIB^{small}[0, +1]$ equation. In the $AOIB^{large}[0, +1]$ equation, we find that the coefficient on $AOIB^{large}_{i,t}[-30, -1]$ is positive (= 0.391) and significant ($p < 0.01$) while the coefficient on $AOIB^{small}_{i,t}[-30, -1]$ is not significantly different from zero. Overall, these results suggest that during the announcement period, small traders tend to unusually buy (sell) stocks with high small-traders' (large-traders') buying pressure during the pre-announcement period. On the other hand, during the announcement period, large traders are likely to unusually heavily buy the stocks they bought during the pre-announcement period.

The investor-level reaction to the earnings announcements considering the previous year's management forecast bias is shown in the Regression 2 of Table 9. With regard to the investor-level reaction to the current earnings, the pattern of the estimated coefficients in Regression 2 is similar to that in Regression 1. The coefficient on $RWFE$ (AFE) in the $AOIB^{small}[0, +1]$ ($AOIB^{large}[0, +1]$) equation is statistically positive while the coefficient on AFE ($RWFE$) in the $AOIB^{small}[0, +1]$ ($AOIB^{large}[0, +1]$) equation is not significantly different from zero[25]. These results for small and large traders are consistent with Hypotheses 1 and 2, respectively.

With regard to the investor-level reaction to the management earnings forecasts, we observe that the coefficients on *EFEC* in the $AOIB^{small}[0,+1]$ and $AOIB^{large}[0,+1]$ equations are 0.802 ($p < 0.01$) and 1.736 ($p < 0.01$), respectively. These results indicate that the abnormal buying activity of both individuals and institutions increases with *EFEC* for the firms that issued the most pessimistic earnings forecasts in the last year. As expected, the results of the interaction terms of $EFEC \times GN \times BIAS_{t-1}^{dec}$ and $EFEC \times BN \times BIAS_{t-1}^{dec}$ in the $AOIB^{small}[0,+1]$ equation show that both are insignificantly different from zero. These results imply that individuals do not change their trading behavior depending on the prior management forecast bias, which is consistent with Hypothesis 3.

On the other hand, we find that the interaction term of $EFEC \times GN \times BIAS_{t-1}^{dec}$ in the $AOIB^{large}[0,+1]$ equation is negative ($= -1.634$) and significant ($p < 0.01$). The coefficients on *EFEC* and $EFEC \times GN \times BIAS_{t-1}^{dec}$ imply that for the good news forecasts, a positive association between the management earnings forecasts and the abnormal buying/selling activity of institutions is weaker for the firms that issued more optimistic forecasts at the earnings announcement of the last year, which is consistent with Hypothesis 4. For the bad news forecasts, however, Hypothesis 4 is not always true. Hypothesis 4 predicts that the coefficient of the interaction term, $EFEC \times BN \times BIAS_{t-1}^{dec}$, should be significantly positive, but the result shows that the coefficient is positive ($= 1.045$) but insignificant. Therefore, for the bad news forecasts, the abnormal buying/selling activity of institutions is positively associated with *EFEC* independent of the prior management forecast bias. These institutions' trading patterns in response to the management earnings forecasts correspond to the movement in the stock returns during the announcement period described in Section 4.1. A possible explanation is that the bad news forecasts are likely to be less optimistically biased than the good news forecasts. Large traders realize such a tendency of the bad news forecasts, and therefore, do not change their trading behavior in response to the management earnings forecasts regardless of whether or not the managers issued optimistically biased forecasts last year. In sum, whether or not institutions adjust for the autocorrelation structure of the forecast bias depends on the content of the management forecasts news; for the good news forecasts, they adjust their trading

[25] We can also point out that the coefficient on *RWFE* in the $AOIB^{small}[0,+1]$ equation is significantly larger than that in the $AOIB^{large}[0,+1]$ equation ($\chi^2 = 5.68$, $p < 0.05$). This indicates that individuals tend to respond more strongly to *RWFE* than institutions. In contrast, the coefficient on *AFE* in the $AOIB^{large}[0,+1]$ equation appears to be much larger than that in the $AOIB^{small}[0,+1]$ equation, but the null of the equality of the two coefficients is not rejected ($\chi^2 = 1.50$, $p > 0.10$).

behavior in response to the management earnings forecasts by taking into account its autocorrelation structure, while for the bad news forecasts, they do not.

Regression 3 of Table 9 includes the additional six variables to control for the potential effect of the various firm characteristics on the trading behavior of individuals and institutions during the announcement period. The conclusion drawn from Regression 2 remains basically unchanged by controlling for these firm characteristics. The only major difference between Regressions 2 and 3 is that the coefficient on *RWFE* in the $AOIB^{large}[0,+1]$ equation is insignificantly positive (= 0.094, t = 1.23) in Regression 2 while it is significantly positive (= 0.164, t = 2.09) in Regression 3. Because Hypothesis 2 predicts that in the $AOIB^{large}[0,+1]$ equation, the coefficient on *AFE* should be positive and significant but the coefficient on *RWFE* should be insignificantly different from zero, the result in Regression 3 partially conflicts with the hypothesis. However, we do not believe that this evidence is inconsistent with the underlying notion of the hypothesis. Institutions seem to react somewhat to *RWFE* but the fact remains that they use not the random walk model but the analyst forecast in forming the prior expectation for the current earnings. In fact, the coefficient on *AFE* appears to be much larger than the coefficient on *RWFE* although the null of equality of the two coefficients (i.e., 0.164 vs. 1.071) cannot be rejected at the conventional levels ($\chi^2 = 2.11$, $p = 0.147$). In addition, it seems unlikely that institutions hold naïve expectations for the current earnings from the results in the univariate analysis (see Table 8). Hence, we conclude that Hypothesis 2 is basically supported even in Regression 3.

Turning to control variables, we observe that the unusual buying/selling activity of small traders during the announcement period is positively associated with *MVE* and *SPREAD*. This means that during the announcement period, individuals tend to actively buy stocks with a larger market cap and higher bid-ask spread even after controlling for the news in the earnings announcement. In the $AOIB^{large}[0,+1]$ equation, the coefficients on *MVE*, *B/M*, and *STDRET* are negative and significant at the conventional levels, and the coefficient on *YIELD* is positive and significant at the 1% level. These findings indicate that during the announcement period, institutions tend to unusually buy stocks with a smaller market cap, lower book-to-market ratio, lower standard deviation of returns, and higher dividend yield even after controlling for the news in the earnings announcement.

The results in this section strongly support our Hypotheses 1, 2, and 3, respectively, and partially support Hypothesis 4; the fourth hypothesis is supported for the good news forecasts, but not for the bad news forecasts. Overall, our results suggest that the individuals' trading behavior in response to the earnings announcements is so naïve as if they use nothing other than the information released at the time of the earnings announcement—for the current earnings, they are interested only in the earnings changes from the previous year, and for the management earnings forecast, they take it at face value despite the anticipated optimistic bias. On the other hand, the institutions' behavior is more sophisticated.

4.4 Robustness check

We conduct several robustness tests. First, we check whether or not our results are sensitive to the definition of event period. Battalio and Mendenhall [2005] investigate the investor-level reaction to the earnings announcements during the three days centered on the announcement date. We then set days −1 to +1 as the alternative event period and reestimate Eqs. (2a) and (2b). The results (not reported in tables) are essentially unchanged from the ones in Table 9, except that the individuals' reaction to the management earnings forecasts weakens. Therefore, our inferences are unaffected by the definition of the event period.

Second, we investigate whether or not our results are sensitive to the measurement of order imbalance. We use the *OIB* measure based on the number of traded shares in the main analyses. As a robustness check, we use the alternative measure, that is, the *OIB* on the basis of the Japanese yen paid by buyer- and seller-initiators, and then reestimate Eqs. (2a) and (2b). We find that the pattern of the estimated coefficients in terms of the sign and magnitude is similar to that in Table 9. Hence, our results are robust to an alternative measurement of the *OIB*.

Finally, the criteria to distinguish between individuals and institutions rely much on our intuition and one may have doubts about the robustness of our results. Thus, we reestimate Eqs. (2a) and (2b) using the following alternative criterion: a trade less (more) than or equal to 1,000,000 (4,000,000) Japanese yen as the trades initiated by individuals (institutions). The untabulated results show that the pattern of the estimated coefficients in terms of the sign and magnitude is barely affected by this switch. However, we observe a significant difference between this robustness test and Table 9. Surprisingly, we find that for the good news forecasts, both individuals and institutions trade on the management earnings forecasts taking into account the prior management forecast bias under this alternative criteria. The untabulated results show that the coefficient on *EFEC* is significantly positive (= 1.181, *t*-stat. = 2.34) and the coefficient on $EFEC \times GN \times BIAS_{t-1}^{dec}$ is significantly negative (= −0.927, *t*-stat. = 1.80) in the $AOIB^{small}[0, +1]$ equation. This is consistent with the pattern of estimated coefficients in the $AOIB^{large}[0, +1]$ equation.

These findings indicate that for the good news forecasts, both individuals and institutions trade on the management earnings forecasts with taking into account the last year's management forecast bias.

In other words, among individuals, only the traders with a relatively smaller amount of investment funds naïvely react to the management earnings forecasts. The stealth-trading hypothesis could provide one possible explanation for this. Barclay and Warner [1993] and Chakravarty [2001] argue that the informed traders prefer to break into more than one medium-sized trades to avoid revealing private information and large price concessions. According to the suggestions in the previous studies, we exclude the medium-sized trades to discriminate accurately between individuals and institutions. By raising the upper threshold for small trades from 500,000 to 1,000,000 Japanese yen, small trades based on the alternative criterion might include more informed trades by the institutions' stealth trading. However, we can again obtain the similar results otherwise. Overall, we conclude that our inferences are basically robust to using an alternative criterion.

4.5 Additional analysis

Malmendier and Shanthikumar [2007] find that large traders rationally react to the biased analyst recommendations, and then, enjoy a positive return during the period after more sophisticated trading. In contrast, they find that by naïvely following the recommendations, small traders incur losses from less sophisticated trading (see also Mikhail, Walther, and Willis [2007]). These results suggest that the rational (naïve) trading activity in response to the public information yields a positive (negative) return after the announcement period. In the previous section, we show that individuals naïvely trade on both the current earnings and management earnings forecasts, while institutions rationally trade on such information. The evidence raises an interesting question as to whether or not by more sophisticated (less sophisticated) trading to the earnings announcements, institutions (individuals) can enjoy a positive (negative) return after the announcement period. To examine this prediction, we estimate the following equation:

$$CAR[k,l] = \alpha_0 + \sum_{\tau=2000}^{2006} \alpha_{\tau-1999} YD_{\tau,i,t} + \beta_1 AOIB^{small}[0,+1] + \beta_2 AOIB^{large}[0,+1] + \mu_{i,t}, \qquad (3)$$

where $[k,l]$ is time interval from day k to l after the earnings announcement date (day = 0). We set two different time intervals, $[+2,+30]$ and $[+2,+60]$, for this analysis[26]. If institutions (individuals) earn positive (negative) future returns from their trading during the announcement period, the coefficient on $AOIB^{large}[0,+1]$ ($AOIB^{small}[0,+1]$) is expected to be positive (negative).

[26] In this test, we exclude the observations that disappear from the stock returns database during the return cumulation period. For this reason, we exclude 15 observations if we use the time interval $[+2,+60]$, while no observations are excluded if we set the time interval $[+2,+30]$.

Table 10 reports the OLS coefficient estimatesm and White [1980] heteroscedasticity consistent t-statistics given in the parentheses. In the $CAR[+2,+30]$ equation, we observe that the coefficient on $AOIB^{large}[0,+1]$ is positive (= 0.003) and statistically significant ($p < 0.05$), while the coefficient on $AOIB^{small}[0,+1]$ is negative (= −0.002) but insignificantly different from zero. These results indicate that the stocks with unusually buying (selling) by institutions during the announcement period experience more positive (negative) returns after the announcement period. For another time interval, $[+2,+60]$, the coefficient on $AOIB^{large}[0,+1]$ remains positive (= 0.006) and statistically significant ($p < 0.01$). In addition, the coefficient on $AOIB^{small}[0,+1]$ becomes significantly negative (= −0.004, $p < 0.10$)[27]. These results suggest that if we assume a holding period of sixty days, institutions can obtain positive returns from their trading during the announcement period. In contrast, individuals have significantly negative future returns on their trading during the announcement period.

Overall, our results indicate that compared with individuals, institutions make better use of the earnings announcement in which the current earnings and management earnings forecasts are simultaneously released. Therefore, institutions (individuals) can have significantly positive (negative) future returns from their trading during the announcement period.

5 Conclusion

We examine how individuals and institutions respond to the earnings announcements by focusing on the unique Japanese disclosure setting wherein the firms simultaneously report the actual earnings for the previous and current years along with the management earnings forecast for the next year. The TSE requires the listed firms to release the management earnings forecasts so as to help the investors in assessing future prospects. Using this unique setting, we test whether or not the trading behavior around the earnings announcements is significantly different between individuals and institutions. Our main findings are as follows.

[27] To evaluate the economic impact of these two coefficients, we also estimate Eq. (3) using the annual decile rank, scaled to range between 0 and 1, for $AOIB^{small}[0,+1]$ and $AOIB^{large}[0,+1]$. By this coding scheme, the coefficient on each variable can be interpreted as the difference in the abnormal return between the portfolio for stocks with the strongest selling pressure and that for the stocks with the strongest buying pressure by each type of traders. The untabulated results show that the coefficient on $AOIB^{small}[0,+1]$ is −0.008 and significant ($p < 0.01$) while the the coefficient on $AOIB^{large}[0,+1]$ is 0.015 and significant ($p < 0.01$). The results imply that the difference in the abnormal return between the lowest and highest $AOIB^{small}[0,+1]$ ($AOIB^{large}[0,+1]$) deciles is −0.8% (1.5%), or −3.3% (6.3%) on an annualized basis. We believe that these differences are also economically significant.

First, we find that individuals respond differently from institutions to the the current earnings—the individuals' (institutions') trading behavior around the earning announcements is strongly associated with the simplistic random walk forecast errors (analyst forecast errors), whereas has little relationship with analyst forecast errors (simplistic random walk forecast errors). The differential trading behavior in response to the current earnings between individuals and institutions reflects the divergent earnings expectations of the current earnings just prior to the earnings announcements. Individuals behave as if they only read the earnings report and/or the financial press, and then regard earnings of the previous year as earnings expectation. Their earnings expectations are not so informed. They are likely to ignore the costly information such as analyst forecasts and use the simplistic random walk model in reference to the incomplete information set that is easily available at the time of earnings announcement. On the other hand, institutions behave as if they in advance hold the earnings expectation based on the prediction of the more accurate model—analyst forecasts. They appear to actively incorporate analyst forecast, which is costly information in terms of acquisition, into their earnings expectation, and therefore, their trading behavior depends on the analyst forecast error.

Second, we find that individuals also respond differently from institutions to the management earnings forecasts. Our results show that both traders use them, but trade on them differently. Individuals trade on the management earnings forecasts literally in spite of the fact that the bias in the management earnings forecast issued at the time of earnings announcement has a positive autocorrelation structure. They behave as if they only see the management earnings forecasts included in the earnings report and/or the financial press to make an investment decision, and therefore, naïvely trade on the forecast. They are not likely to properly unscramble the implication of the management forecasts, and seem to be misled by biased forecasts. In contrast, our results indicate that institutions respond to the management forecasts with the predictable optimistic bias in mind. For good news forecasts, we find that they discount the management forecasts with higher anticipated optimism by judging it from the previous year's forecast bias. On the other hand, for the bad news forecasts, they do not take into account the autocorrelation structure of the forecast bias. Instead, they realize that bad news forecasts are likely to be less optimistically biased than the good news forecast and then react to the bad news forecasts literally even when the management earnings forecast of the previous year is optimistically distorted.

Finally, we find that the individuals' and institutions' unusual buy/sell order imbalances during the announcement period exhibit a predictive power for the post-announcement returns over a sixty-day period: the former (the latter) is negatively (positively) associated with the size-adjusted abnormal returns. These findings indicate that by relatively naïve (rational) trading during the announcement period, individuals (institutions) have negative (positive) returns after the announcement.

Overall, we conclude that individuals respond differently from institutions to identical earnings news under the unique Japanese setting. Our results suggest that the individuals' trading is so naïve as if they use nothing other than the information released at the time of earnings announcement. They prefer to use easily available information at a low cost and spend far less time on analyzing the earnings information. Stated differently, they tend to avoid incurring the additional costs of gathering and processing information. In contrast, institutions tend to actively use costly predisclosure information and unscramble the information released at the time of earnings announcement in combination with such costly predisclosure information. In other words, they willingly incur the additional costs of gathering and processing information. As a result, institutions make better use of the earnings announcement information including the management earnings forecasts and their trading behavior around the earnings announcement is much more sophisticated than that of individuals.

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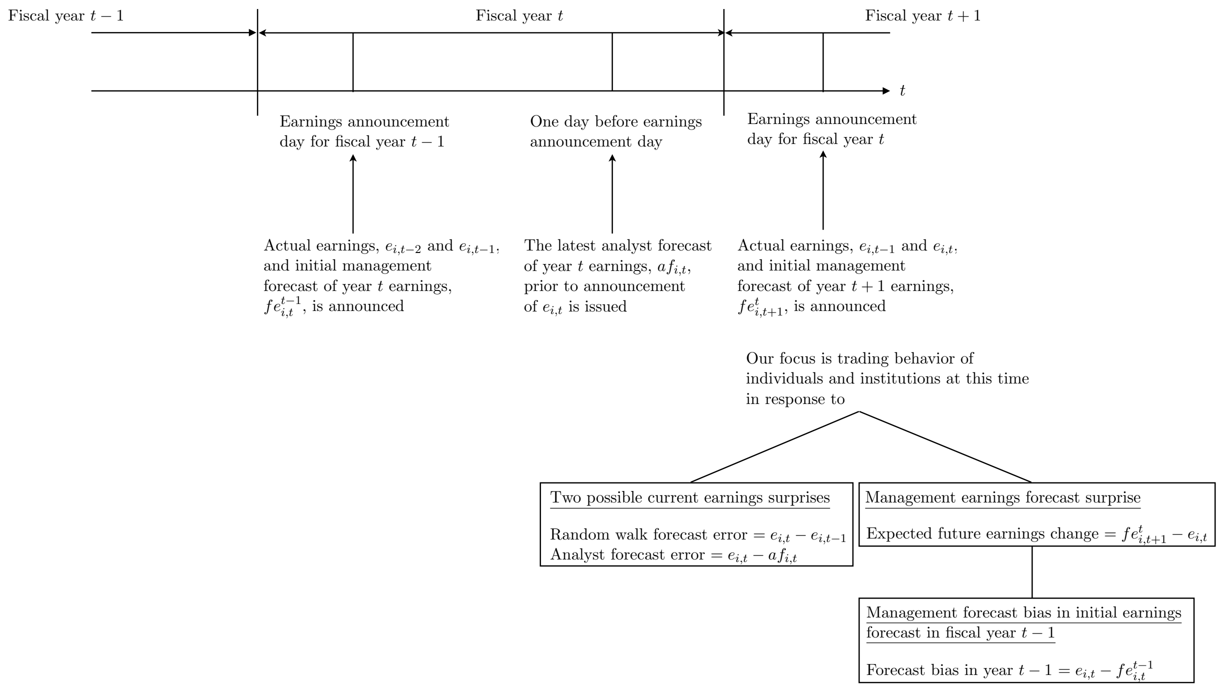

Figure 1: Timeline for measurement of earnings-related variables

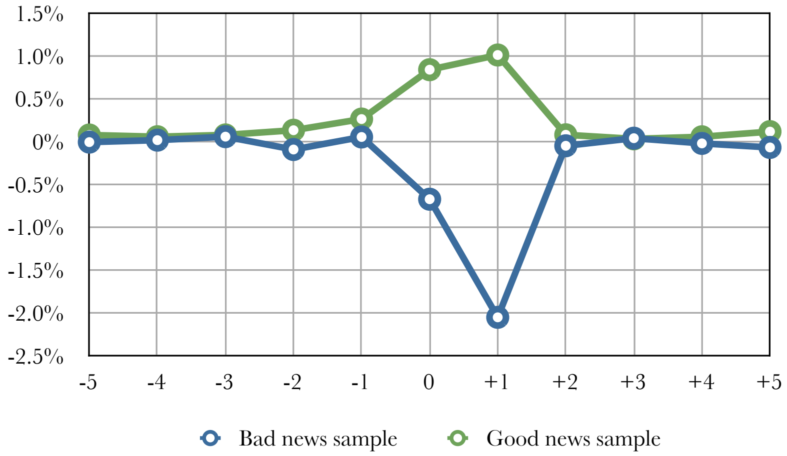

Figure 2: Behavior of mean size-adjusted return around earnings announcements

This figure shows mean size-adjusted return for portfolios of firms that release extremely good and bad news over the period from 5 days before to 5 days after the earnings announcement date (day 0). Good news (bad news) sample consists of 2,903 (257) observations where $RWFE$, AFE, and $EFEC$ are all non-negative (negative). $RWFE$ (AFE) is random walk forecast error (analyst forecast error) and is defined as the difference between actual earnings for year t and actual earnings for year $t-1$ (the most recent analyst forecast for year t before earnings announcement), deflated by the market value of equity at the end of fiscal year t. $EFEC$ is expected future earnings change based on management earnings forecast and is defined as the difference between management earnings forecast for year $t+1$ made at the earnings announcement of year t and actual earnings for year t, deflated by the market value of equity at the end of fiscal year t.

May 7, 2009

Nintendo Co., Ltd.

Fiscal year-end	Sales (billions of Yen)	Operating income (billions of Yen)	Earnings from continuing operation (billions of Yen)	Net income (billions of Yen)	Earnings per share (Yen)	Dividend per share (Yen)
03/08 (actual)	1,672	487	440	257	2,012	1,260
03/09 (actual)	1,838	555	448	279	2,182	1,440
03/10 (management forecast)	1,800	490	500	300	2,345	1,270

Table 1: A typical example of the earnings report listing on the TSE

This table shows an example of earnings report released by Nintendo Co., Ltd, that lists on the TSE. This is the earnings report with regard to fiscal year 2009. The TSE requires listed firms to report the management forecasts for the next year (2010 in this example) of sales, operating income, earnings from continuing operation, net income, earnings per share, and dividend per share.

Panel A: Summary statistics

	$RWFE$	AFE	$EFEC$	$BIAS_{t-1}$
Mean	−0.011	−0.009	0.063	0.052
Standard deviation	0.531	0.322	0.792	0.496
P10	−0.070	−0.007	−0.012	−0.015
P25	−0.011	−0.001	0.000	−0.005
P50	0.004	0.000	0.005	0.002
P75	0.018	0.002	0.021	0.019
P90	0.069	0.006	0.099	0.089

Panel B: Comparison of accuracy of random walk forecast with that of analyst forecast

	$abs(RWFE)$	$abs(AFE)$	t-stat.	z-stat.
Mean	0.092	0.014	19.27***	
Median	0.015	0.002		79.23***

Table 2: Descriptive statistics for earnings-related variables

The sample consists of 10,258 observations during the period from 1999 to 2006. Panel A of this table reports summary statistics for news in current earnings and management earnings forecast and the previous year's management forecast bias in initial earnings forecast. Px is the value of the xth percentile for each variable. $RWFE$ (AFE) is random walk forecast error (analyst forecast error) and is defined as the difference between actual earnings for year t and actual earnings for year $t-1$ (the most recent analyst forecast for year t before earnings announcement), deflated by the market value of equity at the end of fiscal year t. $EFEC$ is expected future earnings change based on management earnings forecast and is defined as the difference between management earnings forecast for year $t+1$ made at the earnings announcement of year t and actual earnings for year t, deflated by the market value of equity at the end of fiscal year t. $BIAS_{t-1}$ is the previous year's management forecast bias in initial earnings forecast and is defined as the difference between initial management earnings forecast of year t earnings made at the earnings announcement of year $t-1$ and actual current earnings, deflated by the market value of equity as of the end of fiscal year t. Panel B of this table shows the mean and median of absolute values of $RWFE$ and AFE to compare accuracy of the two measures. Mean (median) differences are tested using paired two-sample t-test (Wilcoxon matched-pairs signed-ranks test). *** indicates significance at the 1% levels (two-tailed).

Panel A: Contingency table of the sign of $BIAS_{t-1}$ and $BIAS_t$

	$BIAS_t < 0$	$0 \leq BIAS_t$	Total
$BIAS_{t-1} < 0$	2,617	1,858	4,475
	(58.5%)	(41.5%)	(45.0%)
$0 \leq BIAS_{t-1}$	2,007	3,463	5,470
	(36.7%)	(63.3%)	(55.0%)
Total	4,624	5,321	9,945
	(46.5%)	(53.5%)	(100.0%)

$\chi^2 = 472.74$ ($p < 0.01$)

Panel B: Summary statistics of $BIAS_t$ for portfolios formed by $BIAS_{t-1}$

	Obs.	Mean of $BIAS_t$	Median of $BIAS_t$	Percentage of $0 \leq BIAS_t$ (% of Optimistic forecast)
D1 (Low $BIAS_{t-1}$)	990	0.041	−0.003	40.9%
D2	995	0.040	−0.002	42.3%
D3	994	0.015	−0.001	45.9%
D4	995	0.019	−0.001	44.6%
D5	996	0.016	0.000	50.2%
D6	994	0.029	0.002	56.2%
D7	994	0.036	0.003	60.6%
D8	995	0.040	0.004	63.1%
D9	994	0.112	0.008	66.2%
D10 (High $BIAS_{t-1}$)	998	0.190	0.015	64.9%
All firms	9,945	0.054	0.001	53.5%
D10−D1		0.149	0.018	
t-stat.		5.09***		
z-stat.			12.91***	

Table 3: Autocorrelation structure of management forecast bias in initial earnings forecast

Panel A of this table reports a contingency table of the sign of $BIAS_{t-1}$ and $BIAS_t$. $BIAS_{t-1}$ ($BIAS_t$) is the previous year's (current year's) management forecast bias in initial earnings forecast and is defined as the difference between initial management earnings forecast of year t ($t+1$) earnings made at the earnings announcement of year $t-1$ (t) and actual current earnings of year t ($t+1$), deflated by the market value of equity as of the end of fiscal year t ($t+1$). Panel B of this table reports mean and median of $BIAS_t$ and percentage of observations with $0 \leq BIAS_t$ for portfolios formed by $BIAS_{t-1}$. To construct this table, we sort sample firms into deciles based on annual $BIAS_{t-1}$ rank. D10−D1 represents the difference in means between the top (D10) and bottom (D1) deciles. Mean (median) differences are tested using t-test (Wilcoxon rank-sum test). *** indicates significance at the 1% levels (two-tailed). For this analysis, we use 9,945 observations for which $BIAS_t$ is available in our sample.

Panel A: Mean value of RWFE and CAR[0, +1] for portfolios formed by RWFE

	Obs.	*RWFE*	*CAR*[0, +1]
Q1 (Low *RWFE*)	2,047	− 0.248	0.69%
Q2	2,052	−0.009	0.08%
Q3	2,052	0.004	0.43%
Q4	2,052	0.015	1.01%
Q5 (High *RWFE*)	2,055	0.184	0.92%
All firms	10,258	−0.011	0.63%
Q5−Q1			0.22%

Panel B: Mean value of AFE and CAR[0, +1] for portfolios formed by AFE

	Obs.	*AFE*	*CAR*[0, +1]
Q1 (Low *AFE*)	2,047	−0.055	0.12%
Q2	2,052	−0.001	0.21%
Q3	2,052	0.000	0.45%
Q4	2,052	0.002	0.87%
Q5 (High *AFE*)	2,055	0.010	1.48%
All firms	10,258	−0.009	0.63%
Q5−Q1			1.37%***

Panel C: Mean value of EFEC and CAR[0, +1] for portfolios formed by EFEC

	Obs.	*EFEC*	*CAR*[0, +1]
Q1 (Low *EFEC*)	2,047	−0.035	−1.40%
Q2	2,052	0.001	0.00%
Q3	2,052	0.006	0.87%
Q4	2,052	0.019	1.71%
Q5 (High *EFEC*)	2,055	0.320	1.95%
All firms	10,258	0.063	0.63%
Q5−Q1			3.35%***

Table 4: Mean value of $CAR[0, +1]$ for portfolios formed by each news variable

The sample consists of 10,258 observations during the period from 1999 to 2006. This table reports the mean size-adjusted abnormal returns for portfolios formed by *RWFE*, *AFE*, or *EFEC*. The abnormal return (*CAR*) is cumulated over days 0 through +1 relative to the earnings announcement date (day 0). *RWFE* (*AFE*) is random walk forecast error (analyst forecast error) and is defined as the difference between actual earnings for year t and actual earnings for year $t-1$ (the most recent analyst forecast for year t before earnings announcement), deflated by the market value of equity at the end of fiscal year t. *EFEC* is expected future earnings change based on management earnings forecast and is defined as the difference between management earnings forecast for year $t+1$ made at the earnings announcement of year t and actual earnings for year t, deflated by the market value of equity at the end of fiscal year t. To construct this table, we independently sort sample firms into quintiles based on annual *RWFE*, *AFE*, or *EFEC* rank. Q5−Q1 represents the difference in means between the top (Q5) and bottom (Q1) quintiles. Mean differences are tested using t-test. *** indicates significance at the 1% levels (two-tailed).

Panel A: Spearman Correlation Matrix

	$CAR[0,+1]$	$RWFE$	AFE	$EFEC$
$CAR[0,+1]$	1.000	0.026***	0.100***	0.214***
$RWFE$		1.000	0.191***	−0.366***
AFE			1.000	−0.178***
$EFEC$				1.000

Panel B: Regression results of $CAR[0,+1]$ on news variables and the previous year's management forecast bias

	Regression 1	Regression 2
Constant	0.008***	0.008***
	(5.00)	(4.52)
$RWFE$	0.022***	0.020***
	(4.23)	(3.70)
AFE	0.178***	0.142***
	(4.44)	(3.61)
$EFEC$	0.049***	0.293***
	(6.99)	(4.90)
$BIAS_{t-1}^{dec}$		−0.000
		(−0.097)
$EFEC \times GN \times BIAS_{t-1}^{dec}$		−0.262***
		(−4.36)
$EFEC \times BN \times BIAS_{t-1}^{dec}$		0.074
		(0.66)
Year dummy	Included	Included
Observations	9,660	9,660
Adjusted R^2	0.0128	0.0280

Table 5: Market reaction to concurrent announcements of current earnings and management earnings forecast

Panel A of this table provides Spearman correlation coefficients. $CAR[0,+1]$ is the abnormal return cumulated over days 0 through +1 relative to the earnings announcement date (day 0). $RWFE$ (AFE) is random walk forecast error (analyst forecast error) and is defined as the difference between actual earnings for year t and actual earnings for year $t-1$ (the most recent analyst forecast for year t before earnings announcement), deflated by the market value of equity at the end of fiscal year t. $EFEC$ is expected future earnings change based on management earnings forecast and is defined as the difference between management earnings forecast for year $t+1$ made at the earnings announcement of year t and actual earnings for year t, deflated by the market value of equity at the end of fiscal year t. The sample consists of 10,258 observations during the period from 1999 to 2006. Panel B of this table shows OLS pooled regression results of $CAR[0,+1]$ on news in current earnings and management earnings forecast and the previous year's management forecast bias in initial earnings forecast. $BIAS_{t-1}^{dec}$ is annual decile rank, scaled to range between 0 and 1, for $BIAS_{t-1}$. $BIAS_{t-1}$ is the previous year's management forecast bias in initial earnings forecast and is defined as the difference between initial management earnings forecast of year t earnings made at the earnings announcement of year $t-1$ and actual current earnings, deflated by the market value of equity as of the end of fiscal year t. GN (BN) is an indicator variable that is set equal to one for firms with $0 \leq EFEC$ ($EFEC < 0$). To mitigate the influence of outliers, we estimate each regression using the observations within the 1st and 99th of the annual distributions for respective earnings-related variables (i.e., $RWFE$, AFE, and $EFEC$) and return-related variable (i.e., CAR) across year. The t-statistics, reported in parentheses, are based on White [1980] heteroscedasticity-consistent standard errors. *** indicates significance at the 1% levels (two-tailed).

Panel A: Contingency table of the sign of EFEC and $BIAS_t$

	$BIAS_t < 0$	$0 \leq BIAS_t$	Total
$EFEC < 0$	1,338	1,159	2,497
	(53.6%)	(46.4%)	(25.1%)
$0 \leq EFEC$	3,286	4,162	7,448
	(44.1%)	(55.9%)	(74.9%)
Total	4,624	5,321	9,945
	(46.5%)	(53.5%)	(100.0%)

$\chi^2 = 67.22$ ($p < 0.01$)

Panel B: Summary statistics of $BIAS_t$ for portfolios formed by the sign of EFEC

	$EFEC < 0$	$0 \leq EFEC$	Total	t-stat.	z-stat.
Obs.	2,497	7,448	9,945		
Mean	0.063	0.051	0.054	−0.71	
Median	−0.001	0.002	0.001		9.10***

Table 6: Association between management earnings forecast and the forecast bias

Panel A of this table reports a contingency table of sign of *EFEC* and $BIAS_t$. *EFEC* is expected future earnings change based on management earnings forecast and is defined as the difference between management earnings forecast for year $t+1$ made at the earnings announcement of year t and actual earnings for year t, deflated by the market value of equity at the end of fiscal year t. $BIAS_t$ is forecast bias of the management earnings forecast and is defined as the difference between initial management earnings forecast of year $t+1$ earnings made at the earnings announcement of year t and actual earnings of year $t+1$, deflated by the market value of equity as of the end of fiscal year $t+1$. Panel B of this table reports mean and median of $BIAS_t$ for portfolios formed by the sign of *EFEC*. Mean (median) differences are tested using t-test (Wilcoxon rank-sum test). *** indicates significance at the 1% levels (two-tailed). For this analysis, we use 9,945 observations for which $BIAS_t$ is available in our sample.

Panel A: $AOIB^{small}[0, +1]$ and firm characteristics

	Q1 (Net seller)	Q2	Q3	Q4	Q5 (Net buyer)	All firms	Q5-Q1
MVE (billion yen)	228	198	197	225	380	246	152***
B/M	0.872	0.905	0.945	0.906	0.849	0.895	−0.022
STDRET (%)	2.56%	2.64%	2.69%	2.83%	2.75%	2.69%	0.19%***
TURNOVER (%)	0.33%	0.34%	0.35%	0.39%	0.41%	0.36%	0.08%***
SPREAD (%)	0.55%	0.61%	0.63%	0.68%	0.62%	0.62%	0.07%***
YIELD (%)	1.23%	1.22%	1.24%	1.16%	1.08%	1.19%	−0.15%***

Panel B: $AOIB^{large}[0, +1]$ and firm characteristics

	Q1 (Net seller)	Q2	Q3	Q4	Q5 (Net buyer)	All firms	Q5-Q1
MVE (billion yen)	211	332	271	219	196	246	−15
B/M	0.934	0.894	0.874	0.884	0.891	0.895	−0.042**
STDRET (%)	2.69%	2.73%	2.67%	2.71%	2.67%	2.69%	−0.02%
TURNOVER (%)	0.35%	0.37%	0.36%	0.37%	0.36%	0.36%	0.01%
SPREAD (%)	0.66%	0.58%	0.58%	0.61%	0.66%	0.62%	0.00%
YIELD (%)	1.22%	1.13%	1.16%	1.17%	1.25%	1.19%	0.03%

Table 7: *AOIB* measure and firm characteristics

The sample consists of 10,258 observations during the period from 1999 to 2006. Panel A (Panel B) of this table reports the result of univariate relationship between *AOIB* for small traders (large traders) in interval $[0, +1]$ and various firm characteristics. To construct this table, we independently form five portfolios based on annual $AOIB[0, +1]$ rank for small and large traders, and compute the average for each firm characteristics in each of the portfolios. *MVE* is market value of equity defined as market value of equity as of the end of fiscal year t. B/M is market-to-book ratio computed as book value of equity at the end of fiscal year $t-1$ divided by market value of equity six months after the end of fiscal year $t-1$. *STDRET* is standard deviation of daily returns during the fiscal year t. *TURNOVER* is average daily turnover (defined as daily number of shares traded dividend by daily number of shares outstanding) over fiscal year t. *SPREAD* is average daily equal-weighted relative spread over fiscal year t. *YIELD* is average dividend yield at the end of month over fiscal year t. Q5−Q1 represents the difference in means between the top (Q5) and bottom (Q1) quintiles. Mean differences are tested using t-test. *** and ** indicate significance at the 1% and 5% levels (two-tailed), respectively.

Panel A: Mean value of $AOIB^{small}[0,+1]$ and $AOIB^{large}[0,+1]$ for portfolios formed by RWFE

	Obs.	*RWFE*	$AOIB^{small}[0,+1]$	$AOIB^{large}[0,+1]$
Q1 (Low *RWFE*)	2,047	− 0.248	−0.016	0.130
Q2	2,052	−0.009	−0.018	0.073
Q3	2,052	0.004	0.015	0.057
Q4	2,052	0.015	0.042	0.115
Q5 (High *RWFE*)	2,055	0.184	0.075	0.098
All firms	10,258	−0.011	0.020	0.095
Q5−Q1			0.091***	−0.032

Panel B: Mean value of $AOIB^{small}[0,+1]$ and $AOIB^{large}[0,+1]$ for portfolios formed by AFE

	Obs.	*AFE*	$AOIB^{small}[0,+1]$	$AOIB^{large}[0,+1]$
Q1 (Low *AFE*)	2,047	−0.055	0.023	0.058
Q2	2,052	−0.001	0.030	0.047
Q3	2,052	0.000	0.014	0.087
Q4	2,052	0.002	0.012	0.117
Q5 (High *AFE*)	2,055	0.010	0.021	0.163
All firms	10,258	−0.009	0.020	0.095
Q5−Q1			−0.002	0.104***

Panel C: Mean value of $AOIB^{small}[0,+1]$ and $AOIB^{large}[0,+1]$ for portfolios formed by EFEC

	Obs.	*EFEC*	$AOIB^{small}[0,+1]$	$AOIB^{large}[0,+1]$
Q1 (Low *EFEC*)	2,047	−0.035	0.015	−0.018
Q2	2,052	0.001	0.018	0.014
Q3	2,052	0.006	0.004	0.122
Q4	2,052	0.019	0.033	0.171
Q5 (High *EFEC*)	2,055	0.320	0.030	0.183
All firms	10,258	0.063	0.020	0.095
Q5−Q1			0.016	0.200***

Table 8: Mean value of $AOIB^{small}[0,+1]$ and $AOIB^{large}[0,+1]$ for portfolios formed by each news variable

The sample consists of 10,258 observations during the period from 1999 to 2006. This table reports the average *AOIB* for small and large traders during the announcement period from days 0 to +1 relative to the earnings announcement date (day 0) for portfolios formed by *RWFE*, *AFE*, or *EFFE*. $AOIB^{z}[0,+1]$ is abnormal order imbalance for trader type ($z \in small, large$) and time interval $[0,+1]$. *RWFE* (*AFE*) is random walk forecast error (analyst forecast error) and is defined as the difference between actual earnings for year t and actual earnings for year $t-1$ (the most recent analyst forecast for year t before earnings announcement), deflated by the market value of equity at the end of fiscal year t. *EFEC* is expected future earnings change based on management earnings forecast and is defined as the difference between management earnings forecast for year $t+1$ made at the earnings announcement of year t and actual earnings for year t, deflated by the market value of equity at the end of fiscal year t. To construct this table, we independently sort sample firms into quintiles based on annual *RWFE*, *AFE*, or *EFEC* rank. Q5−Q1 represents the difference in means between the top (Q5) and bottom (Q1) quintiles. Mean differences are tested using t-test. *** indicates significance at the 1% levels (two-tailed).

	Regression 1		Regression 2		Regression 3	
	$AOIB^{small}[0,+1]$	$AOIB^{large}[0,+1]$	$AOIB^{small}[0,+1]$	$AOIB^{large}[0,+1]$	$AOIB^{small}[0,+1]$	$AOIB^{large}[0,+1]$
Constant	−0.052**	−0.002	−0.026	−0.026	−0.144	0.199
	(−2.22)	(−0.07)	(−1.02)	(−0.92)	(−0.89)	(1.13)
RWFE	0.348***	0.106	0.337***	0.094	0.275***	0.164**
	(4.96)	(1.39)	(4.79)	(1.23)	(3.80)	(2.09)
AFE	0.329	1.107*	0.061	1.079*	0.208	1.071*
	(0.58)	(1.82)	(0.11)	(1.74)	(0.36)	(1.73)
EFEC	0.248***	0.276***	0.802**	1.736***	0.723*	1.809***
	(2.94)	(3.02)	(2.06)	(4.13)	(1.86)	(4.30)
$BIAS_{t-1}^{dec}$			−0.065**	0.056**	−0.046*	0.043
			(−2.53)	(2.02)	(−1.80)	(1.55)
$EFEC \times GN \times BIAS_{t-1}^{dec}$			−0.502	−1.634***	−0.518	−1.594***
			(−1.27)	(−3.84)	(−1.32)	(−3.74)
$EFEC \times BN \times BIAS_{t-1}^{dec}$			−1.400	1.045	−1.358	0.839
			(−1.29)	(0.89)	(−1.25)	(0.71)
$AOIB^{small}[-30,-1]$	0.537***	−0.001	0.536***	−0.000	0.521***	0.009
	(26.8)	(−0.03)	(26.8)	(−0.02)	(25.9)	(0.41)
$AOIB^{large}[-30,-1]$	−0.094***	0.392***	−0.093***	0.391***	−0.096***	0.388***
	(−5.02)	(19.4)	(−5.00)	(19.3)	(−5.10)	(19.1)
$\ln(MVE)$					0.030***	−0.024***
					(3.54)	(−2.65)
$\ln(B/M)$					−0.006	−0.046***
					(−0.46)	(−3.57)
$\ln(STDRET)$					0.042	−0.075**
					(1.29)	(−2.11)
$\ln(TURNOVER)$					0.009	−0.003
					(0.78)	(−0.27)
$\ln(SPREAD)$					0.082***	−0.008
					(4.00)	(−0.38)
YIELD					−1.290	3.290***
					(−1.25)	(2.95)
Year Dummy	Included	Included	Included	Included	Included	Included
Observations	9,827	9,827	9,827	9,827	9,827	9,827
Adjusted R^2	0.0761	0.0639	0.0766	0.0663	0.0802	0.0690

Table 9: Regression results of $AOIB[0,+1]$ on news variables and the previous year's management forecast bias

(*Continued*)

(—*Continued*) This table reports the estimation results of the following regressions:

$$\begin{aligned} AOIB^{small}_{i,t}[0,+1] &= \alpha_0 + \sum_{\tau=2000}^{2006} \alpha_{\tau-1999} YD_{\tau,i,t} + \beta_1 RWFE_{i,t} + \beta_2 AFE_{i,t} + \beta_3 EFEC_{i,t} \\ &+\beta_4 BIAS^{dec}_{i,t-1} + \beta_5 EFEC_{i,t} \times GN_{i,t} \times BIAS^{dec}_{i,t-1} + \beta_6 EFEC_{i,t} \times BN_{i,t} \times BIAS^{dec}_{i,t-1} \\ &+\beta_7 AOIB^{small}_{i,t}[-30,-1] + \beta_8 AOIB^{large}_{i,t}[-30,-1] + \text{Control variables} + \varepsilon_{i,t} \\ AOIB^{large}_{i,t}[0,+1] &= \delta_0 + \sum_{\tau=2000}^{2006} \delta_{\tau-1999} YD_{\tau,i,t} + \gamma_1 RWFE_{i,t} + \gamma_2 AFE_{i,t} + \gamma_3 EFEC_{i,t} \\ &+\gamma_4 BIAS^{dec}_{i,t-1} + \gamma_5 EFEC_{i,t} \times GN_{i,t} \times BIAS^{dec}_{i,t-1} + \gamma_6 EFEC_{i,t} \times BN_{i,t} \times BIAS^{dec}_{i,t-1} \\ &+\gamma_7 AOIB^{small}_{i,t}[-30,-1] + \gamma_8 AOIB^{large}_{i,t}[-30,-1] + \text{Control variables} + \upsilon_{i,t}. \end{aligned}$$

where $AOIB^{z}_{i,t}[0,+1]$ is abnormal order imbalance for firm i, year t, trader type z ($z \in small, large$), and time intervals $[0,+1]$. *RWFE* (*AFE*) is random walk forecast error (analyst forecast error) and is defined as the difference between actual earnings for year t and actual earnings for year $t-1$ (the most recent analyst forecast for year t before earnings announcement), deflated by the market value of equity at the end of fiscal year t. *EFEC* is expected future earnings change based on management earnings forecast and is defined as the difference between management earnings forecast for year $t+1$ made at the earnings announcement of year t and actual earnings for year t, deflated by the market value of equity at the end of fiscal year t. $BIAS^{dec}_{t-1}$ is annual decile rank, scaled to range between 0 and 1, for $BIAS_{t-1}$. $BIAS_{t-1}$ is the previous year's management forecast bias in initial earnings forecast and is defined as the difference between actual current earnings and initial management earnings forecast of year t earnings made at the earnings announcement of year $t-1$, deflated by the market value of equity as of the end of fiscal year t. *GN* (*BN*) is an indicator variable that is set equal to one for firms with $0 \leq EFEC$ ($EFEC < 0$). The control variables are natural logarithm of MVE, B/M, $STDRET$, $TURNOVER$, and $SPREAD$ and $YIELD$. These control variables are defined as in Table 7. $\varepsilon_{i,t}$ and $\upsilon_{i,t}$ are error terms. We simultaneously estimate these two equations using seemingly unrelated regression techniques. Although initial sample consists of 10,258 observations during the period from 1999 to 2006, to mitigate the influence of outliers, we estimate using the observation within 1st and 99th percentiles of the annual distribution for respective earnings-related variables (i.e., *RWFE*, *AFE*, and *EFEC*) and return-related variable (i.e., *CAR*) across year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Dependent variable	$CAR[+2,+30]$	$CAR[+2,+60]$
Constant	-0.016***	-0.019***
	(-4.83)	(-4.11)
$AOIB^{small}[0,+1]$	-0.002	-0.004*
	(-1.21)	(-1.96)
$AOIB^{large}[0,+1]$	0.003**	0.006***
	(2.30)	(3.29)
Year dummy	Included	Included
Observations	$10,062$	$10,047$
Adjusted R^2	0.0139	0.0090

Table 10: Cross-sectional regression of future CAR on $AOIB$ around earnings announcements

This table reports OLS pooled regression result of future CAR on $AOIB$ for small and large traders in interval $[0,+1]$. Although initial sample consists of 10,258 observations during the period from 1999 to 2006, to mitigate the influence of outliers, we estimate using the observation within 1st and 99th percentiles of the annual distribution for dependent variables (i.e., $CAR[+2,+30]$ or $CAR[+2,+60]$) across year. $CAR[k,l]$ is cumulative size-adjusted abnormal returns over days k through l relative to the earnings announcement date (day 0). $AOIB^z[0,+1]$ is abnormal order imbalance for trader type ($z \in small, large$) and time interval $[0,+1]$. The t-statistics, reported in parentheses, are based on White [1980] heteroscedasticity-consistent standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels (two-tailed), respectively.