Comparing with the Average: Reference Points and Market Reactions to Above-Average Earnings Surprises[*]

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Abstract

We investigate a new reference point in financial markets. Specifically, we examine investors' use of the average earnings surprise as a reference point to classify earnings news into good or bad news. We find that in the short window around earnings announcements, the market rewards a price premium to firms with above-average earnings surprises. The price premium is larger when investors are more likely to be subject to cognitive constraints in processing information. We also find that firms announcing above-average earnings surprises exhibit a greater abnormal trading volume, consistent with the notion that beating reference points prompts investors to trade.

Keywords: Earnings surprises; reference point; stock returns; trading volume; behavioral finance

JEL Classification: G12, M40

1. Introduction

Studies of psychology and behavior have shown that reference points play a critical role in individuals' evaluations of outcomes. Outcomes that exceed a reference point are coded as gains, whereas those below the reference point are treated as losses (Khaneman 1992). According to Khaneman and Tversky's (1979) prospect theory, gains and losses are associated with different utility functions. Finance researchers have recently provided insights into investors' use of reference points to make investment decisions. For example, the prices at which investors purchase shares are important reference points, and investors are more likely to sell their shares if share price exceeds purchase price (Shefrin and Statman 1985, Odean 1998, Grinblatt and Keloharju 2001). The peak stock price in the previous 52 weeks has been found to be a reference-point price at which investors are particularly willing to sell shares to realize gains (Barberis and Xiong 2009), exercise their stock options (Heath, Huddart and Lang 1999), or approve an offer price from an acquirer (Baker, Pan and Wurgler 2012). Investors may also use past dividends as a reference point when assessing current dividends, which may affect firms' dividend policies (Shefrin and Statman 1984, Baker and Wurgler 2012).

Our study extends this line of research by examining an unexplored reference point in the financial market, namely the average earnings surprise on the day when a firm announces its earnings. Specifically, we aim to determine whether investors use the average earnings surprise as a reference point when evaluating firms' earnings performance. As people commonly wish to compare results with the average, the average is one of the most important reference points in our lives. For example, professors whose publication records are better than their peers' average may believe that they have a stronger case for promotion or tenure. Managers often discuss their firms' performance relative to industry averages, implying that the average is a relevant benchmark for firm performance. Studies in

economics have shown that individuals' utility may be dependent upon the average wealth in an economy (Bogliacino and Ortoleva 2014) or the average wage paid to their peers (Clark and Oswald 1996, Clark and Senik 2010). One reason why people use reference points is that individuals' information processing is usually limited by their cognitive capacity. Consequently, simple decision rules are often used to facilitate decision making (Tversky and Khaneman 1974). In the context of earnings announcements, investors receive new information with significant uncertainty, and need to make trading decisions within minutes. They are thus more likely to use reference points such as the average earnings surprise to rapidly assess earnings announcements and decide whether firms' earnings performance is good or bad. Investors' use of the average earnings surprises could also be facilitated by financial media that routinely publishes earnings news. For example, on every week day Wall Street Journal reports all earnings news announced by public firms listed in the U.S., from the companies with most positive earnings surprises to the ones with most negative earnings surprises.[2] For each earnings announcement, the earnings surprise is calculated based on the difference between reported earnings and analyst forecasted earnings.

Using a large sample of quarterly earnings announcements from 1995 to 2013, we provide empirical evidence that the market rewards premiums to firms with above-average earnings surprises. After controlling for the magnitude of earnings surprises, a number of firm characteristics and various fixed effects, we find that firms with above-average earnings surprises are rewarded with a size-adjusted abnormal return of 0.6% in the two-day window [0, 1] surrounding the quarterly earnings announcements. Further, consistent with the prior finding that exceeding reference points prompts investors to trade, we show that firms with above-average earnings surprises have larger abnormal trading volumes at the time of their

[2] The daily ranking of earnings surprises by Wall Street Journal is available at: http://online.wsj.com/mdc/public/page/2_3024-zurprise.html. Appendix A provides an excerpt of the ranking on February 12, 2015. Although it does not explicitly calculate the average earnings surprises on the day, the ranking helps investors with the calculation or estimation of the average earnings surprises.

earnings announcements than firms with below-average earnings surprises. These findings are consistent with the hypothesis that the market-average earnings surprise on a given announcement day is used as an important reference point when investors evaluate a firm's earnings news.

Earnings announcements also provide an interesting setting to examine the effects of multiple reference points on investors' decision making. In addition to the average earnings surprise on the announcement day, relevant reference points include *ex ante* analyst earnings forecasts, zero earnings that define profits and losses, earnings in the previous quarter and earnings in the same quarter of the previous year (Degeorge, Patel and Zeckhauser 1999). According to multiple reference point theory, which is based on experimental evidence, reference points differ in nature and relevance (see Han and Tan 2007 for detailed discussion). Explicitly mentioned reference points serve as primary benchmarks on which individuals place greater weight, compared with secondary reference points that are not mentioned explicitly (Boles and Messick 1995, Blount et al. 1996). In the earnings announcement setting, analysts' earnings forecasts are likely to be primary reference points, as they are salient in the market and have been shown to constitute the most important earnings targets for managers (Graham et al. 2005).[3] In comparison, the average earnings surprise benchmark we construct on the earnings announcement day is not explicitly mentioned and is likely to be a secondary reference point. The multiple reference point theory predicts that investors' reaction to the primary reference point would be stronger than that to the secondary reference point. Consistent with the theory, we find that market reactions are stronger when a firm's earnings exceed a primary reference point than when they exceed a secondary reference point. More importantly, we find that market reaction to the average earnings surprise is no less important

[3] For example, in the Wall Street Journal ranking of earnings surprises, earnings above analyst consensus forecasts are shown in green, while those below analyst forecasts are in red. The contrast of colors makes it easy for investors to identify winners and losers, thus facilitating the use of analyst forecasts as a primary earnings reference point.

than other earnings reference points such as zero earnings and historical earnings. This highlights the importance of the same-day average used by investors as a relevant earnings reference point.

We further propose that reference points are more likely to be used in situations in which information processing is more mentally challenging for investors; that is, when investors experience cognitive-capacity constraints and use reference points to simplify their investment decision making.[4] We examine three settings in which investors are likely to be cognitively constrained when processing earnings information. First, we address earnings announcements accompanied by a large number of contemporaneous announcements, which require investors to process a large amount of information at once. Second, we consider earnings announcements made by firms with high information uncertainty, which makes it difficult for investors to reliably assess the firms' current performance and predict their future performance. Third, we investigate firms whose shares are mainly owned by individual investors. These investors have fewer resources with which to process information than institutional investors. We find that the market reactions to above-average earnings announcements are stronger in all of the three settings, suggesting that cognitive-capacity constraints encourage investors to use the average earnings surprise as a reference point when evaluating firms' earnings.

Our study contributes in three ways to the research on investors' use of reference points in financial markets. First, we investigate a reference point distinct from the reference points examined in prior archival studies of financial markets. Unlike historical stock prices or past dividends, an average earnings surprise is formed on the day of an earnings announcement. This is consistent with the observation in psychology studies that reference

[4] Hirshleifer (2001) points out that investors' psychological bias is likely to be exacerbated by uncertainty, which is assumed to increase the difficulty of information processing. Similarly, Jiang, Lee and Zhang (2005) and Zhang (2006) show that that the market is more likely to under-react to new information when there is greater information uncertainty.

points may be created within the context of a task (Neale and Bazerman 1991). The average earnings surprise is also distinct from earnings benchmarks such as analyst forecasts and past earnings. As the latter are known well in advance, managers have considerable incentive to manage their firms' earnings to exceed these benchmarks. A number of studies have documented that managers manipulate earnings to meet earnings benchmarks (see Dechow, Ge and Shrand (2010) for a review of the literature). Keung, Lin and Shih (2010) show that investors are skeptical about reported earnings that either just meet analysts' forecasts of earnings per share or beat the forecasts by 1%. Therefore, these well-known benchmarks might be tainted by earnings manipulation, and the use of the average earnings surprise as a reference point provides a "cleaner" setting to investigate investors' use of reference points to code gains and losses.

Second, we provide important insights into investors' use of multiple reference points when making decisions. In practice, the presence of multiple reference points is the norm. However, there is little archival evidence on the use of multiple reference points to develop judgments and decisions. With reference to the earnings-announcement setting, we show that the market reacts more strongly to primary reference points than to secondary reference points. To the best of our knowledge, our paper is the first archival study using stock market data to test the differences between primary and secondary reference points.

Third, we provide some exploratory insights into the reasons why investors use reference points to make financial judgments and decisions. Our evidence shows that investors who are subject to greater cognitive constraints rely more on earnings reference points to evaluate firms' earnings news. This finding suggests that investors may use reference points to circumvent their cognitive limitations when processing information, as reference points can help to simplify a task and allow investors to make quick decisions. Therefore, our study also complements recent literature on the effects of cognitive constraints

on investors' reactions to earnings announcements. For example, DellaVigna and Pollet (2009) find that compared with earnings announcements on other days, earnings releases on Fridays tend to elicit weaker market reactions on the day of announcement but a stronger drift after the announcement. Similarly, Hirshleifer, Lim and Teoh (2009) show that announcements concurrent with a large number of earnings announcements made by other firms prompt weaker immediate market reactions but a stronger post-announcement drift. These results suggest that investors' processing of earnings information is constrained by their cognitive capacity, as manifested in their limited attention. Our study extends this line of research by showing that cognitively constrained investors are likely to use reference points to simplify their decision making.

This paper proceeds as follows. In Section 2, we review related studies and discuss our hypotheses. In Section 3, we describe the research design and sample. In Section 4, we empirically document market reactions to above-average earnings surprises and describe our additional tests. Section 5 concludes the paper.

2. Prior Studies

It has long been recognized in the literature on psychology and the social sciences that reference points play an important role in individuals' evaluation of a stimulus or an outcome. For example, Thibaut and Kelley (1959) propose that outcomes that exceed a comparison level are affectively registered as positive and those falling below the comparison level are coded as negative. According to Helson's (1964) theory of adaptation levels, people evaluate the physical characteristics of a stimulus (e.g., brightness, loudness or temperature) by comparing the stimulus with an adaptation level determined by judgment context and history of exposure to related stimuli. Khaneman (1992) points out that for continuous-outcome variables with monotonically increasing value (e.g., salary), reference points

determine whether the outcome is evaluated as a gain or a loss. According to Kahneman and Tversky's (1979) prospect theory, individuals' value functions—their gains and losses—are deviations from reference points, and losses bring more pain than equally sized gains bring pleasure.

A number of finance researchers have examined the effect of the reference-dependent utility function on investors' behavior. For example, Shefrin and Statman (1985) argue that investors tend to use purchase price as a reference point when evaluating their share investments as either gains or losses. Investors are loss-averse; they do not wish to sell their shares at a price lower than the purchase price, and thus tend to hold losses for too long. This phenomenon, termed the "disposition effect," is investigated by Odean (1998) and Grinblatt and Keloharju (2001) with reference to the trading accounts of a large number of individual investors. Similarly, Baker and Xuan (2009) find that the highest-ranking CEOs tend to use share price as a reference point and are more likely to issue new equity when stock prices are above the reference-point price.

Barberis and Xiong (2009) find evidence that the peak price in the previous 52 weeks is a reference-point price at which investors are particularly willing to sell shares to realize gains. Similarly, Heath, Huddart and Lang (1999) find that employees are twice as likely to exercise their stock options when their company's share price exceeds this 52-week peak price. Huddart, Lang and Yetman (2009) document a significant increase in trading volume around this reference-point price. Baker, Pan and Wurgler (2012) show that the price peak of target companies in the previous 52 weeks has an important influence on several aspects of mergers and acquisitions, such as offer price, the probability of merger success and market reactions to merger announcements. Other studies find evidence suggesting that past dividends are also an important reference point for both managers and investors, which helps

to explain managers' reluctance to change dividends (Shefrin and Statman 1984, Baker and Wurgler 2012).

Theoretically, the reference point used to define gains and losses depends on the context. It could be a historical parameter, such as past stock prices (e.g., Shefrin and Statmand 1985), or a current parameter, such as dividends (Baker and Wurgler 2012). It could also be an expected measure, such as expected consumption (e.g., Koszegi and Rabin 2009) or expected wages (e.g., Neale and Bazerman 1991). Multiple reference points may affect individuals' decisions (e.g., Neale and Bazerman 1991). The reference point may change over time (Arkes et al. 2008) and vary between cultures (Arkes et al. 2010).

The average performance is used as a benchmark or reference point in various contexts. For example, students compare their marks with the average mark for the class. A professor may use his or her peers' average number of publications to support a case for promotion or tenure. Historically, the average temperature has been used to gauge whether it is too hot or cold on a particular day. There are many more examples of the use of the average as a reference point in our daily life. More rigorously, prior research has provided vast theoretical and empirical evidence that the average behavior of others is a relevant reference point for decision making. For example, some macroeconomics researchers have proposed that the utility of individuals' consumption and economic decisions is dependent on their relative status in the wealth distribution of an economy (e.g., Corneo and Jeanne 2001, Cooper et al. 2001). This is commonly known as "keeping up with the Joneses." Specifically, Bogliacino and Ortoleva (2014) model the decision of an agent whose utility depends on the average wealth of other members of society. This reference-dependent utility function motivates agents to strive to exceed the average and is conducive to economic growth. It has long been acknowledged in research on labor economics that individuals compare their wages

with the average wage of their peers and report lower levels of job satisfaction if they are paid less than their peers (e.g., Clark and Oswald 1996, Clark and Senik 2010).

The average is also commonly used as a reference point in the financial market. Investors and commentators often refer to the historical average price/earnings ratio when assessing market prices as high or low. In mergers and acquisitions, the average price premium and average price multiples are commonly used to determine the reference offer price for a target company. Financial websites routinely report an industry's average financial ratios or refer to a sector that investors can use to evaluate their companies' performance.

In this study, we address investors' use of the average earnings surprise announced on a particular day as a reference point when evaluating a company's earnings news. Numerous studies have shown that investors use various earnings benchmarks to assess firms' earnings performance, such as zero earnings (profit or loss), earnings in the same quarter of the previous year, earnings in the previous quarter and analyst consensus earnings forecasts (e.g., DeGeorge et al. 1999, Graham et al. 2005). Despite these commonly used benchmarks, investors' earnings evaluation is likely to be conditional on the earnings announcements made concurrently by other firms. Just as students like to compare their exam results with the average mark, a firm's earnings surprise is likely to be compared with the average earning surprise on the same day. This comparison is facilitated by the public ranking of earnings surprises provided by the financial press, which makes it much easier for investors to determine the relative position of a firm's earnings surprise. An example of the ranking of earnings surprises on a randomly selected trading day is given in the appendix A.

We hypothesize that investors are likely to use the average earnings surprise as a reference point to evaluate firms' earnings performance and to treat above-average earnings surprises as "outperformers." We expect the market to reward outperformers with price premiums; that is, we predict that firms with above-average earnings surprises will receive

positive returns. As reference points are likely to influence investors' trading decisions (Heath, Huddart and Lang 1999, Huddart, Land and Yetman 2009), we also expect trading volume to be higher for firms that report above-average earnings surprises.

One important feature of the average earnings surprise reference point is its creation on the day of announcement. It is thus unknown to both managers and investors prior to the announcement day. In contrast, earnings benchmarks such as zero earnings, past earnings and earnings forecasts are available to the market long before the earnings-announcement day. Accounting researchers have shown that managers have strong incentives to manage their earnings to meet or beat these known benchmarks. Therefore, even if a firm's reported earnings exceed a known benchmark, but due to the possibility of manipulations it is unclear to investors whether this news should be classified as good or bad. In support of this view, Keung, Lin and Shih (2010) show that investors are skeptical about reported earnings that either just meet analysts' forecast of earnings per share or beat their forecast by 1%. Such skepticism does not apply to the average earnings surprise on a given day, as the value of this reference point cannot be foreseen by managers before the earnings announcement. In other words, managers may be able to manipulate their own earnings, but it is almost impossible that they can manage earnings of other firms that report earnings news on the same day. Therefore, the average earnings surprise provides a cleaner setting to test investors' use of reference points to evaluate earnings performance relative to the market.

The earnings-announcement setting also provides us with insight into the effects of multiple reference points on investors' judgment and evaluation of firms' earnings. The findings of psychology studies have indicated that explicitly mentioned reference points are regarded as primary benchmarks and thus given a greater weightage by individuals. In contrast, reference points that are not explicitly mentioned are considered as secondary benchmarks and hence receive a smaller weightage (Boles and Messick 1995, Blount et al.

1996). In our setting, analysts' earnings forecasts are likely to be a primary benchmark, as they are salient to the market and regarded as the most important earning benchmark by managers (Graham et al. 2005). Other earning benchmarks, such as zero earnings and past earnings, may also be primary benchmarks, because investors use them explicitly to evaluate outcomes (DeGeorge et al. 1999). In contrast, the average earnings surprise on the announcement day is likely to be a secondary reference point, because it is not explicitly discussed in the market. As less weight is placed on secondary reference points than primary ones, we expect that the market reactions to primary benchmarks (such as analysts' forecasts) will be stronger than the reactions to secondary benchmarks (such as the average earnings surprise).

In summary, we expect investors to use the average earnings surprise as a reference point when evaluating reported earnings and to reward earnings surprises that are higher than the average. However, as the average earnings surprise is only a secondary reference point, we expect the market reaction to this benchmark to be weaker than the reaction to more explicit and primary benchmarks such as analysts' earnings forecasts.

3. Data and Research Design

3.1 Data

The data on quarterly earnings-announcement dates and all of the financial-accounting measures are obtained from Compustat. The data on actual earnings and analyst forecasts are obtained from the Institutional Brokers' Estimate System (I/B/E/S) and the data on stock prices and returns are provided by the Center for Research in Security Prices (CRSP). The data on institutional ownership are obtained from the Thomson Financial Database. Our sample consists of all quarterly earnings announcements from the first quarter of 1995 to the second quarter of 2013. Our starting year is 1995 because the accuracy of

earnings-announcement dates improved substantially after December 1994 (Kothari 2001, DellaVigna and Pollet 2009). We impose the following three criteria for sample selection: 1) the data on quarterly earnings announcement dates must be available from the Compustat database and at least two firms must make earnings announcements on each announcement date; 2) the actual earnings and analyst consensus forecast data must be available from the I/B/E/S; and 3) the data on stock returns surrounding the chosen earnings-announcement dates must be available from the CRSP database. Our final sample comprises 148,307 firm-quarter observations.

In Table 1, we report the distribution of quarterly earnings announcements during our sample period by year, by month and by weekday. The annual distribution shown in Panel A reveals that earnings announcements are made on an average of 225 days per year[5] and that an average of 105 concurrent earnings announcements are made on the day that a firm announces its quarterly earnings. However, the number of concurrent announcements made per day varies considerably, with an average inter-quartile range of 124. There is also some variation over time in the number of announcements and the number of firms that make announcements, which is relatively consistent with boom-bust cycles in the market. Panel B shows that more earnings announcements are made in January, February, April, May, July and October than in June, September or December. For most U.S. firms, the end of each fiscal quarter coincides with the end of a calendar quarter, and firms are usually required to report their quarterly earnings within 45 days of the end of a fiscal quarter.[6] Accordingly, there is considerable monthly variation in the number of concurrent earnings announcements. The average number of concurrent announcements on any announcing day is 9 in June or September, but 149 in April.

[5] We sample 116 days' worth of earnings announcements in 2013, because our sample period ends in the second quarter of 2013.
[6] In the fourth quarter, firms have 90 days to release their quarterly and annual earnings.

In Panel C, we report the distribution of earnings announcements by weekday. We group earnings announcements that occur at weekends with announcements made on Mondays, as investors are likely to react to weekend announcements on the subsequent Monday. About 80% of earnings reports are made on Tuesdays, Wednesdays and Thursdays, whereas only 6.94% are announced on Fridays and 12.22% are announced on Mondays and at weekends. As managers believe that earnings announcements convey important information to investors, they avoid making announcements on Mondays and Fridays, when investors are likely to be distracted by weekend activities.

Overall, Table 1 shows significant variation in the numbers of concurrent earnings announcements across years, months and weekdays. The distributions are quite similar to what were reported in Hirshleifer et al. (2009). It is thus necessary to control for the fixed effects of these variables in the multivariate regressions.

[Insert Table 1 about here]

3.2 Research Design

We use the following model to test our hypotheses.

$$DEP[0,1] =$$

$$\beta_0 + \beta_1 ABOVE + \sum_{k=2}^{4} \beta_k Alternative\ Benchmarks + \beta_5 ES + Other\ Controls \qquad (1)$$

DEP[0,1] stands for the department variables. Our main dependent variable, *CAR*[0,1], denotes the two-day cumulative size-adjusted abnormal return for a given announcement date. The cumulative abnormal returns are measured by the difference between the buy-and-hold return of the announcing firm *i* and that of the size-matched portfolio over the window [0, 1]. Day 0 is the date of the quarterly earnings announcement made by firm *i*. More formally,

$$CAR[0,1]_{i,t} = \prod_{k=t}^{t+1}(1+R_{i,k}) - \prod_{k=t}^{t+1}(1+R_{p,k}) \qquad , \qquad (2)$$

where $R_{i,k}$ denotes the returns received by firm *i* and $R_{p,k}$ denotes the returns elicited by a size-matched portfolio *p* on day *k*.

Our second dependent variable, *ABVOL*[0,1], captures the abnormal trading volume in the two-day earnings announcement window. Specifically, we follow Hirshleifer, Lim and Teoh (2009) and define *ABVOL* as the difference between the average log trading volume in the two-day [0,1] window and the one-month average log trading volume in the [-41, -10] window, where day 0 is the earnings-announcement date.[7] A larger *ABVOL*[0,1] indicates a higher trading volume during the event window relative to the normal volume in the non-event window.

Following the literature, we calculate the earnings surprise, *ES*, as actual earnings per share minus the consensus analyst forecast, scaled by the stock price at the end of the fiscal quarter.[8] A larger *ES* indicates more positive earnings relative to the consensus forecast.

Our variable of interest, ABOVE, is an indicator variable that takes a value of one for firms whose earnings surprises are above the average earnings surprise announced on the same day in the market. We compute three versions of the average *ES* using three calculations of the average earnings surprise of the firms issuing announcements on the given day: (1) equally weighted, (2) weighted by market capitalization and (3) weighted by trading value. The resulting three indicator variables for above-average earnings surprises, ABOVE_EW, ABOVE_VW and ABOVE_TW, indicate that a firm's ES exceeds the equally weighted average ES, the average ES weighted by market value and the average ES weighted by trading volume of each announcer, respectively.[9]

[7] DellaVigna and Pollet (2009) define *ABVOL*[0,1] as the average log trading volume in [0,1] minus the two-week average log trading volume in the [-21, -10] window. If we use their measure of *ABVOL*[0,1], the results remain qualitatively same.

[8] The analyst consensus forecast is defined as the median of the analyst earnings forecasts in the 60 days prior to the earnings-announcement date. If an analyst makes multiple forecasts during this period, we use her most recent forecast.

[9] We also consider using the median of the earnings surprises on the same day to measure the average. The results are very similar to those reported in the tables and discussed in the next section.

To test the multiple reference point theory, we consider alternative earnings reference points that have been widely examined in the accounting literature, namely zero earnings, earnings in the same quarter of the previous year, and consensus analyst earnings forecasts (e.g., DeGeorge et al. 1999, Bartov et al. 2002, Graham et al. 2005). MBE denotes firms with earnings equal to or higher than the equivalent analyst consensus forecasts. PosEPS denotes firms with positive earnings. EPS_UP denotes firms with earnings in the current quarter exceeding their earnings four quarters ago. The use of these alternative earnings reference points allows us to examine the incremental importance of average earnings surprise as a reference point in financial markets.

In multivariate analysis, we include earnings surprises (absolute value of earnings surprises) in the regressions of CAR (ABVOL) to control for the magnitude of earnings shocks. We also consider control variables other than earnings surprises that may affect the market reactions. Following prior studies (e.g., Kormendi and Lipe 1987, Collins and Kothari 1989, Easton and Zmijewski 1989, Hayn 1995, Francis and Ke 2006), we incorporate into our regressions a number of control variables that may affect investors' reactions to earnings news. Firm size (SIZE) is defined as the logarithm of the market value of the firm's equity at the beginning of the quarter. The book-to-market ratio (BM) is defined as the book value of the firm's assets divided by the sum of the book value of the firm's liabilities and the market value of its equity measured at the beginning of the quarter. INST denotes the firm's institutional holdings, measured by the percentage of shares held by institutional investors. REPLAG is the log of 1 plus the number of days between the earnings-announcement date and the date of the end of the fiscal quarter. N_ANALYST is the log of 1 plus the total number of analysts following the firm in a given quarter. TURNOVER is the average trading volume divided by the average number of shares outstanding during the one-year period that ends with the current fiscal quarter. DE is the ratio of total debt to total equity at the end of

the current quarter. QTR4 is an indicator equal to one if the earnings announced are for the fourth fiscal quarter, and zero otherwise. Following Francis and Ke (2006), we also use an indicator variable named RESTRUCT to control for firms undertaking restructuring activities. RESTRUCT is equal to one if "special items" make up -5% or less than the firm's total assets in a quarter, and zero otherwise. We also include the decile rank of the number of earnings announcement on the day (NDEC), where the decile rank is formed each quarter.

To mitigate the effects of outliers, we winsorize all continuous variables in the top 1% and bottom 1% of their distributions. We follow Hirshleifer, Lim and Teoh (2009) in introducing interaction terms between earnings surprises (absolute value of earnings surprises) and all other control variables to our regressions of CAR (ABVOL). We also control for the fixed effects of industry, year, month and weekday to identify any effects specific to these variables. Following Hirshleifer, Lim and Teoh (2009) and Peterson (2009), we adjust the standard errors to deal with two-way clustering effects by the day of announcement and industry. The t-statistics are calculated based on the adjusted standard errors.

4. Empirical Results

4.1 Main results

As shown in Table 2, we divide the sample into two groups according to whether a firm's earnings surprise is greater or less than the average defined by ABOVE_EW. For each group, we then report descriptive statistics for abnormal market returns and abnormal trading volume during the [0,1] window surrounding an earnings announcement. The results suggest that firms with above-average earnings surprises have higher cumulative abnormal returns (mean = 1.2%, median = 0.7%) than those with below-average earnings surprises (mean = -1.4%, median = -0.9%). The differences in the mean and median are statistically significant at the 1% level. The results of this univariate test suggest that investors award price premiums

to firms with above-average earnings surprises, which supports our hypothesis. Firms with above-average earnings surprises also experience a larger abnormal trading volume (mean = 0.550, median = 0.501) than firms whose earnings surprises are below average (mean = 0.481, median = 0.443). This evidence is consistent with the assumption that reference points influence investors' trading decisions.

Table 2 also reveals a significantly positive association between earnings reference points. Compared with firms with below-average earnings surprises, firms with above-average earnings surprises are more likely to meet or beat analyst consensus forecasts (89.2% versus 45.2%), to report positive earnings (81.6% versus 74.1%) and to report earnings higher than those four quarters ago (60.7% versus 48.5%). These findings suggest that it is important to control for other earnings reference points when assessing the relevance of average earnings surprise as a reference point. In addition, the characteristics of firms that announce above-average and below-average earnings surprises differ with statistical significance in a number of respects, which calls for conduct multivariate analyses.

[Insert Table 2 here]

We run multivariate regressions involving *CAR*[0,1], as specified in Equation (1). Table 3 displays the results of regressions of cumulative abnormal returns on the earnings reference point and the control variables. First, the coefficients of the indicator variables for firms with above-average earnings surprises are all positive and statistically significant at the 1% level. For example, Model 1 shows that firms with earnings surprises that exceed the equally weighted average earnings surprise of concurrent announcers receive 0.5% greater size-adjusted abnormal returns in the two-day window [0, 1] surrounding each earnings-announcement date. This evidence supports our argument that the average earnings surprise is a relevant earnings reference point used by investors to code a firm's earnings as either a gain or a loss.

Second, we find that firms with earnings that exceed other earnings reference points also receive higher abnormal returns. For example, firms with earnings that are equal to or greater than analyst consensus forecasts are rewarded with abnormal returns ranging from 1.5% to 1.8% across the three models. Firms that report positive earnings or an increase in earnings also receive positive abnormal returns of about 0.6%.

Third, a comparison of the coefficients of earnings reference points indicates that meeting or beating analyst forecasts elicits the largest abnormal market returns. The coefficients of above-average earnings surprises, positive earnings and earnings increases are smaller than the coefficient for meeting or beating analyst forecasts. Unreported tests show that the differences are statistically significant at 1% level. This finding is consistent with the assumption that analyst forecasts are the primary reference point in the context of earnings announcements. More importantly, the coefficient of the above-average earnings surprise variable is equivalent to or larger than the coefficients of the variables for positive earnings and earnings increases, indicating that the average earnings surprise is as relevant an earnings reference point as zero earnings and historical earnings.

[Insert Table 3 here]

The coefficients of the control variables have the expected signs. Consistent with the findings of prior studies, firms with more positive earnings surprises experience higher abnormal market returns, especially in response to earnings announcements in the fourth fiscal quarter. These firms are also smaller, have greater institutional ownership and are followed by more analysts. Abnormal returns are lower if historical earnings are more volatile and if there is a longer lag between the end of the fiscal year and the earnings-reporting date. As we incorporate a number of fixed effects in the regressions, our results are unlikely to be driven by any particular industry, year, month or weekday.

In Table 3, we calculate the average earnings surprise using all earnings surprises on the announcement day. This calculation assumes that investors can foresee all the earnings surprises on the day before they use the average as a reference point. In practice, investors are unlikely to know the magnitude of earnings surprises announced after the earnings news that they are responding to. So our empirical tests may suffer from a "look-ahead" bias. To address this concern, we calculate the average earnings surprises using two alternative windows. The first one is the day -1, which is the day just before the earnings announcement. The second is the two days [-2,-1] before the earnings announcement. Using these two windows to construct the average earnings surprise benchmark ensures that investors know the reference point before they use it to make trading decisions. Table 4 reports the results from regression of abnormal stock returns associated with earnings surprises that are above the average surprises calculated in Day -1 or Day [-2, -1]. The results are very similar to those reported in Table 3, and we find positive abnormal returns for above-average earnings surprises. Primary reference point (analyst forecasts) continues to have the largest coefficient, while the coefficient of above-average earnings surprises has a magnitude similar to those of other secondary reference points.

[Insert Table 4 here]

We also construct the industry average earnings surprises based on same-day announcing firms from the same industry, as industry-average appears be a more relevant reference point for investors to evaluate announcing firms' earnings. Our results (unreported but available upon request) show that above-industry average earnings surprises also earn a positive returns in the announcement window after controlling for other reference points and firm characteristics. In regressions that include both indicator variables, one for above market average and the other for above industry average earnings surprises, we find both variables have positive and significant coefficients. This evidence suggests that above-industry average

earnings surprises have independent and incremental effect on stock returns, after controlling for the above-market wide average earnings surprises.[10]

4.2 Cognitive constraints and the use of the average earnings surprise as a reference point

Although it is generally recognized that individuals use reference points to make judgments and decisions, the reasons why reference points play such an important role are unclear. We propose that reference points help to simplify the decision-making process by enabling individuals to classify an outcome as either a gain or a loss. According to Tversky and Khaneman (1974), individuals are constrained by their cognitive capacity when solving complex tasks and tend to use simple rules or heuristics to solve these tasks. Simple rules for decision making allow individuals to process information quickly and make judgments and decisions in a timely manner. Although these benefits sometimes come at the cost of error or bias, the use of heuristics may be the most efficient means of decision making, given human beings' cognitive limitations (Thorngate 1980).

In the context of earnings announcements, investors are required to evaluate firms' earnings releases and make trading decisions within minutes. Due to the influx of new information and the significant uncertainty associated with earnings announcements, it is extremely complex for investors with limited cognitive capacity to process the relevant information. Recent studies have shown that investors choose to overlook certain earnings information when they experience cognitive constraints such as limited attention (DellaVigna and Pollet 2009, Hirshleifer, Lim and Teoh 2009). We argue that the use of reference points and the simple classification of earnings as either gains or losses can help investors to circumvent their cognitive limitations. This pragmatic choice can simplify the task of evaluating earnings and facilitate quick trading decisions. We thus contend that reference

[10] Some industries do not have multiple firms announcing earnings on the same day, resulting in missing industry-averages and a smaller sample for this test. In a robustness test, we construct industry-average earnings surprises using earnings announcements in the past 30 days, assuming that investors can remember past earnings surprises. The results remain unchanged if we use this alternative industry-average measure.

points play a more important role in investors' decision making when their information processing is subject to greater constraints. To test this contention, we consider three settings in which we believe investors to be particularly cognitively constrained.

In the first setting, we examine days on which a large number of concurrent earnings announcements take place, inundating investors with new information. As Hirshleifer, Lim and Teoh (2009) observe, concurrent earnings announcements are likely to put pressure on investors' limited cognitive capacity. We hypothesize that investors are more likely to rely on the average earnings surprise as a reference point when a larger number of contemporaneous earnings announcements are made. To test this prediction, we sort the earnings-announcement days into deciles and interact the decile rankings (NDEC) with the indicator variables for above-average earnings surprises. We re-estimate the regressions after adding NDEC and the interaction terms to the models. The results are reported in Table 5.

[Insert Table 5 here]

First, we notice that NDEC has negative coefficients, suggesting that firms whose earnings announcements are contemporaneous with a large number of announcements made by other firms have lower abnormal returns. This evidence is consistent with the findings of Hirshleifer, Lim and Teoh (2009), which indicate that other firms' earnings announcements distract investors and draw their attention from the earnings release of a particular firm, resulting in a weaker immediate market reaction to that firm's announcement. Second, we find that the coefficients of the interaction terms are all positive and statistically significant, suggesting that above-average earnings surprises on days with more concurrent earnings announcements are associated with higher abnormal returns. This evidence supports our conjecture that investors are more likely to rely on earnings reference points to make trading decisions when their limited cognitive power is stretched by the need to process a large number of earnings announcements.

In the second setting, we consider information uncertainty. We hypothesize that greater information uncertainty makes it more difficult for investors to evaluate firms' current earnings and predict their future earnings (Baker and Wurgler 2006). To test this prediction, we divide the sample into two groups: "low uncertainty" and "high uncertainty." We consider three proxies for uncertainty commonly used in the literature: firm size as measured by market capitalization, firm age as measured by the number of years listed and the volatility of the firm's stock returns. It is more difficult for investors to obtain and interpret relevant information on smaller firms, younger firms and firms with high return volatility than information on their larger, older and less volatile counterparts. Therefore, evaluating the earnings and judging the value of these firms pose greater challenges to investors. We define firms with low uncertainty as those whose size or age falls in the top third of the distribution, or those whose return volatility falls in the bottom third of the distribution. We then compare the abnormal returns associated with beating each earnings reference point in each group. A larger abnormal return indicates that investors place more weight on a reference point. The results are reported in Table 6.

[Insert Table 6 here]

First, we consider firm size. All of the earnings reference points in the sample of smaller firms have larger coefficients than those in the sample of large firms. For example, small firms that announce above-average earnings surprises are rewarded with abnormal returns of 0.6%, compared with 0.4% for large firms. Small firms that meet or beat analyst forecasts are rewarded with abnormal returns of 1.9%, compared with 1.7% for large firms. Positive earnings and earnings increases are associated with abnormal returns of 0.6% and 0.8% for small firms, but only 0.2% and 0.3% for large firms, respectively. The differences in abnormal returns between the large and small firms are all statistically significant at the 1% level for each earnings reference point. We find the same results for firm age and return

volatility. Compared with old firms and stable firms, young firms and volatile firms consistently receive larger abnormal returns as a result of beating earnings reference points. Overall, the results shown in Table 6 support our prediction that investors are more likely to use earnings reference points when they face greater information uncertainty about a firm.

In the third setting, we consider the differences between the cognitive constraints imposed on institutional and retail investors. Institutional investors and financial analysts are generally believed to have better resources with which to process information and thus to be less subject to cognitive-capacity constraints. For example, prior studies have shown that institutional trading activities help to mitigate accounting anomalies such as price drift after an extreme earnings surprise and the abnormal returns of firms with extreme accruals (e.g., Collins, Gong and Hriba 2003, Ke and Ramalingegowda 2005), which suggests that institutional investors are better able to understand accounting figures. As sophisticated users of accounting information who analyze firms' performance in detail, institutional investors are expected to be less dependent on simple reference points such as average earnings surprise, positive earnings and earnings increases. However, prior research has also suggested that institutional investors use analyst services to make trading decisions and that the institutional reaction to earnings news is affected by analyst-forecast errors (Battalio and Mendenhall 2005, Chen and Cheng 2006). This evidence suggests that analyst consensus forecasts are an important earnings reference point for institutional investors. To empirically test the effects of investor type on the use of earnings reference points, we use the median level of institutional ownership to divide our sample into two groups with "high" and "low" institutional ownership, respectively, and re-estimate the regression model for each group. We report the results of the regressions in Table 7.

[Insert Table 7 here]

We find that above-average earnings surprises are rewarded with abnormal returns of 0.4% for firms with high institutional ownership, compared with 0.5% for firms with low institutional ownership. Firms with high institutional ownership that report positive earnings receive abnormal returns of 0.3%, whereas those in the low institutional ownership group receive abnormal returns of 0.6%. These differences are statistically significant. The evidence suggests that institutional investors are less likely to use simple earnings reference points such as the average earnings surprise to evaluate firms' performance. There are no statistically significant differences in the coefficients for earnings in excess of analyst forecasts between firms with high and low institutional ownership, implying that analyst forecasts constitute an important earnings reference point regardless of the level of institutional ownership.

In summary, we show that in three settings in which investors are more likely to be subject to cognitive constraints when processing accounting information, simple earnings reference points such as market-average earnings surprise are used more frequently by investors to evaluate a firm's reported earnings. This evidence supports our argument that investors use such earnings reference points to simplify their evaluation of firms' performance and help them make decisions in a timely manner.

Before leaving this section, we consider an information-based explanation for investors' use of average earnings surprises as a reference point to evaluate firms' performance. More specifically, above-average earnings surprises signal that the firms are "better" firms that can generate higher earnings or cash flows in the future. This potentially serves as an alternative explanation to our findings that investors reward firms with above-average earnings surprises a premium. However, in our the average is formed almost randomly because a firm can hardly choose other firms who make concurrent earnings

announcements and has no control over other announcers' earnings surprises. Hence it seems to be stretched to link beating such a random benchmark with superior future performance.

Nevertheless, to alleviate this concern, we test this information-based explanation by examining whether above-average earnings surprises are associated with better future performance. Specifically, we regress measures of future performance on the indicator variable for above-average earnings surprises and a number of control variables included in other reference points, firm characteristics and industry-, day-, month- and year-fixed effects. That is, replace the dependent variables of Equation (1) with future accounting performance measures - return on equity (net income scaled by common equity) and net profit margin (net income scaled by sales) in the next four or eight quarters. The results (untabulated but available upon request) show that the association between above-average earnings surprises and future performance is statistically insignificant for both measures of future performance in next four or eight quarters.[11] We conclude that the empirical results do not support the information-based explanation in that exceeding the average earnings surprise does not signal superior future performance.

4.3 Trading volume

Finally, we examine the effect of earnings reference points on investors' trading around earnings announcements. Prior studies have shown that price reference points such as purchase price play an important role in prompting investors to trade (Shefrin and Statman 1985, Odean 1998, Grinblatt and Keloharju 2001). We seek to determine empirically whether investors also trade more when a firm's earnings surprises exceed the average earnings surprise announced on the same day in the market. We conduct multivariate regressions of abnormal trading volume on the indicator variables for above-average earnings surprises and report the results in Table 8.

[11] The Unreported results show a positive and statistically significant association between meeting or beating analyst forecasts (MBE) and future performance. This evidence is consistent with findings in Bartov, Givoly and Hayn (2002).

In Model 1 to 4 in Table 8, we examine the abnormal trading volume associated with meeting or beating each earnings reference point. In each of these four models, we find a positive and statistically significant coefficient for the indicator variable for earnings news that above a particular reference point. For example, in Model 1, ABOVE_EW has a coefficient of 0.058 (t-statistics = 6.73). This evidence suggests that abnormal trading volume is higher in the [0, 1] window around earnings-announcement dates for firms whose earnings are higher than earnings reference points. Concerned about multi-collinearity between reference points, we gradually add multiple reference points to regressions in Model 5 to 7. We find that the coefficients in front of ABOVE_EW remain positive and statistically significant, implying reporting above average earnings surprises is associated with higher abnormal trading volume, after controlling for other earnings reference points. [12] This evidence suggests that investors trade more when reported earnings surprises are above the average earnings surprises announced on the same day in the market.[13] Overall, the results in Table 8 are consistent with prior findings that meeting reference points prompts investors to trade in the financial market.

[Insert Table 8 here]

5. Conclusion

Reference points play an important role in individuals' evaluations of outcomes and their subsequent decision making. A few studies of finance have shown that purchase price and the previous year's dividends may be important reference points affecting investors' and managers' decisions (Shefrin and Statman 1985, Odean 1998, Grinblatt and Keloharju 2001, Baker and Wurgler 2012, Baker, Pan and Wurgler 2012). In this study, we focus on an

[12] MBE has an unexpected negative coefficient in Model 7, possibly due to multi-collinearity between the earnings reference points.

[13] One possible explanation for this result is that earnings above the reference point attract more attention from investors, thereby increasing trading volume. However, earnings below the reference point are likely to indicate bad news for a firm, which is more likely to attract attention in the market. Therefore, investor attention seems unable to fully explain this result.

unexplored reference point, namely average peer performance, in the context of quarterly earnings announcements.

We document a number of interesting findings. First, we find that firms that report above-average earnings surprises experience positive abnormal returns in the short window around earnings-announcement dates. This result is robust to controlling for other earnings reference points, a number of firm characteristics and various fixed effects. This evidence suggests that investors use the average earnings surprise as a reference point to classify firms' earnings as gains or losses. We also show that the importance of earnings reference points increases in settings in which investors' processing of earnings information is inhibited by cognitive-capacity constraints. This evidence implies that investors use reference points to simplify their decision making in response to complex and difficult tasks. Finally, we show that abnormal trading volume increases when reported earnings exceed reference points, consistent with the assumption that reference points influence investors' trading decisions.

Our study adds to the literature by providing evidence that the average earnings surprise of same-day earnings announcers is used as a reference point. This reference point is incremental to previously documented reference points such as analyst consensus forecasts and historical earnings. Due to its timeliness, this reference point is also less susceptible to managers' manipulation to meet or beat the benchmark. We believe that the results of our analysis provide insight into investors' reactions to reference points during the short window surrounding an earnings announcement. More specifically, we show that investors respond differently to primary and secondary reference points and rely more on simple reference points when subject to greater cognitive constraints.

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Appendix A

An example of the ranking of earnings surprises on a randomly selected trading day

The following table is exacted from Wall Street Journal on Thursday, February 12, 2015. On that day, 138 firms make earnings announcement. 80 of them have announced EPS exceeding analyst forecasted EPS, 15 of them have announced earnings equal to the forecast, and the remaining 43 earnings announcers missed the analyst forecasted EPS. To save space, we only partially show the data (45 announcers).

Company	Symbol	Qtr ended	Actual EPS	Estimated EPS	Diff.	%surprise	No. of analysts
COMSCORE INC	SCOR	14-Dec	0.15	0.06	0.09	150	4
CHINA DISTANCE	DL	14-Dec	0.13	0.06	0.07	116.67	1
ALNYLAM PHARMA	ALNY	14-Dec	-0.28	-0.66	0.38	57.58	3
MARKEL CORP	MKL	14-Dec	8.05	5.56	2.49	44.78	4
NAVIGANT CONSLT	NCI	14-Dec	0.28	0.2	0.08	40	5
PBF ENERGY INC	PBF	14-Dec	1.13	0.82	0.31	37.8	8
REWALK ROBOTICS	RWLK	14-Dec	-0.41	-0.58	0.17	29.31	2
HOSPIRA INC	HSP	14-Dec	0.53	0.41	0.12	29.27	10
MONOTYPE IMAGNG	TYPE	14-Dec	0.27	0.21	0.06	28.57	1
RTI SURGICAL	RTIX	14-Dec	0.05	0.04	0.01	25	3
MFA FINANCIAL	MFA	14-Dec	0.2	0.17	0.03	17.65	7
PBF LOGISTICS	PBFX	14-Dec	0.5	0.43	0.07	16.28	4
COUSIN PROP INC	CUZ	14-Dec	0.24	0.21	0.03	14.29	8
TOTAL FINA SA	TOT	14-Dec	1.22	1.09	0.13	11.93	1
WATSCO INC	WSO	14-Dec	0.69	0.63	0.06	9.52	10
SCRIPPS NETWRKS	SNI	14-Dec	1.02	0.94	0.08	8.51	8
CORESITE REALTY	COR	14-Dec	0.61	0.57	0.04	7.02	5
STEWART INFO SV	STC	14-Dec	0.38	0.36	0.02	5.56	2
ATLAS AIR WORLD	AAWW	14-Dec	1.55	1.48	0.07	4.73	3
REPUBLIC SVCS	RSG	14-Dec	0.5	0.48	0.02	4.17	7
NATL RETAIL PPT	NNN	14-Dec	0.55	0.53	0.02	3.77	9
JARDEN CORP	JAH	14-Dec	1.15	1.11	0.04	3.6	11
COCA-COLA ENTRP	CCE	14-Dec	0.58	0.56	0.02	3.57	9
REGAL ENTMNT GP	RGC	14-Dec	0.3	0.29	0.01	3.45	11
SHUTTERFLY INC	SFLY	14-Dec	2.57	2.49	0.08	3.21	7
MOBILE MINI INC	MINI	14-Dec	0.37	0.36	0.01	2.78	5
NORTHWESTERN CP	NWE	14-Dec	0.89	0.87	0.02	2.3	4
DIGITAL RLTY TR	DLR	14-Dec	1.26	1.24	0.02	1.61	10
DR PEPPER SNAPL	DPS	14-Dec	0.88	0.87	0.01	1.15	9
MEDICAL PPTYS	MPW	14-Dec	0.28	0.28	0	0	7
WHITEWAVE FOODS	WWAV	14-Dec	0.27	0.27	0	0	10
ORBITZ WORLDWID	OWW	14-Dec	0.06	0.06	0	0	7
PRIMERO MINING	PPP	14-Dec	-0.03	-0.03	0	0	4
LIVEPERSON INC	LPSN	14-Dec	-0.04	-0.04	0	0	4
ZYNGA INC	ZNGA	14-Dec	-0.04	-0.04	0	0	4
KELLOGG CO	K	14-Dec	0.86	0.92	-0.06	-6.52	9
ADVANCE AUTO PT	AAP	14-Dec	1.37	1.48	-0.11	-7.43	13
AMER INTL GRP	AIG	14-Dec	0.97	1.07	-0.1	-9.35	13
TREEHOUSE FOODS	THS	14-Dec	0.99	1.13	-0.14	-12.39	9
TELUS CORP	TU	14-Dec	0.42	0.48	-0.06	-12.5	4
AGL RESOURCES	GAS	14-Dec	0.66	0.79	-0.13	-16.46	3
CABELAS INC	CAB	14-Dec	1.11	1.35	-0.24	-17.78	9
MANULIFE FINL	MFC	14-Dec	0.29	0.36	-0.07	-19.44	3
AVON PRODS INC	AVP	14-Dec	0.2	0.25	-0.05	-20	8
TECK RESOURCES	TCK	14-Dec	0.16	0.2	-0.04	-20	8
MONEYGRAM INTL	MGI	14-Dec	0.13	0.19	-0.06	-31.58	2
YAMANA GOLD INC	AUY	14-Dec	-0.02	0.03	-0.05	-166.67	7

Appendix B
Variable Definition

Variables	Definitions
Dependent Variables	
CAR[0,1]	Cumulative size-adjusted abnormal returns in the [0.1] window around the quarterly earnings announcements
ABVOL[0,1]	Abnormal volume, defined as the difference between the average log dollar volume over days (0,1) and the average log dollar volume over days (-41, -10)
Key Explanatory Variables	
ABOVE_EW	An indicator equal to 1 if the firm's earnings surprise is greater than the equally-weighted average earnings surprises on the same day of earnings announcement, and 0 otherwise
ABOVE_VW	An indicator equal to 1 if the firm's earnings surprise is greater than the market value-weighted average earnings surprises on the same day of earnings announcement, and 0 otherwise
ABOVE_TW	An indicator equal to 1 if the firm's earnings surprise is greater than the trading volume-weighted average earnings surprises on the same day of earnings announcement, and 0 otherwise
Control Variables	
AbsES	Absolute value of earnings surprises (ES)
AGE	The number of years the firm is listed
BM	Book-to-market ratio
DE	Total debt divided by total equity at the end of current quarter
EPERSIST	Earnings persistence, measured by the first-order autocorrelation coefficient of quarterly earnings per share during the past 4 years (requiring at least 4 observations)
EPS_UP	An indicator variable equal to one for firms whose quarterly earnings are higher than the earnings four quarter ago, and 0 otherwise
ES	Earnings surprise, defined as the difference between firm's quarterly earnings per share and analyst forecast, divided by the stock price before announcement
EVOL	Earnings volatility, measured by the standard deviation during the preceding 4 years of the deviations of quarterly earnings up to year t-1
INST	The percentage of shares owned by institutional investors
MBE	An indicator variable equal to one for firms whose earnings are equal to or higher than consensus analyst forecasts, and 0 otherwise
N_ANALYST	The natural logarithm of (1+number of analysts who give earnings forecasts within 60 days prior to the earnings announcement)
NDEC	Decile ranking of the number of earnings announcements on a day
PosEPS	An indicator variable equal to one for firms whose earnings are positive, and 0 otherwise
QTR4	An indicator variable taking value of 1 for earnings announcements for the fourth fiscal quarter, and 0 otherwise
REPLAG	The natural logarithm of (1+number of days between the earnings announcement and fiscal quarter ending date)
RESTRUCT	An indicator variable taking value of 1 if a firm has negative special items larger than 5% of total assets
SIZE	The natural log of market value of common equity
TURNOVER	The average trading volume divided by the average number of shares outstanding during last year
VOLATILITY	Standard deviation of daily stock returns over a 90-day window ending 7days prior to the earnings announcement

Table 1
Distribution of Earnings Announcements by Year, Month, and Weekday

Panel A: Distribution of earnings announcements by year

Year	Number of days with announcements	Number of Earnings Announcements in a Day				Number of Announcing Firms
		Mean	Q1	Median	Q3	
1995	239	92	38	64	142	2,360
1996	241	94	40	75	150	2,632
1997	241	97	34	82	167	2,777
1998	243	99	42	91	148	2,858
1999	239	105	43	104	151	2,966
2000	228	105	40	83	176	2,763
2001	220	103	41	89	177	2,573
2002	219	99	42	85	169	2,818
2003	225	96	41	82	141	2,816
2004	224	105	40	86	178	3,141
2005	230	108	43	96	161	3,220
2006	233	108	52	95	163	3,253
2007	236	106	48	100	147	3,292
2008	236	113	48	117	169	3,326
2009	234	122	57	113	185	3,412
2010	230	118	47	100	181	3,243
2011	227	119	50	98	175	3,050
2012	225	112	53	104	160	2,990
2013	116	100	43	88	138	2,668
Average	225.58	105.27	43	94	167	2955.68

Panel B: Distribution of earnings announcements by month

	Number of announcements	Percentage of total announcements	Number of concurrent announcements in a day			
			Mean	Q1	Median	Q3
January	14,266	9.62	92	57	89	129
February	16,261	10.96	67	49	67	85
March	5,462	3.68	23	13	20	31
April	23,624	15.93	149	90	163	198
May	15,378	10.37	102	37	74	163
June	2,263	1.53	9	6	9	12
July	21,540	14.52	139	87	153	189
August	11,939	8.05	88	32	63	153
September	1,956	1.32	9	6	9	12
October	21,519	14.51	136	81	147	187
November	11,926	8.04	93	35	67	145
December	2,173	1.47	12	8	11	16

Panel C: Distribution of earnings announcements by weekday

	Number of announcements	Percentage of total announcements	Number of concurrent announcements in a day			
			Mean	Q1	Median	Q3
Monday	18,125	12.22	58	31	58	82
Tuesday	35,158	23.71	102	53	98	154
Wednesday	38,564	26.00	114	58	115	172
Thursday	46,169	31.13	138	62	146	210
Friday	10,291	6.94	34	17	31	46

Table 2
Descriptive Statistics

This table reports the descriptive statistics for variables. All the variables are defined in the Appendix B.

	ES ABOVE AVERAGE			ES BELOW AVERAGE			Diff in		Diff in	
	Mean	STD	Median	Mean	STD	Median	Mean	(p-value)	Median	(p-value)
CAR	0.012	0.079	0.007	-0.014	0.079	-0.009	0.027	(<.001)	0.016	(<.001)
ABVOL	0.550	0.948	0.501	0.481	0.936	0.443	0.069	(<.001)	0.059	(<.001)
MBE	0.892	0.310	1.000	0.452	0.498	0.000	0.440	(<.001)	1.000	(<.001)
PosEPS	0.816	0.388	1.000	0.741	0.438	1.000	0.074	(<.001)	0.000	(<.001)
EPS_UP	0.607	0.488	1.000	0.486	0.500	0.000	0.121	(<.001)	1.000	(<.001)
ES	0.003	0.007	0.001	-0.005	0.013	0.000	0.008	(<.001)	0.002	(<.001)
SIZE	13.829	1.708	13.749	13.911	1.754	13.832	-0.082	(<.001)	-0.084	(<.001)
BM	0.649	0.639	0.488	0.629	0.643	0.465	0.019	(<.001)	0.023	(<.001)
INST	0.659	0.261	0.693	0.649	0.262	0.678	0.009	(<.001)	0.015	(<.001)
EVOL	0.689	1.732	0.206	0.689	1.788	0.195	0.000	0.995	0.011	(<.001)
EPERSIST	0.267	0.676	0.172	0.268	0.669	0.171	-0.001	0.6839	0.000	(0.960)
REPLAG	3.342	0.371	3.332	3.305	0.377	3.296	0.037	(<.001)	0.036	(<.001)
N_ANALYST	1.361	0.647	1.099	1.369	0.652	1.099	-0.009	(0.010)	0.000	(0.076)
TURNOVER	1.890	1.651	1.407	1.798	1.625	1.306	0.092	(<.001)	0.101	(<.001)
DE	1.028	1.907	0.475	1.080	1.922	0.511	-0.052	(<.001)	-0.036	(<.001)
RESTRUCT	0.017	0.129	0.000	0.020	0.142	0.000	-0.004	(<.001)	0.000	(<.001)

Table 3
Market Returns to Above-Average Earnings Surprises

This table reports abnormal stock returns to above average earnings surprises. Dependent variables are CAR, or abnormal stock returns in [0,1] window around quarterly earnings announcement. All the variables are defined in the Appendix B. T-statistics (in parentheses) are based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement and industry. *, **, *** indicate the coefficients are statistically significant at 10%, 5% and 1% level, respectively.

	Model 1	**Model 2**	**Model 3**
Variable of Interest			
ABOVE_EW	0.005***		
	(6.06)		
ABOVE_VW		0.011***	
		(9.48)	
ABOVE_TW			0.010***
			(9.19)
Alternative Benchmarks			
MBE	0.018***	0.015***	0.016***
	(13.82)	(13.25)	(13.39)
PosEPS	0.005***	0.006***	0.006***
	(4.79)	(5.04)	(5.00)
EPS_UP	0.006***	0.006***	0.006***
	(9.05)	(8.90)	(9.06)
Control Variables			
ES	3.606***	3.440***	3.463***
	(5.78)	(5.60)	(5.63)
SIZE	-0.001***	-0.001***	-0.001***
	(-8.26)	(-7.17)	(-7.43)
BM	0.001	0.000	0.001
	(1.51)	(1.14)	(1.22)
INST	0.005***	0.005***	0.005***
	(3.26)	(3.21)	(3.26)
EVOL	-0.001***	-0.001***	-0.001***
	(-4.27)	(-4.36)	(-4.34)
EPERSIST	-0.001**	-0.000*	-0.000*
	(-2.12)	(-1.77)	(-1.79)
REPLAG	-0.003***	-0.003**	-0.003***
	(-2.72)	(-2.54)	(-2.59)
N_ANALYST	0.002***	0.002***	0.002***
	(4.05)	(4.39)	(4.32)
TURNOVER	-0.001***	-0.001***	-0.001***
	(-4.40)	(-4.44)	(-4.39)
DE	0.000	0.000	0.000
	(1.50)	(1.33)	(1.37)
QTR4	0.002**	0.002**	0.002**
	(2.18)	(2.04)	(2.10)
RESTRUCT	0.001	0.001	0.001
	(0.56)	(0.61)	(0.58)
NDEC	-0.000	-0.000	-0.000
	(-1.18)	(-1.19)	(-1.20)
Other control variables			
ES Interactions	YES	YES	YES
Industry Indicators	YES	YES	YES
Weekday Indicators	YES	YES	YES
Month Indicators	YES	YES	YES
Year Indicators	YES	YES	YES
Observations	148,307	148,307	148,307
Adjusted R^2	0.0749	0.0769	0.0765

Table 4
Robustness Test: Average Earnings Surprises Prior to the Announcement Day

This table reports a robustness test on abnormal stock returns to above average earnings surprises. Dependent variables are CAR, or abnormal stock returns in either day -1 or [-2,-1] window prior to quarterly earnings announcements. All the variables are defined in the Appendix B. T-statistics (in parentheses) are based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement and industry. *, **, *** indicate the coefficients are statistically significant at 10%, 5% and 1% level, respectively.

	Average Surprise in Day t-1			**Average Surprise in Day [-2,-1]**		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Variable of Interest						
ABOVE_EW	0.005***			0.011***		
	(5.32)			(9.87)		
ABOVE_VW		0.005***			0.009***	
		(5.34)			(7.85)	
ABOVE_TW			0.011***			0.009***
			(8.61)			(7.87)
Alternative Benchmarks						
MBE	0.018***	0.018***	0.016***	0.015***	0.017***	0.017***
	(14.08)	(13.80)	(13.29)	(12.52)	(13.34)	(13.17)
PosEPS	0.005***	0.005***	0.006***	0.006***	0.006***	0.006***
	(4.56)	(4.55)	(4.80)	(4.86)	(4.76)	(4.76)
EPS_UP	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(8.80)	(8.77)	(8.70)	(8.63)	(8.70)	(8.65)
Control Variables	YES	YES	YES	YES	YES	YES
Other control variables						
ES Interactions	YES	YES	YES	YES	YES	YES
Industry Indicators	YES	YES	YES	YES	YES	YES
Weekday Indicators	YES	YES	YES	YES	YES	YES
Month Indicators	YES	YES	YES	YES	YES	YES
Year Indicators	YES	YES	YES	YES	YES	YES
Observations	144,815	144,815	144,815	144,815	144,815	144,815
Adjusted R^2	0.0752	0.0751	0.0770	0.0772	0.0764	0.0763

Table 5
Effect of the Number of Concurrent Earnings Announcements

This table reports the effect of the number of concurrent earnings announcements on abnormal stock returns to above average earnings surprises Dependent variables are CAR, or abnormal stock returns in [0,1] window around quarterly earnings announcement. All the variables are defined in the Appendix B. T-statistics (in parentheses) are based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement and industry. *, **, *** indicate the coefficients are statistically significant at 10%, 5% and 1% level, respectively.

	Model 1	**Model 2**	**Model 3**
Variable of Interest			
ABOVE_EW	0.004***		
	(2.92)		
ABOVE_VW		0.007***	
		(6.52)	
ABOVE_TW			0.006***
			(5.80)
ABOVE_EW × NDEC	0.004*		
	(1.66)		
ABOVE_VW × NDEC		0.007***	
		(3.05)	
ABOVE_TW × NDEC			0.006***
			(2.67)
NDEC	-0.003*	-0.005***	-0.005**
	(-1.71)	(-2.66)	(-2.34)
Alternative Benchmarks	YES	YES	YES
Control Variables	YES	YES	YES
Other control variables			
ES Interactions	YES	YES	YES
Industry Indicators	YES	YES	YES
Weekday Indicators	YES	YES	YES
Month Indicators	YES	YES	YES
Year Indicators	YES	YES	YES
Observations	148,307	148,307	148,307
Adjusted R^2	0.0748	0.0769	0.0765

Table 6
Effect of Information Uncertainty

This table reports the effect of information uncertainty on abnormal stock returns to above average earnings surprises Dependent variables are CAR, or abnormal stock returns in [0,1] window around quarterly earnings announcement. All the variables are defined in the Appendix B. T-statistics (in parentheses) are based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement and industry. *, **, *** indicate the coefficients are statistically significant at 10%, 5% and 1% level, respectively.

Uncertainty Proxies:	**Firm Size**		**Firm Age**		**Return Volatilities**	
	Small	**Large**	**Young**	**Old**	**High**	**Low**
Variable of Interest						
ABOVE_EW (β_1)	0.006***	0.004***	0.006***	0.004***	0.007***	0.002***
	(6.22)	(4.04)	(5.83)	(4.04)	(6.86)	(3.77)
Alternative Benchmarks						
MBE (β_2)	0.019***	0.017***	0.020***	0.016***	0.020***	0.016***
	(15.27)	(8.90)	(14.19)	(8.55)	(16.45)	(8.73)
PosEPS (β_3)	0.006***	0.002**	0.006***	0.002*	0.006***	0.001
	(5.45)	(2.43)	(6.29)	(1.68)	(6.22)	(0.68)
EPS_UP (β_4)	0.008***	0.003***	0.007***	0.005***	0.008***	0.004***
	(9.48)	(4.41)	(8.31)	(5.30)	(10.04)	(6.23)
Control Variables	YES	YES	YES	YES	YES	YES
Other control variables						
ES Interactions	YES	YES	YES	YES	YES	YES
Industry Indicators	YES	YES	YES	YES	YES	YES
Weekday Indicators	YES	YES	YES	YES	YES	YES
Month Indicators	YES	YES	YES	YES	YES	YES
Year Indicators	YES	YES	YES	YES	YES	YES
Observations	98,874	49,433	98,738	49,568	98,892	49,407
Adjusted R^2	0.0811	0.0594	0.0730	0.0863	0.0751	0.0901

Difference in β_1	0.002**	0.002**	0.005***
(p-value)	(0.0285)	(0.0302)	(0.0003)
Difference in β_2	0.002*	0.004***	0.004
(p-value)	(0.062)	(0.0015)	(0.7490)
Difference in β_3	0.004**	0.004***	0.005***
(p-value)	(0.0128)	(0.0008)	(0.0001)
Difference in β_4	0.005***	0.002**	0.004**
(p-value)	(0.000)	(0.0145)	(0.0101)

Table 7
Effect of Investor Type

This table reports the effect of investor type on abnormal stock returns to above average earnings surprises Dependent variables are CAR, or abnormal stock returns in [0,1] window around quarterly earnings announcement. All the variables are defined in the Appendix B. T-statistics (in parentheses) are based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement and industry. *, **, *** indicate the coefficients are statistically significant at 10%, 5% and 1% level, respectively.

Investor base Proxies:	**Institutional Ownership**	
	High	**Low**
Variable of Interest		
ABOVE_EW (β_1)	0.004***	0.006***
	(3.97)	(6.05)
Alternative Benchmarks		
MBE (β_2)	0.019***	0.018***
	(10.16)	(12.39)
PosEPS (β_3)	0.003**	0.006***
	(2.04)	(6.01)
EPS_UP (β_4)	0.006***	0.006***
	(6.67)	(7.78)
Usual control variables	YES	YES
Other control variables		
ES Interactions	YES	YES
Industry Indicators	YES	YES
Weekday Indicators	YES	YES
Month Indicators	YES	YES
Year Indicators	YES	YES
Observations	49,433	98,874
Adjusted R^2	0.0695	0.0803
Difference in β_1	0.002**	
(p-value)	(0.0184)	
Difference in β_2	-0.001	
(p-value)	(0.136)	
Difference in β_3	0.003**	
(p-value)	(0.0146)	
Difference in β_4	0.000	
(p-value)	(0.5657)	

Table 8
Abnormal Trading Volume to Above-Average Earnings Surprises

This table reports the effect of above average earnings surprises on trading volume. Dependent variables, ABVOL[0,1], are 2-day abnormal trading volume around earnings announcement. All the variables are defined in the Appendix B. T-statistics (in parentheses) are based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement and industry. *, **, *** indicate the coefficients are statistically significant at 10%, 5% and 1% level, respectively.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
Reference Points							
ABOVE_EW	0.058***				0.047***	0.040***	0.038***
	(6.73)				(5.46)	(4.77)	(4.52)
MBE		0.050***			0.024***	0.002	-0.009
		(5.72)			(2.94)	(0.27)	(-1.06)
PosEPS			0.228***			0.222***	0.202***
			(9.56)			(9.19)	(8.11)
EINCREASE				0.104***			0.067***
				(11.13)			(7.72)
Control Variables							
AbsES	21.173***	22.938***	27.376***	22.759***	21.702***	26.496***	26.262***
	(3.33)	(3.64)	(4.21)	(3.59)	(3.40)	(4.04)	(4.00)
SIZE	0.016***	0.015***	0.008*	0.014***	0.016***	0.008*	0.008*
	(3.42)	(3.26)	(1.86)	(3.00)	(3.36)	(1.95)	(1.87)
BM	-0.004	-0.004	-0.003	-0.005	-0.004	-0.003	-0.004
	(-0.39)	(-0.33)	(-0.26)	(-0.43)	(-0.38)	(-0.31)	(-0.38)
INST	0.094**	0.094**	0.068	0.091*	0.094**	0.069	0.069
	(1.99)	(1.98)	(1.48)	(1.94)	(1.98)	(1.50)	(1.53)
STD	-0.006**	-0.005*	-0.001	-0.006**	-0.006**	-0.001	-0.002
	(-1.98)	(-1.95)	(-0.52)	(-2.17)	(-1.97)	(-0.57)	(-0.84)
EPERSIST	0.021***	0.021***	0.018***	0.021***	0.021***	0.018***	0.019***
	(3.29)	(3.25)	(2.89)	(3.38)	(3.28)	(2.90)	(3.00)
REPLAG	-0.020	-0.015	-0.001	-0.010	-0.018	-0.002	0.001
	(-1.12)	(-0.85)	(-0.05)	(-0.59)	(-1.01)	(-0.11)	(0.07)
N_ANALYST	-0.066***	-0.066***	-0.057***	-0.057***	-0.066***	-0.057***	-0.052***
	(-3.57)	(-3.59)	(-3.20)	(-3.19)	(-3.59)	(-3.23)	(-2.98)
TURNOVER	0.030***	0.030***	0.034***	0.031***	0.030***	0.034***	0.034***
	(5.71)	(5.73)	(6.70)	(5.87)	(5.72)	(6.70)	(6.72)
NDEC	-0.033***	-0.033***	-0.032***	-0.033***	-0.033***	-0.032***	-0.032***
	(-12.76)	(-12.56)	(-12.58)	(-12.50)	(-12.68)	(-12.66)	(-12.60)
DE	0.004	0.004	0.007**	0.004	0.004	0.007**	0.007**
	(1.40)	(1.48)	(2.42)	(1.58)	(1.42)	(2.33)	(2.35)
QTR4	0.041***	0.040***	0.041***	0.039***	0.040***	0.040***	0.039***
	(4.23)	(4.16)	(4.05)	(3.98)	(4.20)	(4.06)	(3.94)
RESTRUCT	-0.180***	-0.180***	-0.018	-0.132***	-0.179***	-0.021	-0.004
	(-5.35)	(-5.36)	(-0.49)	(-3.98)	(-5.35)	(-0.57)	(-0.11)
Other control variables							
AbsES Interactions	YES	YES	YES	YES	YES	YES	YES
Industry Indicators	YES	YES	YES	YES	YES	YES	YES
Weekday Indicators	YES	YES	YES	YES	YES	YES	YES
Month Indicators	YES	YES	YES	YES	YES	YES	YES
Year Indicators	YES	YES	YES	YES	YES	YES	YES
Observations	148,306	148,306	148,306	148,306	148,306	148,306	148,306
Adjusted R^2	0.0505	0.0502	0.0567	0.0525	0.0506	0.0571	0.0582