Earnings Announcements are Full of Surprises

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Abstract

We study the drift in returns of portfolios formed on the basis of the stock price reaction around earnings announcements. The Earnings Announcement Return (EAR) captures the market reaction to unexpected information contained in the company's earnings release. Besides the actual earnings news, this includes unexpected information about sales, margins, investment, and other less tangible information communicated around the earnings announcement. A strategy that buys and sells companies sorted on EAR produces an average abnormal return of 7.55% per year, 1.3% more than a strategy based on the traditional measure of earnings surprise, SUE. The post earnings announcement drift for EAR strategy is stronger than post earnings announcement drift for SUE. More importantly, unlike SUE, the EAR strategy returns do not show a reversal after 3 quarters. The EAR and SUE strategies appear to be independent of each other. A strategy that exploits both pieces of information generates abnormal returns of about 12.5% on an annual basis.

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1. Introduction

Since Ball and Brown (1968), a number of studies have documented the post-earnings announcement drift phenomenon where stock prices tend to drift upward (downward) after the earnings announcement if the earnings are unexpectedly positive (negative). This drift constitutes a violation of stock market efficiency and attempts to explain this phenomenon as an artifact of omitted risk factors, mismeasured returns, or research design flaws have been only partially successful. Thus, post earnings announcement drift continues to pose a significant challenge to financial theorists (Brennan 1991; Fama 1998).

Our paper deepens the puzzle. Research up to now has primarily attempted to measure the surprise in the announced earnings number. This surprise is the difference between the realized earnings and an estimate of the investors' expectation of earnings, either from a time series model of earnings or from analyst forecasts. After standardizing this surprise by a measure of earnings uncertainty, this measure is typically referred to as Standardized Unexpected Earnings (SUE). We focus instead on the stock return around the time of the announcement in excess of the return of a portfolio of firms with similar risk exposures and refer to it as the Earnings Announcement Return, or EAR. When measured in a short window around the announcement, the EAR is mainly driven by the unexpected information contained in the announcement. Importantly, the EAR captures the surprise in all aspects of the company's earnings announcement, and not just the surprise in earnings. Besides earnings, firms disclose sales and margins, and often release other forward-looking information in the form of press releases, conference calls, or private communications around the earnings announcement date, all of which will be impounded into stock prices at that time. As an additional advantage, EAR does not suffer from estimation errors like SUE which requires an estimate of the market's unobservable expectation of earnings.

We define firms with extreme positive EAR (i.e., firms in the highest quintile of unexpected returns) at the earnings announcement date as "good-news" firms and firms with extreme negative EAR (i.e., firms in the lowest quintile of unexpected returns) as "bad-news" firms. We find that returns tend to drift upward (downward) for good-news (bad-news) firms over the subsequent four quarters. A trading strategy taking long positions in good-news stocks and short positions in bad-news stocks produces an annual abnormal return of 7.5%. This return is better than the 6.2% obtained in a similar trading strategy based on the traditional SUE measure. Though the difference in returns is not large, it suggests that market participants under-react to all the information in the earnings announcement and not just to the surprise in the earnings number.

At first blush, the similar returns obtained for the EAR and SUE strategy might lead a reader to conclude that these two strategies are not independent in that each of the strategies may subsume the other. It turns out that it is not the case. We find that significant abnormal returns obtain for the EAR strategy even after controlling for the SUE strategy, and vice-versa. Therefore, investors under-react to both the earnings and the other information in the announcement, and one effect does not subsume the other. In other words, the two strategies are largely independent. A trading strategy that combines the two signals significantly improves the magnitude of abnormal returns to 12.5% per year.

Furthermore, the pattern of returns generated by the EAR and SUE strategies is quite different. While both the SUE strategy and EAR strategy cumulative abnormal returns increase monotonically across the four quarters subsequent to portfolio formation, the SUE strategy registers a decline in the fourth quarter. This is partly due to the reversal in SUE strategy stock returns surrounding the earnings announcement date four quarters after the portfolio formation (see Bernard and Thomas 1990). Another important distinction between the EAR and SUE strategies is that the abnormal returns from the EAR strategy have increased over time, while the abnormal returns from the SUE strategy have dropped since 1996. This is consistent with Francis, Schipper and Vincent (2002) who document the increasing concurrent disclosures of other information during earnings announcements over the last decade. It is, of course, also consistent with the SUE effect being exploited by savvy investors who, by their actions, have arbitraged away a significant portion of the anomaly.

The cumulative abnormal returns across time for both the SUE and EAR strategy appear to be drifting. We interpret this finding as suggesting that earnings and non-earnings surprises are confirmed continuously throughout the next quarters and, as this happens, stock prices drift upward or downward depending on the sign of the initial surprise. This is consistent with findings in Soffer and Lys (1999) that investors appear to discern more information about future earnings as time progresses and new information arrives. It appears investors follow a similar inference process for valuation factors unrelated to earnings as well.

Foster, Olsen and Shevlin (1984) and Chan, Jegadeesh and Lakonishok (1996) also use announcement day abnormal returns. However, our paper is different from these two papers in several respects. Foster et al. (1984) use a slightly different measure of announcement day returns in that they scale the returns by the standard deviation of returns to be consistent with the SUE measure. Using this measure they are unable to document any subsequent return patterns. Chan et al. (1996) use a measure similar to ours but the focus of their paper is quite different. Their objective was to understand price momentum and its relation to post earnings announcement drift and they used earnings announcement returns as a proxy for earnings surprises. In contrast, we argue that the earnings announcement return is not merely a proxy for the earnings surprise; rather it combines two important and distinct pieces of information surrounding the earnings release, i.e., earnings and non-earnings information. Furthermore, Chan et al. (1996) do not analyze the subsequent return patterns based on SUE and EAR measures, which is the focus of our paper. Finally, we report how the return patters emerge when combining the SUE and EAR measures.

Our paper offers three contributions to the extant literature. First, we add to the literature on drifts by documenting that the market under-reaction to information at the earnings announcement date extends beyond the earnings news. Second, we contribute to the literature that examines the valuation implications of non-financial information. While prior research consistently documents an association between non-financial information and stock prices it is often unclear whether market participants correctly value this piece of information. The evidence presented here adds to the growing body of work that suggests this is not the case (Rajgopal, Shevlin and Venkatachalam 2003, Gu 2005). Third, we shed light on an anomaly that is more pervasive and generates greater abnormal returns than the post earnings announcement drift anomaly. It is intriguing that such a visible piece of information, the announcement return, can lead to predictable returns in the future. While the post earnings announcement drift can be at least partially explained by the lack of understanding of the time-series properties of earnings, it is unclear what might explain the drift following the announcement return.

The rest of the paper is organized as follows. In section 2, we discuss related research. Section 3 describes the sample while section 4 presents the empirical methodology and findings.

We present some concluding remarks in section 5.

2. Related research

Ball and Brown (1968) discovered the post earnings announcement drift over three decades ago but it still remains a puzzle as the drift persists even after years of research and public dissemination of the anomaly. An extensive body of literature has attempted to explain the drift as compensation for some risk factor or due to methodological flaws, but such endeavors have been largely unsuccessful (see Bernard, Thomas and Whalen 1997 for a discussion).

Bernard and Thomas (1990) and Ball and Bartov (1996), among others, show that investors' apparent inability to fully process the time-series properties of earnings is a plausible explanation for the drift. That is, investors fail to fully recognize the serial correlation in quarterly earnings shocks, and, as such, systematically misestimate future expected earnings. Consequently, when subsequent quarterly earnings are announced, stock prices respond to a component of the earnings that is a surprise even though it should have been predictable based on the past time series of earnings.

Prior research has predominantly focused on the earnings surprise and very little attention has been directed towards other non-earnings information (both financial and non-financial in nature) that is concurrently released around the earnings announcement date. Firms provide considerable information in press releases both elaborating on the earnings report as well as providing other forward looking information. For example, firms provide expanded information about components of earnings such as sales and operating margin or report forward looking information such as order backlog data. In addition, earnings-related conference calls that are typically held within a few hours of the earnings announcement have become increasingly common. These conference calls represent an important voluntary disclosure mechanism for firms to disseminate valuable information to analysts and investors. Moreover, analysts obtain soft information about future firm performance in private discussions with the firm management (Hutton 2005).[1] Thus, market participants become aware of significant pieces of new information in addition to earnings at the earnings announcement date. For example, Francis et al. (2002) examine press releases for a sample of firms during the period 1980-1999 and find a considerable increase in the length of the press releases (measured by the number of words) as well as the number of items disclosed. They also document that this increase in concurrent disclosures helps explain the increase in the absolute market reaction to earnings announcements. It is therefore reasonable to argue that the market returns surrounding the earnings release reflects both earnings and non-earnings information released on the announcement. More importantly, it appears that the proportion of market reaction attributable to non-earnings information is on the rise.

The lack of explanatory power of unexpected earnings for the returns around the announcement documented by the accounting literature (see Lev 1989 for a review) is also consistent with the arguments above. Recent research by Liu and Thomas (2000) shows that a significant portion of the market reaction surrounding earnings announcements is attributable to other information released around the announcement date rather than the earnings information itself. Thus, a natural question to examine is whether market participants correctly impound into share prices the other information that is concurrently disclosed at the earnings release.

[1] The promulgation of Regulation FD in Aug 2000 by the SEC curbed the practice of selective disclosure of material information. While critics claimed that this regulation might result in less disclosures, recent research by Bushee et al. (2004) finds otherwise.

Recent research that examines whether market participants are able to correctly value the future earnings implications of nonfinancial information finds conflicting results. For example, Rajgopal, Shevlin and Venkatachalam (2003) find that investors overestimate the valuation implications of order backlogs that are disclosed in the financial statements. That is, investors place a higher weight on order backlog than that implied by the association between order backlog and future earnings. A trading strategy that takes a long (short) position in the lowest (highest) decile of order backlog generates significant future abnormal returns. In contrast, Gu (2005) finds that changes in patent citations have positive implication for future earnings but investors generally treat them as if they contained no relevant information. In other words, investors underweight the value implications of changes in patent citation. Deng, Lev and Narin (1999) document a similar underweighting of patent counts and level of patent citations. Thus, there is no consistent evidence of investor over or under reaction to non-financial information. Furthermore, none of these studies examine the short-run pricing implications of other information disclosed surrounding earnings announcements. Also, these papers focus on a single non-financial indicator such as order backlog, patent count, or patent impact, and hence limit the generalizability of their findings to a broader set of information. Our paper extends this literature by examining whether market participants under or over react to a broader set of concurrent disclosures at earnings announcements.

In a paper most directly related to ours, Chan et al. (1996) use the stock returns surrounding the earnings announcement as an alternative measure (to standardized unexpected earnings) of the post earnings announcement drift phenomenon to study its relationship with price momentum. Using both measures they document that the post earnings announcement drift still persists even after controlling for price momentum. Unlike Chan et al. (1996) we treat these measures as capturing different elements of the information around earnings announcement. Thus, our paper extends their work by examining whether the subsequent return patterns attributable to the two alternative measures are different. In particular, we are interested in the interactions between these two measures to gain a better understanding of the subsequent returns attributable to surprises in earnings and non-earnings news.

3. Data and methodology

Our data spans January 1987 to December 2004. Our sample consists of firms reported on COMPUSTAT Industrial Quarterly and CRSP databases and for which we can calculate size and book-to-market ratios. We do not include financials (NAICS 2-digit code 52) and utilities (NAICS 2-digit code 22) in our sample.[2] We also exclude firms with CRSP daily price less than $5 on the trading day prior to the earnings announcement date (COMPUSTAT Data *RDQE*). The Standardized Unexpected Earnings, SUE, for a firm in a given quarter is constructed by dividing the earnings surprise by the standard deviation of earnings surprises:

$$SUE_{i,q} = \frac{X_{i,q} - E(X_{i,q})}{\sigma_{i,q}}, \tag{1}$$

where $X_{i,q}$ (COMPUSTAT Data *8)* is the actual earnings number for firm *i* in quarter *q*, $E(X_{i,q})$ the expected earnings counterpart and $\sigma_{i,q}$ the standard deviation of earnings surprises over the last eight quarters.

Following previous research (e.g., Bernard and Thomas 1990), a seasonal random walk with drift model is used to estimate expected earnings. More specifically:

[2] Including these firms does not alter our inferences. In particular, a combined SUE and EAR strategy that includes utilities and financial firms results in an abnormal return of 12.1% over a 240 day trading window comparable to the 12.48% return obtained without including these firms (see Table 3).

$$E(X_{i,q}) = X_{i,q-4} + \mu_{i,q} \tag{2}$$

$$\mu_{i,q} = \frac{\sum_{n=1}^{8} X_{i,q-n} - X_{i,q-n-4}}{8}. \tag{3}$$

In Section 4.4, we show that our main findings are robust to the use of consensus analyst forecasts from I/B/E/S as an alternative measure of earnings expectation.

We use an alternative and arguably broader measure of the surprise in an earnings announcement, that we term the Earnings Announcement Return, EAR. EAR is the abnormal return for firm *i* in quarter *q* recorded over a three-day window centered on the announcement date:

$$EAR_{i,q} = \prod_{j=t-1}^{t+1}(1+R_{i,j}) - \prod_{j=t-1}^{t+1}(1+FF_j), \tag{4}$$

where FF_j is the return on the benchmark size and book-to-market Fama-French portfolio to which stock *i* belongs. Following Fama and French (1992), we form six portfolios based on the intersection of two size-based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock *i* on date *j* surrounding the earnings announcement in quarter *q*.

For every quarter, we form portfolios as follows:

a) We calculate SUE and EAR for all the stocks in the COMPUSTAT Industrial Quarterly files as described in equations (1) through (4).

b) We calculate quintile breakpoints by ranking SUE or EAR observations from quarter *q-1* rather than quarter *q*. This mitigates potential look-ahead bias associated with ranking observations based on quarter *q* realizations of SUE and EAR. That is, because the return accumulation starts a day after the earnings announcement in quarter *q*, it is not practically feasible to ascertain whether a firm falls in the extreme positive or negative surprises quintiles until all firms announce their earnings for quarter *q*.

c) We form 5 portfolios based on SUE, 5 portfolios based on EAR, and 25 portfolios (two-way SUE × EAR independent sort) and examine abnormal returns to each of those portfolios in subsequent periods.

Each quarter, we also analyze cumulative post announcement returns for both EAR and SUE strategies. Returns start cumulating a day after the earnings announcement window ends and cumulate up to *n* days after the earnings announcement date. For example, if *t* is the earnings announcement date for a stock, returns are cumulated from *t+2* through *t+n* trading days. This cumulative return is the *n* day cumulative return for the given stock. The *n* day cumulative abnormal returns are calculated using

$$ABR_{i,n} = \prod_{j=t+2}^{t+n}(1+R_{i,j}) - \prod_{j=t+2}^{t+n}(1+FF_j) \tag{5}$$

4. Empirical results

The fundamental hypothesis of our paper is that pieces of information in addition to earnings arrive around the earnings announcement date and that a significant portion of the market reaction around the announcement date is attributable to non-earnings information. To investigate this hypothesis, we first examine the distribution of returns around the earnings announcement date across different quintiles of both EAR and SUE, independently of each other. The abnormal returns to a strategy based on perfect foresight of extreme good news and bad news in earnings (i.e., perfect foresight of SUE) is 3.41% (see Panel A of Table 1). In contrast, the average abnormal return to a strategy based on perfect foresight of good news and bad news as measured through the abnormal returns at earnings announcement (i.e., perfect foresight of

EAR) is 19.13%. This latter result might at first appear obvious – the return on a strategy based on a sort on returns themselves – but we present it for two reasons: *i*) to document the upper bound of abnormal returns obtainable around earnings announcements, and *ii*) to ascertain the proportions of earnings and non-earnings news inherent in the market reaction surrounding the earnings announcement. It is interesting that only a small fraction (about 18%) of the announcement window returns is attributable to perfect foresight of earnings information. This is consistent with the hypothesis that other material pieces of information contribute a significant amount to the abnormal returns obtained around earnings announcements.[3]

To buttress our findings, we examine abnormal returns to a perfect foresight of future SUE (EAR) across different quintiles of EAR (SUE). Specifically, we consider two-dimensional trading strategies where we sort stocks independently based on perfect foresight of EAR and SUE respectively, and focus on the interactions resulting from these independent sorts. Panels B and C of Table 1 presents results from the independent sorts of EAR and SUE. Panel B presents the fraction of firms in each of the cells across the independent sorts while Panel C presents abnormal returns across the 25 SUE-EAR portfolio combinations. Results presented in Panel B indicate that, on average, only a quarter of the firms in the highest (lowest) SUE category also fall in the highest (lowest) EAR category. This further reinforces our earlier finding that the earnings surprise represented by SUE is not sufficient to capture abnormal stock returns around the earnings announcement date. In fact, a substantial proportion of firms (14% to 15%) within each SUE category experience extreme announcement returns in exactly the opposite direction of the earnings surprise. In other words, despite a huge positive (negative) earnings shock, these

[3] The low returns are not attributable to a poor model of investor expectations of earnings because, as we show later, using analyst forecasts, the returns only improve marginally from 2.99% to 3.11% (see Livnat and Mendenhall 2006).

stocks still grossly underperformed (outperformed) as suggested by their very low (high) earnings announcement returns.

The results in Panel C, Table 1 indicate that the announcement window abnormal returns across different SUE quintiles are evenly distributed. In contrast, there is a wide distribution in announcement day abnormal returns in each of the SUE quintiles. Furthermore, notice that the average abnormal return to the portfolio in the lowest EAR quintile but with extremely high SUES (i.e., the top right corner cell return of –8.53%) is almost as low as the average return to the portfolio in the lowest EAR/lowest SUE quintile cells (i.e., top left corner cell has -9.78% abnormal return). This suggests that the signals from earnings and non-earnings information released at the earnings announcement date are not necessarily convergent.

4.1 Examination of basic SUE and EAR strategies

In this section we examine returns to SUE and EAR strategies independently to provide a direct comparison between the two anomalies. That is, we examine future abnormal returns across the five quintiles of SUE and EAR separately. We examine cumulative abnormal returns in increments of 30 and 60 trading days commencing with the day after portfolio formation. Portfolios are formed the day after the earnings announcement date.

The results presented in Table 2 Panel A show that the cumulative abnormal return to the highest quintile SUE portfolio is significantly positive over extended holding periods after the earnings announcement. Similarly, the lowest quintile SUE portfolio earns significantly negative cumulative abnormal returns. Thus, a long position in the high SUE stocks (quintile 5) and a short position in the low SUE stocks (quintile 1) yields an average abnormal return of about 3.23% over the 60 trading days subsequent to the earnings announcement. The returns are much higher (about 5.10%) when the equity positions are held for 120 trading days. After 180 trading days, the SUE strategy becomes weak and shows signs of a reversal. These findings are consistent with those reported by Bernard and Thomas (1989) and Jegadeesh and Livnat (2005).

Turning to the returns from EAR portfolios, a similar pattern is observed. For example, firms in the highest (lowest) quintile of EAR stocks earn significant positive (negative) returns over extended periods following the earnings announcement. A strategy of buying (selling) high (low) EAR stocks results in an average abnormal return of 3.27% and 4.07% for the 60 and 120 day holding periods following the earnings announcement, respectively. However, there is no return reversal after 180 trading days.

In the short run, it appears that both trading strategies generate comparable abnormal returns on average, with the EAR strategy being slightly inferior. As we increase the holding period, the SUE trading strategy generates 6.18% returns over 240 trading days following the earnings announcement. For the same holding period, the EAR strategy earns 7.55%, respectively. Therefore, over increasingly longer holding periods, the returns to both strategies first appear to converge and then diverge. After one year following the earnings announcement, the EAR strategy generates slightly higher abnormal returns on average than the SUE strategy.

While both strategies appear to produce similar abnormal returns on average, this does not automatically imply that either of these strategies subsumes the other. An examination of abnormal returns in the three day earnings announcement window in the subsequent 4 quarters provides the first clue on the independent nature of the two strategies (see Table 2, Panel B). Consistent with prior research, we find that a significant portion of the subsequent abnormal returns to the SUE strategy occurs around earnings announcement dates. The three-day announcement window stock returns surrounding subsequent quarterly earnings announcements based on a strategy that takes a long position in extreme positive SUE stocks and a short position in extreme negative SUE stocks generates 0.46%, 0.27%, -0.07% and -0.38% abnormal returns in the four subsequent quarters, respectively. This indicates that part of the market reactions around earnings announcements is predictable based on current period earnings surprises. However, the predictive ability is monotonically declining over time and becomes less significant, economically and statistically, in the four quarters subsequent to portfolio formation. The return pattern observed for the EAR strategy, reported in Panel B of Table 2, is markedly different. The 3 day window abnormal returns around subsequent earnings announcement dates do not seem to monotonically decrease and reverse. The magnitude of EAR strategy (EAR5-EAR1) abnormal returns around subsequent announcement dates remains almost stable and becomes statistically insignificant by the fourth quarter. The EAR strategy generates one quarter ahead and three quarter ahead 3-day announcement window abnormal returns equal to 0.5%, 0.38% and 0.47% respectively. Overall, the findings indicate that the two strategies based on SUE and EAR are likely to be independent although they appear to generate similar cumulative long run abnormal returns. Thus, market participants fail to reflect fully the information contained in both earnings and non-earnings news conveyed at the time of earnings release.

4.2 Examination of a joint SUE and EAR strategy

The evidence in Table 2 suggests that EAR and SUE based abnormal returns are potentially two independent phenomena, and it is plausible to expect each to not be subsumed by the other. In this section, we examine to what extent these two strategies overlap with and differ from each other. To accomplish this, we focus on the interactions of returns from the independent sorts of EAR and SUE strategies. First, we conduct tests to assess whether the EAR strategy is viable after holding SUE constant and vice versa. Such an analysis provides information about how each of the strategies performs across different portfolios of the other (see Reinganum 1981, Jaffe et al. 1989).

Table 3 presents the cumulative abnormal returns to each of the portfolios across several holding periods in 30 trading day and 90 trading day increments. As before, we focus our attention on 30, 60, 90, 120, 180, and 240 day holding periods. As is evident from the results across all the holding periods, each strategy makes money independent of the other strategy. That is, holding the SUE (EAR) quintile constant, the EAR (SUE) strategies make consistent returns. For example, in the 60 day holding period the returns to the SUE strategy are 2.35%, 2.24%, 2.26%, 2.87%, and 4.79% across EAR quintiles 1 through 5. Similarly, the EAR strategy generates returns of 1.53%, 2.17%, 2.30%, 3.40%, and 3.97%, respectively, across quintiles 1 to 5 of SUE. As the holding periods increase to 180 and 240 trading days, the returns to each of the strategies increase considerably, but what is noteworthy is that each of the strategies performs consistently across all the quintiles of the other strategy.

To provide additional evidence on the independent nature of these two strategies we conduct a nonoverlap hedge test as in Desai et al. (2005). The basic idea behind the nonoverlap test is to assess the extent to which the EAR or the SUE strategy are able to generate returns after eliminating convergent extreme groups, i.e., eliminating firms in the lowest EAR and SUE portfolios (i.e., top left corner cell) and similarly firms in the highest EAR and SUE portfolios (i.e., bottom right corner cell). That is, when examining the extreme quintiles of the independent EAR strategy, we eliminate firms in the extreme quintile of the SUE strategy, and vice versa. In this way, we can ensure that the two strategies are independent if they generate returns even after eliminating firms that generate returns for the other strategy. Panel B of Table 3 presents the findings of the nonoverlap hedge tests. Across all the holding periods, we find that both the

EAR and SUE strategies generate significant abnormal returns even after removing firms in the extreme quintiles of the intersection of EAR and SUE portfolios. For example, for the 60 day holding period, the EAR strategy earns a hedge return of 2.01%, whereas the SUE strategy earns a hedge return of 2.1%. This demonstrates that the two strategies are largely independent.

Next, we consider whether we can exploit the two strategies to generate even greater abnormal returns than can be obtained by each of the individual strategies alone. If the SUE and EAR strategies are indeed distinct mispricing phenomena, then we should be able exploit both elements of mispricing to create a combined strategy that would yield significantly higher abnormal returns. Given that market participants appear to under-react to both earnings and non-earnings information, ex ante we predict that by taking trading positions on the extreme cells in the diagonal, i.e., firms in the extreme quintiles of both EAR and SUE (top left corner and bottom right corner cells), we should earn larger abnormal returns than those obtained using the individual strategies. Results presented in Table 3 are consistent with the prediction. For example, in the 60 day holding period we can obtain a return of 6.32% by taking a long position in the high SUE/high EAR portfolio (return of 4.12%) and a short position in the low SUE/low EAR portfolio (return of -2.20%). This return is almost double that obtained for either strategy on its own (see Table 2, Panel A).

The returns obtained for the joint strategy are further illustrated in Figure 1, which plots cumulative abnormal returns over 240 trading days starting with the day after the earnings announcement. Six cumulative return series are plotted in this figure. First, we plot the return pattern for extreme deciles of SUE (SUE1, SUE5) and EAR (EAR1, EAR5). Next, we plot the returns for the joint strategies (EAR5/SUE5, EAR1/SUE1). Notice that the returns to the joint high SUE/ high EAR portfolios are significantly higher than the returns earned on either the highest SUE or EAR portfolios alone. Similarly, portfolios that contain firms with the lowest SUE and the lowest announcement day stock returns experience significantly more negative returns on average than those experienced by firms in the lowest SUE or the lowest EAR quintiles separately. Thus, Figure 1 further highlights the superior returns obtained for the joint SUE/EAR strategy.

We now consider two-by-two independent sorts of returns to EAR and SUE quintile portfolios surrounding subsequent earnings announcements. The results, presented in Table 4, provide further evidence on the independence of SUE and EAR. With the exception of the SUE4 quintile for one and three-quarter ahead announcements, for any SUE quintile, returns to the EAR strategy (i.e., EAR5 - EAR1) generates strong positive returns. Similarly, the SUE strategy generates strong positive returns one quarter ahead, across all the EAR quintiles. The return reversal pattern surrounding the fourth quarter subsequent to the portfolio formation is present only for the SUE strategy across all the EAR quintiles with the exception of EAR4. The return patterns are sufficiently different across quarters and different between the EAR and SUE strategies, that we can conclude that the two strategies operate independent of each other.

4.3 EAR and SUE profitability through time

Table 5 examines the EAR and SUE strategies over two sub-samples, 1987 through 1995 and 1996 through 2004, to examine the time-series stability of the two anomalies. Panel A reports the average abnormal returns over the three days surrounding the initial announcement and Panel B reports the average abnormal three-day returns for the subsequent four announcements. This sub-sample analysis highlights two striking differences between the two strategies. Looking first at Panel A, we notice that the contemporaneous (i.e., perfect foresight) return spread for the EAR sort increased from 16.47% to 21.68%, about a 30% rise from the first to the second sub-sample. In contrast, the contemporaneous return spread for the SUE sort decreased 3.62% to 3.25%, about a 10% relative drop. The increase in the contemporaneous return spread for the EAR sort implies that stock prices have become more sensitive to the information released in quarterly announcements (see Maydew and Landsman 2002). The considerable drop in the contemporaneous return spread for the SUE sort implies further that this increased sensitivity is not attributed to information about earnings. In fact, stock prices seem to have become less sensitive to earnings-related information. This observation is consistent with the findings of Lev and Zarowin (1999) and Ryan and Zarowin (2003).

Turning to Panel B of Table 5, we observe the same sub-sample pattern for the average abnormal returns surrounding the next four earnings announcements. For example, the one-quarter ahead average abnormal return from the EAR strategy increases by 13 basis points, from 0.44% in the 1987-1995 period to 0.57% in the 1996-2004 period. This is an increase upwards of about 30%. The corresponding average abnormal returns from the SUE strategy, in contrast, falls from 0,48% to 0.45%. Finally, it is interesting to note that the increase in the average abnormal returns for the EAR strategy from the first sub-sample to the second is consistently strong for three quarters subsequent to the earnings announcement. On the other hand, for SUE, from the first sub-sample to the second, the magnitude of returns around subsequent earnings announcement dates decreases for all four subsequent earnings announcement dates. In sum, the EAR effect has grown stronger over the years whereas the SUE effect has weakened.

4.4. Robustness checks

4.4.1. EAR vs. price momentum

Sorting on announcement day returns is clearly related to sorting on past cumulative returns, which is the basis of the price momentum anomaly documented by Chan et al (1996), among others. It is therefore natural to examine how, if at all, and to what extent the EAR anomaly is related to price momentum. Chan et al (1996) already shed some light on this issue, by showing that price momentum is not driven entirely by past and future announcement day returns. Their analysis does not reveal, however, whether the converse is also true – whether the EAR anomaly is simply a restatement of price momentum.

Table 6 shows that the EAR and the price momentum strategies are largely independent of each other. Each month, stocks are given EAR and MOMENTUM ranks. For month *m*, five EAR ranks (EAR1 through EAR5) are allocated based on quintiles of 3-day abnormal returns around earnings announcements during months *m-2* through *m-4*. Similarly, five MOMENTUM ranks (MOM1 through MOM5) are given based on holding period returns for all stocks in the CRSP universe from *m-13* to *m-2*. We find that the EAR strategy produces abnormal returns after controlling for MOMENTUM and vice-versa. Panel A shows the average monthly returns using univariate sorts and Panel B presents results for bivariate sorts.

Panel A of the table shows that in the monthly implementation, the momentum sort results in a significantly higher average hedge return – an annualized 11.4% versus 8.28% for the EAR sort. Panel B of Table 2 shows an EAR strategy return of 7.55% for 240 trading days (roughly equivalent to one year). This difference is, however, largely driven by the fact that we impose on the EAR variable the standard monthly implementation of the momentum strategy. Rather than hold all good- and bad-news positions through the subsequent four earnings announcements, we resort the portfolio every month. From Figure 1, we see that the gradient for the EAR strategy (or, the rate at which EAR return increases with time), is steepest for the first 60 trading days. Therefore, by rebalancing each month, the EAR portfolio captures the part of the EAR return curve with steepest ascent. Of course, we could have alternatively imposed on the momentum variable the future announcement day implementation of the EAR strategy (i.e., sort stocks in event time as opposed to calendar time and then hold them for four quarters), but we already know from Chen et al (1996) that the returns to momentum are only partially related to future announcement day returns. We therefore interpret our analysis in Table 6 as conservatively stacking the deck in favor of the momentum sort.

Before we look at the returns from double sorting, we examine the composition of the extreme EAR and Momentum portfolios in the single sort. In unreported results, we find that the overlap is only marginally greater than that reported for the EAR and SUE portfolios. For example, on average less than 35% of the stocks are common to the highest EAR and highest momentum portfolios. This further suggests that the two anomalies are quite distinct.

Panel B presents the average monthly returns from independent double-sorting on the EAR and the momentum variables. The EAR sort produces a 20 to 70 basis point spread in each of the momentum quintiles. The momentum sort is also profitable in each of the EAR quintiles, but especially so in the EAR5 quintile (firms with extremely good news in the last quarterly announcement as measured through the announcement day returns) where it yields an average annualized return of 16.6%. Again, the fact that the momentum strategy is profitable when controlling for EAR is not surprising given the results of Chen et al (1996) and the fact that the implementation favors momentum. The important observation is that the converse is also largely true – the EAR strategy is profitable even when controlling for momentum. We therefore conclude that the EAR anomaly is not a mere manifestation of the price momentum anomaly.

4.4.2. EAR and SUE for large firms

It is well known that small firms are more opaque than large ones (Imhoff 1992; Lang and Lundholm 1993). Furthermore, the more opaque a firm's operational and/or financial condition is, the more should the firm's stock price react to the quarterly release of information by management (Collins, Kothari and Rayburn 1987). It may therefore be quite possible that the extreme portfolios of the EAR sort contain predominantly small firms. This would raise questions about the economic relevance of our result, since it is obviously difficult to exploit small-firm anomalies in a meaningful scale. If the EAR anomaly is limited to small firms, it may be explained by standard limits-to-arbitrage arguments.

Table 7 duplicates our main Table 3 using only the top 1,000 largest firms in the CRSP universe. There are two striking results that emerge from this table. First, it is clear that the profitability of the EAR sort is considerably reduced, yet far from eliminated, in this large-cap universe. For example, for holding periods of 30, 60, 90, 120, 180, and 240 trading days, EAR5-EAR1 is statistically significant and positive for at least three SUE quintiles. For holding periods of 120 and 90 trading days, EAR5-EAR1 is positive and statistically significant for two SUE quintiles. While the reduction in the abnormal return is consistent with our argument about the opacity of small firms, the EAR sort still produces economically meaningful abnormal returns in the large-cap universe.

The second important result is that the SUE sort is much more sensitive to the elimination of small firms than the EAR sort. In particular, in most of the cases (different horizons and EAR quintiles) the SUE spread return is statistically insignificant. This shows clearly that a significant portion of the abnormal returns of the SUE strategy is attributable to mispricing of small firms (Bernard and Thomas 1990).

4.4.3. EAR and SUE with analyst forecasts

Are insignificant SUE strategy abnormal returns the result of a misspecified model of expected earnings? It could be that a seasonal random walk with drift model of earnings expectations is not what the market actually uses on an aggregate basis and hence the SUE measure constructed for the analysis above may be unable to capture the true earnings surprises perceived by investors. Consistent with this argument, Livnat and Mendenhall (2006) and Battalio and Mendenhall (2005) document that the post earnings announcement drift is significantly larger when defining earnings surprise based on analyst forecasts rather than a time-series expectation model. Therefore, we ascertain the sensitivity of our findings by using IBES consensus analyst forecasts as an alternative measure of earnings expectations.

Panel A of Table 8 shows the three-day announcement window returns of EAR and SUE sorted portfolio with SUE now calculated using IBES mean consensus estimates for expected earnings. This panel is directly comparable to Panel A of Table 1, except the sample is smaller due to limited IBES coverage. Comparing the SUE spread return of 5.18% to the corresponding value of 3.41% from Table 1, suggests that a better measure of earnings surprise using IBES forecasts helps in a significant improvement in announcement day returns. The results do confirm the findings of Doyle, Lundholm and Soliman (2005) that using IBES forecasts instead of a seasonal random walk with drift model for expected earnings improves considerably the performance of the SUE strategy (see also Livnat and Mendenhall (2006)). However, the return difference is not significantly different for the EAR sort (18.77% in Table 8 vs 19.13% in Table 3) indicating that the reduced sample size due to the IBES coverage can not explain the improved returns for the SUE sort.

Panel B of Table 8 reports the abnormal returns of the EAR and SUE sorted portfolios around the subsequent four earnings announcements, analogous to Panel B of Table 2. Qualitatively, the results for abnormal returns around subsequent announcement dates using analyst forecasts remain the same as compared to the results using seasonally random walk with drift. In terms of statistical significance, however, only the strategy for the first subsequent quarter demonstrates statistically significant returns. For the IBES sample, we see statistically significant EAR strategy returns for the first and third quarter subsequent to the earnings announcement. Overall, Table 8 confirms that the EAR measure captures something more fundamental than mismeasurement of the market's earnings forecasts.

5. Conclusion

We unearth a new dimension to the post earnings announcement drift anomaly. We document that, in addition to under reacting to the earnings surprise revealed at the time of earnings release, the market seems to under react to other information contained in the announcement. Consistent with existing literature, we find that the portion of the announcement date abnormal returns attributable to the earnings surprise is dwarfed by the other relevant information in the announcement. In particular, for at least 40% of stocks with positive (negative) earnings surprises, investors earn negative (positive) abnormal returns around earnings announcements.

Return patterns observed for the SUE and EAR strategies are different in many respects. First, we find that a long-short strategy based on an EAR sort generates significant abnormal returns over one year horizon. These returns are larger than the returns of the SUE strategy. These abnormal returns obtain even after controlling for the SUE strategy. Second, the announcement window EAR returns for subsequent quarters do not seem to decline monotonically. They remain significant up to the third quarter following portfolio formation. Furthermore, unlike the return reversal in the 4^{th} quarter for SUE strategy, we do not find any reversal for the EAR strategy. Third, while the returns to the SUE strategy appear to have waned over the years, the returns to the EAR strategy have, in fact, increased over time. Finally, for large stocks, the post earnings announcement drift for the EAR effect is much stronger than for the SUE effect.

The abnormal returns obtained for the EAR strategy are robust to several additional sensitivity tests. The EAR strategy is neither subsumed by nor subsumes the price momentum strategy. It is also robust to restricting the universe of stocks to large caps only. Using analyst forecasts for earnings expectations does not change our results in any way.

Our findings are intriguing in that we are able to generate predictable abnormal returns using a conspicuous piece of information, the earnings announcement returns. They indicate a systematic under reaction to both earnings and non-earnings information that is disseminated around earnings announcements. This adds a new dimension to the long-standing post-earnings announcement drift anomaly.

References

Ball, R., and E. Bartov. 1996. How Naive is the Stock Market's Use of Earnings Information?, *Journal of Accounting and Economics* 21: 319-337.

Ball, R., and P. Brown. 1968. An Empirical Evaluation of Accounting Numbers, *Journal of Accounting Research* 6: 159-178.

Battalio, R.H., and R. R. Mendenhall, 2005. Earnings expectations, investor trade size, and anomalous returns around earnings announcements, *Journal of Financial Economics* 77: 289-319.

Bernard, V. L., and J. Thomas. 1989. Post-Earnings Announcement Drift: Delayed Price Response or Risk Premium, *Journal of Accounting Research* 27: 1-35.

Chan, L. K.C., N. Jegadeesh, and J. Lakonishok. 1996 Momentum Strategies, *Journal of Finance* 51: 1681–1713.

Chordia, Tarun, and L. Shivakumar. Earnings and Price Momentum, forthcoming *Journal of Financial Economics*.

Doyle, J.T., R.J. Lundholm, and M.T. Soliman. 2005. The Extreme Future Stock Returns Following Extreme Earnings Surprises. Working Paper, Stanford University.

Fama, E. 1998. Market Efficiency, Long-term Returns and Behavioral Finance, *Journal of Financial Economics* 49: 283-306.

Fama, E., and K. R. French. 1992. The Cross-section of Expected Stock Returns, *Journal of Finance* 47: 427-465.

Fama, E., and K. R. French. 1993. Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics* 33: 3-56.

Fama, E., and K. R. French. 1996. Multifactor Explanations of Asset Pricing Anomalies, *Journal of Finance* 51: 55–84.

Foster, G., C. Olsen, and T. Shevlin. 1984. Earnings Releases, Anomalies, and the Behavior of Security Returns, *The Accounting Review*: 574-603.

Francis, J., K. Schipper, and L. Vincent. 2002. Expanded Disclosures and the Increased Usefulness of Earnings Announcements, *The Accounting Review* 77: 515-546.

Gu. 2005. Innovation, Future Earnings, and Market Efficiency, *Journal of Accounting, Auditing & Finance* 20: 385-418.

Hutton 2005. Determinants of Managerial Earnings Guidance Prior to Regulation Fair Disclosure and Bias in Analysts' Earnings Forecasts, *Contemporary Accounting Research* 22:867-914.

Imhoff, E.A. 1992. The Relation between Perceived Accounting Quality and Economic Characteristics of the Firm, *Journal of Accounting and Public Policy* 11: 97-118.

Jegadeesh, N. 1990. Evidence of Predictable Behavior in Security Returns, *Journal of Finance* 45: 881-898.

Jegadeesh, N., and J. Livnat. 2004. Revenue Surprises and Stock Returns, *Working Paper*.

Jegadeesh, N., and S. Titman. 1993. Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *Journal of Finance* 48: 65–91.

Jegadeesh, N., and S. Titman. 2001. Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, *Journal of Finance* 56: 699-720.

Lang, M., and R. Lundholm. 1993. Cross-sectional Determinants of Analyst Ratings of Corporate Disclosures, *Journal of Accounting Research* 31: 246-271.

Lev, B. 1989. On the Usefulness of Earnings and Earnings Research: Lessons and Directions from Two Decades of Empirical Research, *Journal of Accounting Research* 27: 153-192

Lev, B., and P. Zarowin. 1999. The Boundaries of Financial Reporting and How to extend them, Journal of Accounting Research 37: 353-385.

Liu, J., and Thomas, J. 2000. Stock Returns and Accounting Earnings, *Journal of Accounting Research* 38: 71-101

Livnat, J., and R.R. Mendenhall. 2006. Comparing the Post-Earnings Announcement Drift for Surprises Calculated from Analyst and Time-Series Forecasts, *Journal of Accounting Research* 44: 177-204.

Maydew, E.L., and W.R. Landsman. 2002. Has the information content of quarterly earnings announcements declined in the past three decades?, *Journal of Accounting Research* 40: 797-808.

Rajgopal, S., T. Shevlin, and M. Venkatachalam. 2003. Does the Stock Market Fully Appreciate the Implications of Leading Indicators for Future Earnings? Evidence from Order Backlog, *Review of Accounting Studies* 8: 461-492.

Ryan, S., and P. Zarowin. 2003. Why Has the Contemporaneous Linear Returns-Earnings Relation Declined?, Journal of Accounting Research 78: 523-553.

Table 1

Abnormal returns around earnings announcement dates

Panel A presents the average abnormal stock returns over the three days surrounding the earnings announcement date (-1 through +1) for each of the quintile portfolios sorted on SUE and EAR for the period 1987 to 2004. SUE is the earnings surprise measure computed as the seasonally differenced quarterly earnings scaled by the standard deviation of the forecast error. EAR is the earnings announcement abnormal returns over the three day window surrounding the earnings announcement. Abnormal returns are computed as follows:

$$ABR_i = \prod_{j=t-1}^{t+1}(1+R_{i,j}) - \prod_{j=t}^{t+1}(1+FF_j)$$

where t is the earnings announcement date for firm i, FF_j is the return on the benchmark size book-to-market Fama-French portfolio to which stock i belongs. Fama-French form 6 portfolios based on intersection of stocks between two size based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock i on date j. Panels B and C present fractions of observations and average abnormal returns for various portfolios based on 2 X 2 independent sorts of SUE and EAR portfolios. Columns EAR1-EAR5 represent the quintiles of stocks with the lowest to highest EAR. Columns SUE1-SUE5 represent the quintiles of stocks with the smallest to the largest SUE. EAR spread and SUE spread represents hedge returns obtained as EAR5 – EAR1 and SUE5 – SUE1 respectively. * (^) represents statistical significance at 1% (5%) level.

Panel A: Abnormal returns around 3-day announcement window

EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread
-8.99*	-2.38*	0.10*	2.74*	10.14*	19.13*

SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
-1.40*	-0.40*	0.30*	1.09*	2.01*	3.41*

Panel B: Fraction of firms in each quintile

EAR Quintiles	SUE1	SUE2	SUE3	SUE4	SUE5
EAR1	0.28	0.22	0.19	0.16	0.15
EAR2	0.22	0.22	0.20	0.19	0.17
EAR3	0.19	0.21	0.21	0.20	0.19
EAR4	0.17	0.19	0.20	0.21	0.23
EAR5	0.14	0.16	0.19	0.23	0.28

Panel C: Abnormal returns around 3-day announcement window

	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread (SUE5 – SUE1)
EAR1	-9.78*	-8.88*	-8.60*	-8.64*	-8.53*	1.24*
EAR2	-2.41*	-2.38*	-2.38*	-2.36*	-2.36*	0.05*
EAR3	0.08^	0.09^	0.09*	0.11*	0.12*	0.04*
EAR4	2.69*	2.73*	2.74*	2.76*	2.79*	0.10*
EAR5	9.75*	9.65*	9.66*	10.14*	10.92*	1.17*
EAR Spread (EAR5 – EAR1)	19.53*	18.53*	18.26*	18.77*	19.46*	

Table 2

Post announcement abnormal returns for SUE and EAR portfolios

Panel A presents cumulative abnormal returns computed over different holding periods (in 60 day increments) from date of after the earnings announcement date for a particular stock. Abnormal returns for n day holding period are computed as follows:

$$ABR_{i,n} = \prod_{j=t+2}^{t+n}(1+R_{i,j}) - \prod_{j=t+2}^{t+n}(1+FF_j)$$

where t is the earnings announcement date for firm i, FF_j is the return on the benchmark size book-to-market Fama-French portfolio to which stock i belongs. Fama-French form 6 portfolios based on intersection of stocks between two size based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock i on date j. Panel B presents Abnormal returns surrounding earnings announcement date q quarters ahead. These are computed as follows:

$$ABR_{i,q} = \prod_{j=t(q)-1}^{t(q)+1}(1+R_{i,j}) - \prod_{j(q)=t}^{t(q)+1}(1+FF_j)$$

where $t(q)$ is the q quarters ahead earnings announcement date.

Columns EAR1-EAR5 represent the quintiles of stocks with the lowest to highest EAR. Columns SUE1-SUE5 represents the quintiles of stocks with the smallest to the largest SUE. EAR spread and SUE spread represents hedge returns obtained as returns from EAR5 minus EAR1 and SUE5 minus SUE1 respectively. * (^) represents statistical significance at 1% (5%) level.

Panel A: Cumulative abnormal returns

		EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
Trading days following earnings announcement	30	-0.39^	-0.16	0.05	0.33^	1.08*	1.47*	-0.51*	-0.21	0.27^	0.39^	1.09*	1.60*
	60	-1.28*	-0.21	-0.16	0.76*	1.99*	3.27*	-1.28*	-0.52*	0.34	0.75*	1.95*	3.23*
	90	-1.31*	-0.34	-0.05	0.78^	2.42*	3.73*	-1.69*	-0.62^	0.53	0.99*	2.40*	4.09*
	120	-1.45*	-0.42	-0.15	0.61	2.62*	4.07*	-2.24*	-0.97*	0.18	1.10*	2.85*	5.10*
	180	-2.78*	-1.05*	-0.20	0.62	3.56*	6.35*	-3.28*	-1.07*	0.36	1.06*	3.14*	6.43*
	240	-2.94*	-1.06	-0.53	1.09	4.61*	7.55*	-3.48*	-0.20	1.07	1.04	2.70*	6.18*

Panel B: Abnormal returns around 3-day announcement window in subsequent quarters

		EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
Quarters ahead	1	0.11	0.18*	0.26*	0.41*	0.61*	0.50*	0.08	0.20*	0.26*	0.51*	0.53*	0.46*
	2	0.17*	0.15*	0.26*	0.41*	0.55*	0.38*	0.12*	0.28*	0.37*	0.36*	0.40*	0.27*
	3	0.12	0.28*	0.26*	0.42*	0.59*	0.47*	0.31*	0.39*	0.37*	0.34*	0.24*	-0.07
	4	0.32*	0.35*	0.31*	0.33*	0.30*	-0.02	0.50*	0.33*	0.33*	0.32*	0.12	-0.38*

Table 3

Post announcement cumulative abnormal returns based on independent sorts of SUE and EAR portfolios

Cumulative abnormal returns are computed over different holding periods from date of after the earnings announcement date for a particular stock. Abnormal returns for n day holding period are computed as follows:

$$ABR_{i,n} = \prod_{j=t+2}^{t+n}(1+R_{i,j}) - \prod_{j=t+2}^{t+n}(1+FF_j)$$

where t is the earnings announcement date for firm i, FF_j is the return on the benchmark size book-to-market Fama-French portfolio to which stock i belongs. Fama-French form 6 portfolios based on intersection of stocks between two size based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock i on date j. Panels B and C present fractions of observations and average abnormal returns for various portfolios based on 2 X 2 independent sorts of SUE and EAR portfolios. Columns EAR1-EAR5 represent the quintiles of stocks with the lowest to highest EAR. Columns SUE1-SUE5 represents the quintiles of stocks with the smallest to the largest SUE. EAR spread and SUE spread represents hedge returns obtained as returns from EAR5 minus EAR1 and SUE5 minus SUE1 respectively. * (^) represents statistical significance at 1% (5%) level.

Panel A: Cumulative abnormal returns over different holding periods

	30 days						60 days						90 days					
	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
EAR1	-0.75*	-0.50*	-0.05	-0.19	-0.05	0.70	-2.20*	-1.56*	-0.57	-1.28*	0.15	2.35*	-2.68*	-1.79*	-0.55	-0.57	0.41	3.09*
EAR2	-0.83*	-0.25	-0.02	0.03	0.46*	1.29*	-1.42*	-0.46	0.09	0.12	0.81	2.24*	-1.71*	-0.81*	0.49	-0.24	1.11*	2.83*
EAR3	-0.46*	-0.40	0.08	0.15	0.90*	1.36*	-0.98	-1.02	0.00	0.39	1.28*	2.26*	-1.53*	-0.89*	0.07	0.56	1.72*	3.26*
EAR4	-0.40	-0.17	0.20	0.62*	1.18*	1.57*	-0.94*	-0.03*	0.28	1.66*	1.94*	2.87*	-1.13*	-0.16	0.29	1.95*	2.40*	3.53*
EAR5	0.01	0.14	1.02*	1.07*	2.16*	2.15*	-0.67	0.62	1.72*	2.14*	4.12*	4.79*	-0.86	0.76	2.39*	2.71*	4.76*	5.62*
EAR spread	0.76^	0.64^	1.06*	1.26*	2.21*		1.53*	2.17*	2.30*	3.40*	3.97*		1.82*	2.54*	2.95*	3.28*	4.35*	

	120 days						180 days						240 days					
	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
EAR1	-3.60*	-2.24*	-1.01	-0.81	1.22	4.82*	-5.28*	-3.11*	-1.55	-1.17	-0.83	4.45*	-5.24*	-1.40	-2.35*	-1.51	-1.77	3.47*
EAR2	-2.01*	-0.82	0.13	0.25	0.98	2.99*	-2.90*	-1.78*	0.04	-0.99	1.32	4.22*	-3.25*	-1.77*	1.03	-1.30	0.49	3.74*
EAR3	-2.13*	-1.18*	-0.01	0.86	1.93*	4.06*	-2.68*	-0.85	-0.31	0.85	2.39*	5.07*	-3.36*	-0.72	0.17	0.04	1.74*	5.10*
EAR4	-1.78*	-0.35	0.21	1.83*	2.39*	4.17*	-2.55*	-0.50	0.61	1.67*	3.04*	5.59*	-2.60*	0.59	0.80	2.87*	2.87*	5.47*
EAR5	-0.96	0.25	1.87*	2.90*	5.84*	6.80*	-1.63	1.35	3.14*	4.15*	7.15*	8.79*	-1.87	3.02*	6.05*	4.66*	7.24*	9.11*
EAR spread	2.64*	2.49*	2.88*	3.71*	4.62*		3.65*	4.46*	4.69*	5.31*	7.99*		3.37*	4.42*	8.39*	6.17*	9.01*	

Table 3 Continued

Panel B: Hedge returns over different holding periods after eliminating portfolios in the (SUE1,EAR1) and (SUE5, EAR5) cells

Trading days following earnings announcement		EAR spread	SUE spread
	30	0.92*	1.14*
	60	2.01*	2.10*
	90	2.29*	2.86*
	120	1.98*	3.47*
	180	4.01*	4.10*
	240	5.50*	3.80*

Table 4

Abnormal returns around subsequent quarterly earnings announcements based on independent sorts of SUE and EAR portfolios

Abnormal returns surrounding earnings announcement date *q* quarters ahead are computed as follows:

$$ABR_{i,q} = \prod_{j=t(q)-1}^{t(q)+1} (1+R_{i,j}) - \prod_{j(q)=t}^{t(q)+1} (1+FF_j)$$

where *t(q)* is the *q* quarters ahead earnings announcement date, FF_j is the return on the benchmark size book-to-market Fama-French portfolio to which stock i belongs. Fama-French form 6 portfolios based on intersection of stocks between two size based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock *i* on date *j*. Quintile portfolios sorted on SUE and EAR for the period 1987 to 2004 are formed based on SUE and EAR in the current quarter. SUE is the earnings surprise measure computed as the seasonally differenced quarterly earnings scaled by the standard deviation of the forecast error. EAR is the earnings announcement abnormal returns over the three day window surrounding the earnings announcement. * (^) represents statistical significance at 1% (5%) level.

	1 quarter ahead						2 quarters ahead					
	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
EAR1	-0.09	-0.08	0.06	0.46*	0.42*	0.51 *	-0.01	0.22*	0.32*	0.11	0.23	0.25
EAR2	0.07	0.06	0.24*	0.18	0.38*	0.31^	0.08	0.10	0.31^	0.08	0.22	0.14
EAR3	0.01	0.23*	0.20^	0.43*	0.38*	0.36^	0.17	0.22^	0.35^	0.30*	0.29*	0.12
EAR4	0.19	0.41*	0.24*	0.67*	0.46*	0.28^	0.24*	0.46*	0.45*	0.44*	0.39*	0.15
EAR5	0.24	0.41*	0.57*	0.73*	0.84*	0.61*	0.19	0.48*	0.47*	0.68*	0.65*	0.46*
EAR spread	0.33^	0.50*	0.50*	0.28	0.44^		0.21	0.25	0.17	0.55*	0.40^	
	3 quarters ahead						4 quarters ahead					
	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
EAR1	0.14	0.05	0.11	0.15	0.05	-0.11	0.49*	0.19	0.38*	0.31	0.04	-0.45*
EAR2	0.25*	0.38*	0.32*	0.22	0.26^	0.02	0.61*	0.32*	0.32*	0.29^	0.11	-0.51*
EAR3	0.32*	0.33*	0.33*	0.15	0.10	-0.21	0.59*	0.26^	0.32^	0.24*	0.16	-0.43*
EAR4	0.46*	0.53*	0.46*	0.53*	0.06	-0.40*	0.32*	0.44*	0.22*	0.41*	0.25*	-0.07
EAR5	0.59*	0.73*	0.71*	0.59*	0.50*	-0.06	0.45*	0.54*	0.35*	0.29*	0.08	-0.36^
EAR spread	0.41^	0.71*	0.58*	0.43^	0.47^		-0.05	0.35	-0.04	-0.02	0.04	

Table 5

Abnormal returns around earnings announcement dates for both EAR and SUE strategies across two sub-periods (1987-1995:1996-2004)

Panel A presents the average abnormal stock returns over the three days surrounding the earnings announcement date (-1 through +1) for each of the quintile portfolios sorted on SUE and EAR for two subperiods between 1987 and 2004. SUE is the earnings surprise measure computed using analyst forecast error scaled by the standard deviation of the forecast error. EAR is the earnings announcement abnormal returns over the three day window surrounding the earnings announcement. Abnormal returns are computed as follows: $ABR_i = \prod_{j=t-1}^{t+1}(1+R_{i,j}) - \prod_{j=t}^{t+1}(1+FF_j)$ where t is the earnings announcement date for firm i, FF_j is the return on the benchmark size book-to-market Fama-French portfolio to which stock i belongs. Fama-French form 6 portfolios based on intersection of stocks between two size based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock i on date j. Panel B presents Abnormal returns surrounding earnings announcement date q quarters ahead are computed as $ABR_{i,q} = \prod_{j=t(q)-1}^{t(q)+1}(1+R_{i,j}) - \prod_{j(q)=t}^{t(q)+1}(1+FF_j)$ where $t(q)$ is the q quarters ahead earnings announcement date. Columns EAR1-EAR5 represent the quintiles of stocks with the lowest to highest EAR. Columns SUE1-SUE5 represents the quintiles of stocks with the smallest to the largest SUE. EAR spread and SUE spread represents hedge returns obtained as returns from EAR5 minus EAR1 and SUE5 minus SUE1 respectively. * (^) represents statistical significance at 1% (5%) level.

Panel A: Abnormal returns around 3-day window at the earnings announcement quarter

Sub period	EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
1987-1995	-7.76*	-2.18*	-0.01	2.30*	8.71*	16.47*	-1.58*	-0.57*	0.17	1.02*	2.04*	3.62*
1996-2004	-10.10*	-2.52*	0.23*	3.19*	11.58*	21.68*	-1.21*	-0.26*	0.43	1.22*	2.04*	3.25*

Panel B: Abnormal returns around 3-day announcement window in subsequent quarters

Sub period	Quarters ahead	EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
1987-1995	1	-0.02	0.01	0.23*	0.31*	0.42*	0.44*	-0.06	0.04	0.14*	0.44*	0.42*	0.48*
	2	0.10	0.08	0.15*	0.24*	0.39*	0.29*	0.01	0.08	0.25*	0.23*	0.35*	0.34*
	3	-0.01	0.18*	0.14*	0.31*	0.50*	0.51*	0.28*	0.22*	0.24*	0.23*	0.13*	-0.15
	4	0.25*	0.25*	0.23*	0.21*	0.13*	-0.13	0.43*	0.17*	0.31*	0.17*	-0.03	-0.46*
1996-2004	1	0.25	0.36*	0.29*	0.51*	0.81*	0.57*	0.22*	0.35	0.40*	0.58*	0.67*	0.45*
	2	0.25*	0.24*	0.37*	0.59*	0.73*	0.48*	0.26*	0.48*	0.51	0.49*	0.47*	0.21*
	3	0.27	0.39*	0.40*	0.54*	0.69*	0.42*	0.34*	0.56*	0.52*	0.47*	0.36*	0.02
	4	0.40*	0.47*	0.39*	0.47*	0.48*	0.08	0.59*	0.49	0.35*	0.48*	0.29*	-0.30*

Table 6

Returns to EAR strategy after controlling for momentum

Panel A presents average monthly holding period returns for EAR-only and momentum-only strategy. Columns EAR1-EAR5 (MOM1-MOM5) represents the quintiles of stocks with the smallest to the largest EAR (MOM). EAR spread and MOM spread represents hedge returns obtained as returns from EAR5 minus EAR1 and MOM5 minus MOM1 respectively. For month *m*, 5 EAR portfolios are formed based on EAR quintiles of months *m-2*, *m-3*, and *m-4*. For month *m*, 5 MOM portfolios are formed based on holding period returns of stocks for months *m-13* through *m-2*. EAR and MOM portfolios are held for month *m*.

Panel B presents average monthly holding period returns for EAR-MOM strategy. * (^) represents statistical significance at 1% (5%) level.

Panel A: Average monthly holding period returns for only-EAR and only-momentum strategies

EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread	MOM1	MOM2	MOM3	MOM4	MOM5	MOM spread
-0.16	0.04	0.10	0.24*	0.53*	0.69*	-0.27	-0.12	-0.04	0.18*	0.68*	0.95*

Panel B: Average monthly holding period returns for EAR-momentum portfolios

	MOM1	MOM2	MOM3	MOM4	MOM5
EAR1	-0.49	-0.39*	-0.36*	-0.07	0.41*
EAR2	-0.23	-0.18	-0.06	0.10	0.44*
EAR3	-0.27	-0.08	-0.05	0.14	0.56*
EAR4	0.00	0.00	-0.04	0.27*	0.66*
EAR5	-0.29	0.15	0.35*	0.41*	1.09*

Table 7

Large Stocks: Post announcement cumulative abnormal returns based on independent sorts of SUE and EAR portfolios

For th e sample of large stocks, cumulative abnormal returns are computed over different holding periods from date of after the earnings announcement date for a particular stock. Abnormal returns for n day holding period are computed as follows:

$$ABR_{i,n} = \prod_{j=t+2}^{t+n}(1+R_{i,j}) - \prod_{j=t+2}^{t+n}(1+FF_j)$$

where t is the earnings announcement date for firm i, FF_j is the return on the benchmark size book-to-market Fama-French portfolio to which stock i belongs. Fama-French form 6 portfolios based on intersection of stocks between two size based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock i on date j. Panels B and C present fractions of observations and average abnormal returns for various portfolios based on 2 X 2 independent sorts of SUE and EAR portfolios. Columns EAR1-EAR5 represent the quintiles of stocks with the lowest to highest EAR. Columns SUE1-SUE5 represents the quintiles of stocks with the smallest to the largest SUE. EAR spread and SUE spread represents hedge returns obtained as returns from EAR5 minus EAR1 and SUE5 minus SUE1 respectively. * (^) represents statistical significance at 1% (5%) level.

Panel A: Cumulative abnormal returns over different holding periods

	30 days						60 days						90 days					
	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
EAR1	0.31	0.54	0.51	0.67	0.72	0.42	-0.58	-0.19	-0.17	0.04	0.99	1.57	0.54	0.42	0.13	0.62	1.96	1.43
EAR2	0.51	0.44	0.60	0.88^	0.45	-0.06	0.16	0.51	0.69	0.49	0.84	0.68	0.71	0.72	1.24^	1.52*	1.04	0.33
EAR3	0.37	0.31	0.90*	0.78^	1.02*	0.65	0.48	-0.03	0.56	0.18	1.92*	1.44*	0.85	0.38	1.03	0.42	1.90*	1.05
EAR4	0.58	0.53	0.73^	0.82*	0.77*	0.19	-0.09	0.49	0.80	1.48^	0.77^	0.86	0.39	0.80	1.21	1.15^	0.66	0.26
EAR5	1.29*	0.98*	1.58*	1.59^	2.07*	0.78	1.56^	1.44*	2.00*	2.02*	2.97*	1.41	2.00	1.97^	3.27*	2.32*	3.04*	1.03
EAR spread	0.98^	0.43	1.07^	0.92	1.35*		2.14*	1.64	2.17*	1.97*	1.98^		1.47	1.55	3.14*	1.71^	1.08	-0.39
	120 days						**180 days**						**240 days**					
	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
EAR1	-0.56	-0.53	-0.50	-0.69	1.95	2.51	-2.16	-1.52	-0.63	-0.58	-0.08	2.08	-2.41	-0.78	-1.10	-0.31	-1.34	1.06
EAR2	-0.09	-0.08	1.00	1.69^	0.43	0.52	-0.39	-0.62	1.00	1.72	0.40	0.78	-0.43	0.35	0.82	2.21	-0.40	0.03
EAR3	0.49	0.03	0.76	0.64	1.88^	1.39	0.16	1.14	1.18	-0.89	2.94^	2.78^	0.51	1.05	1.29	-0.84	0.66	0.14
EAR4	-0.16	0.53	0.82	0.91	0.57	0.74	-0.03	0.18	1.33	0.24	0.23	0.27	0.56	1.19	1.40	1.46	0.15	-0.41
EAR5	1.56	0.68	2.48*	2.36^	3.19^	1.63	0.02	1.22	4.32*	4.06*	4.04^	4.02*	-0.43	1.58	4.56^	4.64*	4.44^	4.86*
EAR spread	2.12	1.21	2.98*	3.05*	1.24		2.18	2.74^	4.95*	4.64*	4.12^		1.98	2.36	5.66*	4.95	5.78*	

Table 8

Abnormal returns around earnings announcement dates for both EAR and SUE strategies using analyst forecasts for determining SUE

Panel A presents the average abnormal stock returns over the three days surrounding the earnings announcement date (-1 through +1) for each of the quintile portfolios sorted on SUE and EAR for the period 1987 to 2004. SUE is the earnings surprise measure computed using analyst forecast error scaled by the standard deviation of the forecast error. EAR is the earnings announcement abnormal returns over the three day window surrounding the earnings announcement. Abnormal returns are computed as follows:

$$ABR_i = \prod_{j=t-1}^{t+1}(1+R_{i,j}) - \prod_{j=t}^{t+1}(1+FF_j)$$

where t is the earnings announcement date for firm i, FF_j is the return on the benchmark size book-to-market Fama-French portfolio to which stock i belongs. Fama-French form 6 portfolios based on intersection of stocks between two size based cutoffs and three book-to-market based cutoffs. $R_{i,j}$ is the return on stock i on date j. Panel B presents Abnormal returns surrounding earnings announcement date q quarters ahead are computed as $ABR_{i,q} = \prod_{j=t(q)-1}^{t(q)+1}(1+R_{i,j}) - \prod_{j(q)=t}^{t(q)+1}(1+FF_j)$ where $t(q)$ is the q quarters ahead earnings announcement date. Columns EAR1-EAR5 represent the quintiles of stocks with the lowest to highest EAR. Columns SUE1-SUE5 represents the quintiles of stocks with the smallest to the largest SUE. EAR spread and SUE spread represents hedge returns obtained as returns from EAR5 minus EAR1 and SUE5 minus SUE1 respectively. * (^) represents statistical significance at 1% (5%) level.

Panel A: Abnormal returns around 3-day window at the earnings announcement quarter

EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
-8.84*	-2.24*	0.29*	2.97*	9.93*	18.77*	-2.20*	-0.84*	0.61*	1.79*	2.98*	5.18*

Panel B: Abnormal returns around 3-day announcement window in subsequent quarters

Quarters ahead	EAR1	EAR2	EAR3	EAR4	EAR5	EAR spread	SUE1	SUE2	SUE3	SUE4	SUE5	SUE spread
1	0.39*	0.25*	0.52*	0.62*	0.76*	0.37*	0.35*	0.12	0.58*	0.85*	0.76*	0.40*
2	0.41*	0.32*	0.42	0.56	0.64*	0.23	0.56*	0.12	0.68*	0.40*	0.69*	0.13
3	0.37*	0.30*	0.51	0.46	0.86*	0.49*	0.44*	0.34*	0.50*	0.56*	0.70*	0.26
4	0.47*	0.48*	0.36*	0.49*	0.71*	0.24	0.71*	0.37*	0.47*	0.43*	0.60*	-0.11

Figure 1

Figure 1 shows abnormal returns to EAR, SUE and combined EAR/SUE spreads for 240 days subsequent to quarterly earnings announcement. EAR1, EAR5 represent the quintiles of stocks with the lowest, highest EAR. SUE1, SUE5 represents the quintiles of stocks with the smallest, largest SUE.