Management Science

Publication details, including instructions for authors and subscription information:
http://pubsonline.informs.org

Attracting Attention in a Limited Attention World: Exploring the Causes and Consequences of Extreme Positive Earnings Surprises

Allison Koester, Russell Lundholm, Mark Soliman

To cite this article:
Allison Koester, Russell Lundholm, Mark Soliman (2016) Attracting Attention in a Limited Attention World: Exploring the Causes and Consequences of Extreme Positive Earnings Surprises. Management Science 62(10):2871-2896. http://dx.doi.org/10.1287/mnsc.2015.2286

MANAGEMENT SCIENCE
Vol. 62, No. 10, October 2016, pp. 2871–2896
ISSN 0025-1909 (print) | ISSN 1526-5501 (online)

http://dx.doi.org/10.1287/mnsc.2015.2286

Attracting Attention in a Limited Attention World: Exploring the Causes and Consequences of Extreme Positive Earnings Surprises

Allison Koester
McDonough School of Business, Georgetown University, Washington, DC 20057, allison.koester@georgetown.edu

Russell Lundholm
Sauder School of Business, University of British Columbia, Vancouver, British Columbia V6T 1Z2, Canada, russell.lundholm@sauder.ubc.ca

Mark Soliman
Marshall School of Business, University of Southern California, Los Angeles, California 90089, msoliman@marshall.usc.edu

We investigate why extreme positive earnings surprises occur and the consequences of these events. We posit that managers know before analysts when extremely good earnings news is developing, but can have incentives to allow the earnings news to surprise the market at the earnings announcement. In particular, managers can use an extreme positive earnings surprise to attract investor attention when they believe their stock is neglected and future performance is expected to be strong. Analysts, who must allocate scarce resources across many firms, can also be inattentive and miss signals that suggest good performance is going to be announced. Using various proxies for extreme positive earnings surprises, management expectations for future performance and desire for attention, and analyst neglect, we find evidence that an extreme positive earnings surprise is a predictable event. These findings are incremental to controlling for a firm's information environment, earnings volatility, and operating leverage. Finally, we show that extreme positive earnings surprises are a successful method for attracting attention, with significant increases in the number of institutional owners, the number of analysts, and trading volume during the subsequent three years.

Keywords: accounting; economics; behavior; behavioral decision making; financial institutions; markets
History: Received January 16, 2013; accepted June 2, 2015, by Mary Barth, accounting. Published online in *Articles in Advance* January 19, 2016.

1. Introduction

This paper examines the causes and consequences of extreme positive earnings surprises. Instances where a firm's earnings far exceed the analyst consensus forecast are interesting because, *on the surface*, it seems that neither analysts nor managers have an incentive for this kind of breakdown in communication to occur. The analyst appears inaccurate and out of touch with the firm, and, given the evidence that incremental stock returns are diminishing in the amount of earnings surprise (Freeman and Tse 1992, Kinney et al. 2002, Burgstahler and Chuk 2010), managers appear to waste some of the impact of their good news. We hypothesize that there are circumstances when managers have incentives to allow an extreme positive earnings surprise to occur, and there are circumstances when analysts are not fully attentive to the firm. Although we cannot directly observe management intent or all the communication between the firm and outside parties, we present a rich body of indirect evidence indicating that management sometimes allows extreme positive earnings surprises (PESs) to occur to attract attention to the firm. We also find that analyst inattention contributes to extreme positive earnings surprises. Finally, we show that the extreme positive earnings surprise is effective in attracting attention, with firms experiencing increases in the number of analysts, number of institutional investors, and trading volume in the three years subsequent to the extreme positive earnings surprise.

Managers have incentives to attract investor attention because investors tend to invest only in firms they are aware of (Merton 1987), and a firm that catches investors' attention is more likely to be included in their portfolio (Odean 1999, Busse and Green 2002, Barber and Odean 2008). In addition, investors require a premium for holding illiquid stocks, implying that managers can lower their cost of capital by diversifying their investor base and increasing liquidity (Amihud and Mendelson 1986). We posit that a manager, aware of unexpectedly good current period news, may choose to delay the revelation of the good news until the firm's earnings announcement, as opposed to preempting the good news prior to the earnings announcement. Allowing the good news to reach the market at the earnings announcement date generates a large positive earnings surprise, which managers anticipate

will attract investor and analyst attention. As Merrill Lynch economist Trent Barnett notes, "if a company surprises. . . it gets the market's attention" (Maguire 2002). Managers who expect the good performance to continue, and who feel the firm's past performance has not been adequately recognized, are likely candidates for such a communication strategy. We note that this strategy is not without cost; managers may damage their relationship with both investors and analysts by failing to provide earnings guidance.

Because an earnings surprise is defined as the difference between a firm's earnings realization and the consensus analyst forecast of earnings, it is also possible that analyst inattention contributes to an extreme earnings surprise. Analysts must allocate scarce investigative resources across the firms they follow, and consequently they may not be aware of what is going on at the firm. We investigate four aspects of analyst attention—the number of analysts following the firm, the average analyst experience and busyness, and the economic importance of a firm relative to all other firms covered by an analyst. We also examine two forecast properties that reflect analyst attention–forecast staleness and forecast dispersion.

The null hypothesis of our study is that neither management nor analysts know an extreme positive earnings surprise is coming until it is too late to change their behavior. In this case, firms reporting extreme positive earnings surprises could be simply those with poor information environments, volatile earnings, or high operating leverage. We control for these factors, along with industry and calendar-quarter fixed effects, to isolate the impact of the managerial attention seeking and analyst inattention variables.

Although large *negative* earnings surprises are often attributed to "big bath" stories (Watts and Zimmerman 1978, 1986), there is currently little known about the causes and consequences of large *positive* earnings surprises. Most of the earnings surprise literature has focused on small positive surprises, concluding that the unusually large number of small positive surprises is evidence of earnings management (Burgstahler and Dichev 1997, Burgstahler and Eames 2006). But the large positive earnings surprises we study are unlikely to be the result of earnings management.[1] The paper most similar to ours is that by Brown et al. (2009), who find that information asymmetry is lower for firms that experience a positive earnings surprise relative to firms with no earnings surprise, and that this relation is stronger when earnings surprises are greater than 2¢ per share. Whereas the authors are interested in exploring information environment changes that occur *after* an earnings surprise, we are primarily interested in exploring how managers and analysts contribute to the creation of an extreme positive earnings surprise. Brown et al. (2009) take an earnings surprise as an exogenous event that precipitates changes in information asymmetry, while we treat an earnings surprise as an endogenous event that can be predicted by variables that capture managerial attention seeking and analyst inattention.

We define an extreme positive earnings surprise three different ways: being in the top decile of surprises for the quarter, being greater than 0.5% of the stock price, or being in the top decile of surprises *and* exceeding the absolute value of forecasted earnings by at least 50%. For all three definitions, the difference between the analyst forecast and the realized amount is extreme. For example, in the top decile of quarterly earnings surprises, the median earnings realization is 13¢ per share, whereas the median analyst expectation is only 4¢ per share (untabulated). We believe an earnings surprise more than twice as large as forecasted earnings is a large deviation from expectations.

Evidence in support of our hypotheses is necessarily circumstantial. We cannot observe management's intentions, nor can we observe many of the communications firms have with the analyst community. We also cannot observe analysts' investigative efforts. Our approach is to present a battery of indirect evidence that is collectively consistent with managers allowing the earnings surprise to happen and, to a lesser extent, that analysts were not paying sufficient attention to the firm. Comparing PES firms with the rest of the sample, we also find that management has a reason to want to attract investor attention at this time: future return on assets (ROA) increases more for PES firms than non-PES firms. Management of PES firms may also feel neglected by the market: their past ROAs have exceeded the industry median and they have beaten the analysts forecast in three of the four past quarters, yet their market-adjusted stock prices have declined over this same period. Their price-to-earnings ratios are also lower than those of non-PES firms. In terms of observable actions, we find that the frequency of earnings guidance is lower for PES firms, and decreased from the previous quarter. Managers also stand to profit from

[1] We do not consider accrual management as a managerial technique to achieve an extreme positive earnings surprise because the magnitude of the accrual management required to achieve a positive earnings surprise that meets our definition of extreme would be implausible. In addition, discretionary accrual models used by researchers have been shown to be imprecise and perform particularly poorly in the presence of business model shocks (e.g., Owens et al. 2015). It is also possible that large positive earnings surprises arise during auditors' quarterly reviews or annual audits, such that neither managers nor analysts were aware of the pending surprise during the quarter. We believe that large and unexpected earnings *increases* as the result of audit adjustments are unlikely. Extreme positive earnings surprises systematically arising from the review/audit process biases against us finding evidence consistent with large positive earnings surprises being due to managerial attention seeking or analyst inattention.

the good news: the frequency of firms with net insider purchases in the month prior to the announcement is greater for PES firms than for non-PES firms. Finally, we also find evidence that if managers' intended to attract attention, they were successful: in the three years following the earnings surprise, the number of analysts, the number of institutional owners, and trading volume all increase more for PES firms than for non-PES firms.

There is also evidence that analysts contribute to the extreme positive earnings surprise. Fewer analysts follow PES firms than non-PES firms, and the number decreases from the previous quarter for the PES firms. PES firms are a smaller part of analysts' portfolio relative to non-PES firms, and analyst forecast dispersion is greater for PES firms. Although these results are significant, joint odds ratios reveal the analyst determinants are secondary to the management attention seeking determinants. We compute the joint odds ratio for the managerial attention seeking variables, the analyst inattention variables, and the control variables. After holding all other variables in the model constant, the odds of $PES1 = 1$ are 6.36 higher when the binary (continuous) manager variables change by one unit (standard deviation) in the predicted direction. In contrast, the odds of $PES1 = 1$ are 1.69 higher when the continuous analyst variables change by one standard deviation in the predicted direction.

To illustrate the phenomenon we want to study, consider TETRA Technologies, a small-cap oil service company based in Texas. In the second quarter of 2005, TETRA reported earnings that exceeded analyst expectations by nearly 50% (earnings of 64¢ per share, whereas the analyst consensus forecast was only 44¢ per share). President and chief executive officer Geoffrey Hertel opened his remarks during the firm's quarterly conference call with, "I imagine the second quarter earnings were somewhat surprising to at least a few of you." Lewis Kreps with Aperion Group, the second analyst selected to ask a question, began his remarks with, "Congratulations Geoff. . . . You've surprised me." If the TETRA management team was attempting to garner attention from the investment community with its extreme positive earnings surprise, it was successful. Analysts at Ferris, Baker Watts Inc. noted in their quarterly research report that TETRA Technologies' earnings per share (EPS) "substantially beat our estimates. . ." and "as a result of the strength that TETRA is experiencing . . . and our views for continued growth in each of TETRA's markets, we are increasing our 2005 and 2006 revenue and EPS forecasts." In addition, Jefferies' analysts noted that "TETRA Technologies' reported second-quarter EPS of $0.64 [was] well ahead of our $0.46 estimate . . . with each of the company's segments registering double-digit growth in revenues and margin improvement. . . .[We] are reiterating our Buy rating on TETRA Technologies with a new 12-month price target." It appears that TETRA's large positive earnings surprise successfully caught the attention of its analysts.

2. Hypotheses Development

There are four stylized cases that can produce an extreme positive earnings surprise:

(1) managers know a large surprise is coming but choose not to communicate,

(2) managers do not know a large surprise is coming until it is too late to revise their communications,

(3) analysts know their forecasts are wrong but choose not to update, or

(4) analysts do not know their forecasts are wrong until earnings are announced.

Our manager attention seeking hypothesis is based on the first case, our analyst inattention hypothesis is based on the fourth case, and our null hypothesis encompasses some combination of the second and third cases. Below we elaborate on the details behind each case.

2.1. Managerial Attention-Seeking Hypothesis

This hypothesis assumes that managers know the future earnings realization far exceeds the analyst forecast, but they want to attract investor attention by letting the news arrive in the earnings announcement rather than communicate to the market beforehand. If the amount of attention a firm receives influences its stock price, the manager of a neglected firm has an incentive to draw attention to her firm. In the limited attention capital asset pricing model proposed by Merton (1987), investors form diversified portfolios only from the set of firms they are aware of, causing a firm's cost of capital to decrease as investor awareness increases. Relatedly, Odean (1999) proposes that investors do not evaluate each of the thousands of stocks actively trading in public markets when making their investment decisions; rather, investors limit their investment decisions to stocks that have recently caught their attention. A firm that catches an investor's attention is more likely to be included in an investor's portfolio, and the broader investor base lowers the firm's cost of capital. A simple online search shows that earnings surprises certainly garner media attention, with prominent financial media outlets like the *Wall Street Journal* providing daily updates to its Earnings website, NASDAQ populating its Earnings Surprise website, and Zacks announcing both bottom- and top-line surprises on its Earnings Releases website.[2]

Lehavy and Sloan (2008) find that increases in institutional ownership (a measure of investor awareness) are

[2] See http://www.wsj.com/news/types/earnings, http://www.nasdaq.com/earnings/daily-earnings-surprise.aspx, and http://www.zacks.com/research/earnings/today_eps.php, respectively (last accessed December 7, 2015).

associated with decreases in expected returns, providing some empirical evidence consistent with investor awareness impacting a firm's cost of equity capital. More directly, Brown et al. (2009) examine the effect of earnings surprises on changes in information asymmetry and find that bid–ask spreads and the probability of informed trading decline after positive earnings surprises. The authors interpret this as evidence the firm has increased its market visibility. Similarly, Irvine (2003) finds that firms experience a significant increase in liquidity following the initiation of analyst coverage, and that the effect increases with the analyst's recommendation. Barber and Odean (2008) find that individual investors tend to buy stocks that grab their attention (e.g., those mentioned in the news, with high daily trading volume, with an extreme daily return, etc.). Finally, Busse and Green (2002) use intraday price and transaction data to document abnormally high trading volume precisely when investor attention increases. They show that when Maria Bartiromo mentions a stock during the CNBC television show *Midday Call*, the average trading volume for the stock immediately increases nearly fivefold. Taken together, the prior literature indicates that managers have an incentive to draw attention to their firms.

We cannot observe many of the methods that managers may use to communicate information to the market, nor can we observe the intentions behind their actions.[3] However, there are some observable circumstances and actions that would be consistent with managers intentionally limiting the flow of information about the upcoming earnings surprise.

2.1.1. When Might Management Want to Report an Extreme Positive Earnings Surprise? We posit that managers have a particular interest in drawing attention to their firm when the firm's past performance appears to have been underappreciated by the market, when the current results are particularly good, when their private information about future performance is also good, and when the firm needs external financing. We use five variables to capture these circumstances.

We identify a firm that may feel neglected by the market with two variables. The first variable, *MKT_NEGLECT*1, is set equal to one if the firm's average ROA in the four quarters prior to a PES quarter is greater than the industry median, but its market-adjusted buy-and-hold stock return during the prior year is less than the industry median, and equal to zero otherwise. The second variable, *MKT_NEGLECT*2, is set equal to one if the firm meets or beats the analyst consensus forecast in at least three of the four prior quarters, but its market-adjusted buy-and-hold stock return during the prior year is less than the industry median, and equal to zero otherwise. We predict a positive association between both market neglect measures and PES.

It would appear obvious that to have a PES the firm must have had a large increase in current earnings per share; the firm must have some means of surprising the market in the first place. However, earnings surprises are relative to analyst forecasts, not the prior period earnings. In fact, 31% of the PES observations reflect reported losses, and 20% reflect earnings declines (untabulated). Nonetheless, managers are likely to want to draw attention to large increases in EPS. We measure ΔEPS as the change in a firm's unsplit-adjusted realized earnings per share scaled by stock price per share from quarter $t-1$ to t. We predict a positive association with between ΔEPS and PES. We include ΔEPS as a manager-based variable under the assumption that management has a good idea about the results for the quarter well before the earnings announcement. We acknowledge that if management does not know a large change in EPS is coming, ΔEPS might better be categorized as a variable that controls for operating volatility.

We also expect managers of PES firms to have positive private information about their firm's future performance. Our assumption is that managers will want to attract attention when the firm's positive performance is expected to continue into the future. Following Lang and Lundholm (1993), we measure managers' private information about their firm's future performance (*PRIVATE_INFO*) using the change in average industry-adjusted ROA from four quarters prior to four quarters after a PES quarter, excluding the PES quarter. We predict a positive association between *PRIVATE_INFO* and PES.

Our fifth managerial intent variable seeks to capture how firms benefit from an extreme positive earnings surprise. We posit that managers of firms with financing needs have a strong incentive to attract investor attention to broaden their firm's investor base, increase their liquidity, and lower their cost of capital. Financing needs help to explain why a manager chose quarter t, as opposed to some other quarter, to allow an extreme positive earnings surprise to occur. We use the ex ante measure of financing needs (*FIN_NEEDS*) from Dechow et al. (2011). We predict a positive relation between *FIN_NEEDS* and PES.

2.1.2. What Actions Might a Manager Take if She Was Actively Trying to Surprise the Market? Next, we consider two observable actions consistent with a manager using an earnings surprise to attract the

[3] There are multiple tactics a firm can employ to attract attention. For example, firms can improve disclosures, hold conference calls, have a more active investor relation department, signal through corporate finance policies, or employ more modern communication channels such as interviews on cable television, Twitter, or Facebook. Each of these methods has costs and benefits that the firm must weigh before choosing its communication strategy.

market's attention—a lack of management earnings guidance and management insider trading. Both are indirect signals of managerial intent to surprise the market.

We hypothesize that if managers are intentionally allowing a large positive earnings surprise to occur, they are less likely to provide earnings guidance about the upcoming earnings announcement. We measure a lack of manager guidance with *NOGUIDE*, a binary variable set equal to zero if management provided any type of EPS guidance for quarter t earnings prior to the earnings announcement date, and set equal to one otherwise. Anilowski et al. (2007) report that less than 2% of firms provided management forecasts in 1994, rising to 27% in 2003. Since most firms in our sample do not provide guidance (72.6% of firm-quarters), and this decision may be a stable policy that does not respond to quarter-specific events, we include the prior quarter's value of *NOGUIDE* (*PRIOR_NOGUIDE*) in the model as well. This allows the coefficient on *NOGUIDE* to capture the managerial actions of providing guidance in the prior period ($PRIOR\_NOGUIDE = 0$), but ceasing guidance in the current period ($NOGUIDE = 1$). We predict a positive relation between *NOGUIDE* and PES, but have no prediction about the relation between *PRIOR_NOGUIDE* and PES.

It is possible that the impact of ΔEPS on PES depends on whether managers provided earnings guidance about the upcoming increase in EPS or not. For instance, if the only source of information available to analysts was management earnings guidance, and managers chose to not provide such guidance in the PES quarter, then a period with a large ΔEPS would be more likely to surprise analysts. To capture this effect, we interact *NOGUIDE* with ΔEPS and predict a positive coefficient on the interaction.

We note that the decision to cease guidance is not without cost, because it is likely to damage management's relationship with analysts. Prior research has found that firms that cease earnings guidance generally have poor prior performance, more uncertain operations, and fewer informed investors (Houston et al. 2010, Chen et al. 2011). We control for the uncertainty of operations and the number of informed investors (as discussed below). We also control for good prior performance (not bad prior performance) as part of our market neglect measures. Consequently, it is unlikely that the effect of *NOGUIDE* on PES is due to one of these firm attributes.[4]

[4] We acknowledge that, quite apart from our hypothesis, it is reasonable to expect that firms that provide earnings guidance are less likely to have a PES than firms that withhold guidance. Nonetheless, the result is not mechanical; 18.4% of PES firms provide guidance. Furthermore, the correlation between *NOGUIDE* and any of the PES variables is less than 0.08. Regardless of how we interpret *NOGUIDE*, no model of PES would be complete without including a guidance variable.

We also consider whether managers of PES firms personally capitalize on their expectation of future increases in investor attention by examining their net stock purchases prior to a PES quarter. Insider trading is often interpreted as revealing management's private information about a firm's future prospects, with net purchases (sales) being associated with positive (negative) private information (Ke et al. 2003, Huddart and Ke 2007). In contrast to insider sales prior to the revelation of bad news, insider purchases prior to good news bear less litigation risk because this type of insider trading does not harm existing shareholders. Prior research finds that insider purchases enhance the credibility of qualitative voluntary disclosures (especially for firms that exhibit higher degrees of information asymmetry) and that firms with insider purchases preceding voluntary disclosures exhibit greater future abnormal returns relative to firms with no insider purchases preceding voluntary disclosures (Gu and Li 2007). If managers of PES firms truly anticipate their firm's current strong earnings performance will continue into future periods, it is rational that managers will want to benefit from the firm's upward trajectory. Thus, rather than trying to update the market's expectations of the firm's earnings in advance of the earnings announcement, managers use their private information for personal gain and increase their holdings in their firm's stock prior to a PES. The variable *INSIDER* is set equal to one if the five highest paid firm executives purchased more shares than they sold during the four weeks preceding the firm's earnings announcement, and equal to zero otherwise. We predict a positive association between *INSIDER* and PES.

2.1.3. A Caveat on the Managerial Attention Seeking Hypothesis. Because our proxies for managerial attention seeking are necessarily indirect, we acknowledge that PES may be positively related to several of our variables for reasons other than managerial attention seeking. For example, PES could be positively related to ΔEPS because the firm has a policy of not giving earnings guidance or having any other communication with the market, and so the PES occurs because the news is unusually good and the analysts were uninformed. PES could be positively associated with *NOGUIDE* because the absence of managerial guidance, for any reason, allows analyst forecasts to drift further from realized earnings. In addition, a positive relation could exist between PES and future firm fundamentals (as captured in *PRIVATE_INFO*) because earnings shocks often have a permanent component. Insiders could increase their stock holdings prior to a PES not because they know the current surprise will be large, but because they believe the firm's future fundamentals are good and the current period is the start of this good performance. Because there is no

one single test to definitively show that managers orchestrated the large positive earnings surprise, we build a body of evidence using numerous indirect proxies.

2.2. Analyst Inattention Hypothesis

It is also possible that large earnings surprises occur because analysts issue particularly poor earnings forecasts. In equilibrium, the analyst labor market should allocate the most time and talent to firms that generate the most interest in the resulting forecasts and reports, and so it is possible that large earnings surprises are associated with firms where the benefit of greater accuracy is simply too low to justify the cost. Alford and Berger (1999) find that analyst forecast accuracy increases with the firm's trading volume (and thus trading commissions), and Lang and Lundholm (1996) find that forecast accuracy increases as the cost of collecting firm-specific information declines. These findings are consistent with analysts rationally trading off the costs and benefits of expending effort on forecast accuracy. Thus, analysts may be less concerned with forecast accuracy for neglected firms with little investor attention, exactly the types of firms we posit are more likely to experience extreme positive earnings surprises.

We use six variables to capture different aspects of analyst inattention—four relate to analyst characteristics and two relate to forecast properties. First, we capture the aggregate supply of analyst effort using the number of analysts issuing forecasts for firm j (*AN_FOLLOW*) in period t. We expect a negative relation between *AN_FOLLOW* and PES. We also measure how thinly analysts spread their attention with *AN_BUSY*, defined as the average number of firms covered by each analyst following firm j in period t. We expect a positive relation between *AN_BUSY* and PES. Because prior research has found that more experienced analysts issue more accurate forecasts (Ramnath et al. 2008), we predict that analyst experience (*AN_EXP*) will be negatively associated with PES. We measure *AN_EXP* as the average number of years the analysts following firm j have been providing earnings forecasts per the Institutional Brokers' Estimate System (I/B/E/S) as of period t. Our fourth characteristic captures the average economic importance of firm j to analyst k; *AN_ECON_IMP* is measured as the market capitalization of firm j relative to the market capitalization of all other firms covered by analyst k during the same quarter, averaged over all analysts that cover firm j. We predict a negative relation between *AN_ECON_IMP* and PES.

Our fifth and sixth analyst inattention variables relate to properties of the consensus forecast. The variable *AN_STALE* measures how stale the forecasts are; the greater the time between the analyst forecasts and earnings announcement dates, the greater the chance that new information is not incorporated into the consensus forecast and the forecast deviates from realized earnings. We expect a positive association between *AN_STALE* and PES.[5] Finally, we use analyst forecast dispersion (*AN_DISPERSION*) as a measure of analyst uncertainty (e.g., Barron et al. 1998, Burgstahler and Chuk 2010). We expect a positive association between *AN_DISPERSION* and PES.

2.3. The Null Hypothesis

The null hypothesis for our managerial attention seeking and analyst inattention hypotheses is that managers did not know a PES was developing until it was too late to communicate the news, or that analysts knew the surprise was coming but failed to update their forecasts. The purpose of the control variables is to hold constant forces beyond those that we have hypothesized, and this includes proxies for the likelihood that management did not know a large surprise was coming or the possibility that analysts knew the upcoming surprise but did not updates their forecasts. To do so, we use five control variables to hold constant firms' operational volatility and general information environment. We think it unlikely that an analyst would knowingly make an extremely inaccurate forecast, but it is possible that the lag between when they issue the forecast and when I/B/E/S computes the consensus could make them appear inattentive. As discussed earlier, we include the lag between the consensus date and the earnings realization (*AN_STALE*) in the list of analyst variables, but we acknowledge that this variable could alternatively be viewed as a control variable.

First, firms with volatile operations are more likely to find themselves in the extremes of a distribution of earnings surprises. We measure operating volatility with *ROA_VOLATILITY*, computed as the standard deviation of quarterly ROA in quarters $t-4$ through $t-1$. Second, special items also capture operating uncertainty and may make it difficult for analysts to forecast EPS. Although I/B/E/S aligns its consensus forecast and reported actual earnings to include or exclude the same nonoperating items, firms still have the ability to hide certain operating expenses inside a large special item (McVay 2006).[6] To control for

[5] Although we view this measure as a proxy for analyst inattention, we acknowledge that *AN_STALE* is also driven by the lag between when analysts contribute their forecasts to I/B/E/S and when I/B/E/S calculates the consensus forecast for a firm. For the historical file, the consensus is calculated on the Thursday preceding the third Friday of each month (Thomson Reuters 2010). For this reason, *AN_STALE* could also capture cases when PES is based on stale information.

[6] It is highly unlikely that an earning surprise is due to an inconsistent classification of special items between the forecasts and the I/B/E/S actual earnings. I/B/E/S is extremely careful to align all the analyst

this possibility, we include an indicator variable for large special items (*SPEC_ITEMS*). Third, firms with high operating leverage (i.e., high fixed costs as a percentage of total costs) are inherently difficult to forecast because most of these firms' profit (or lack thereof) is realized in the last few days of each quarter. For these firms, it is possible that neither managers nor analysts knew much about the earnings for the quarter until immediately before the earnings announcement. Following Darrat and Mukherjee (1995), we measure operating leverage (*OP_LEV*) as the slope coefficient from regressing the change in earnings before interest and taxes on the change in sales revenues, estimated via rolling regressions using data from quarters $t-20$ through $t-1$. We predict a positive relation between PES and all three control variables.

To control for the firm's information environment, we include the percentage of shares owned by institutional investors (*INST_OWN*) and the natural log of a firm's market capitalization (*SIZE*). Because lower values of both variables suggest a weaker information environment, we expect both *INST_OWN* and *SIZE* to be negatively correlated with PES. Finally, we include industry fixed effects to control for industry differences in operating volatility and information environments, and we include calendar quarter fixed effects to control for period-specific shocks that may give rise to extreme positive earnings surprises.

3. Descriptive Statistics

3.1. Defining an Extreme PES

We construct three measures of extreme positive earnings surprises, each with different strengths and weaknesses. Our primary measure, *PES*1, is constructed by ranking firm-quarter observations by quarterly earnings surprise (*SURP*) in each calendar quarter and setting a binary indicator equal to one for firm-quarter observations in the top calendar-quarter *SURP* decile and equal to zero otherwise. We define *SURP* as the I/B/E/S realized EPS less the I/B/E/S analyst consensus EPS forecast for a firm-quarter, scaled by a firm's end of quarter stock price per share.[7] We use I/B/E/S realized EPS values unadjusted for subsequent stock splits because this database provides the EPS that was actually reported in the company's earnings announcement and because prior research finds that using split-adjusted data can potentially distort both time-series and cross-sectional characteristics of earnings surprises (Baber and Kang 2002, Payne and Thomas 2003).[8] The I/B/E/S analyst consensus EPS forecast is the most recent median forecast preceding the firm's earnings announcement date. In the top decile of quarterly earnings surprises, the median earnings realization is 13¢ per share, whereas the median analyst expectation is 4¢ per share (untabulated). Defining *PES*1 by calendar quarter as opposed to pooling the entire sample controls for changes in macroeconomic conditions that might affect firms' propensity to generate a positive extreme earnings surprise.

Two limitations of *PES*1 are that (1) there is always a top decile of earnings surprise, regardless of earnings surprise magnitude, and (2) the absolute cutoff value for a positive extreme earnings surprise varies from quarter to quarter. If managers are trying to surprise the market with large positive earnings news, an earnings surprise value that changes every quarter and is dependent upon all other firms' earnings surprise values may present an uncertain target. We address these limitations by constructing a PES definition with an absolute cutoff value. *PES*2 is a binary variable set equal to one when *SURP* is greater than or equal to 0.5% of stock price, and equal to zero otherwise. Finally, to ensure the positive earnings surprise is truly large, we create *PES*3, a binary variable set equal to one if a firm is both in the highest *SURP* decile by calendar quarter *and* the earnings surprise is at least 50% of the absolute value of forecasted earnings, and equal to zero otherwise. This definition ensures the surprise is economically significant and genuinely surprising. The mean *SURP* value for PES observations using any of the three PES definitions is approximately 1.3% of stock price (untabulated).

3.2. Sample Composition and Descriptive Statistics

Our sample consists of 72,118 firm-quarter observations from January 1998 through September 2007, with calendar-quarter year-ends (e.g., March, June, September, and December) and nonmissing values for the variables included in our analysis. We begin our analysis in January 1998 because we require manager

forecasts composing the consensus on what items will be included or excluded from the forecast, and if necessary it adjusts the company's reported earnings ex post to be on the same basis as the forecasts. See Doyle et al. (2013) and Thomson Reuters (2010) for an extended discussion of the I/B/E/S process.

[7] Note that this is the same definition commonly used in the literature to describe an "analyst forecast error."

[8] Our confidence in the assertion that the I/B/E/S actual EPS unadjusted for subsequent stock splits is the value market participants observe is based on findings in Doyle et al. (2006, 2013). Doyle et al. (2006) compare the earliest available I/B/E/S actual EPS in the unsplit-adjusted database with the actual press release found through LexisNexis for each of 50 firms and find that the data from the two sources match in all 50 cases. In addition, Doyle et al. (2013) match 1,000 randomly selected quarterly observations from 1997 through 2000 from the I/B/E/S unsplit-adjusted database to the press release issued by firms via a LexisNexis search and find that the I/B/E/S data correspond perfectly with the press releases in 915 cases. Given this high level of documented accuracy, we do not believe that large systematic errors in the I/B/E/S actual EPS value have a material impact on our results.

Table 1 Incentives for a Positive Extreme Earnings Surprise—Descriptive Statistics

				Mean values		
Variable	Mean	S.D.	P50	*PES*1 = 1 (*N* = 6,915)	Pred. diff.	*PES*1 = 0 (*N* = 65,203)
SURP	−0.001	0.01	0.00	0.01	>***	−0.002
SURP_UNSCALED	0.01	0.11	0.01	0.15	>***	−0.01
NOGUIDE	0.73	0.45	1.00	0.82	>***	0.72
PRIOR_NOGUIDE	0.73	0.45	1.00	0.79	>***	0.72
ΔEPS	0.002	0.27	0.01	0.15	>***	−0.01
PRIVATE_INFO	−0.001	0.04	0.00	0.01	>***	−0.002
*MKT_NEGLECT*1	0.20	0.40	0.00	0.30	>***	0.19
*MKT_NEGLECT*2	0.21	0.41	0.00	0.20	>	0.21
FIN_NEEDS	0.32	0.47	0.00	0.32	>	0.32
INSIDER	0.12	0.32	0.00	0.11	>	0.12
AN_FOLLOW	6.89	5.70	5.00	4.60	<***	7.14
AN_BUSY	13.50	5.28	12.60	13.23	>	13.53
AN_EXP	6.12	2.61	5.94	6.05	<***	6.13
AN_ECON_IMP	0.13	0.15	0.08	0.09	<***	0.14
AN_STALE	15.98	12.62	13.00	16.80	>***	15.89
AN_DISPERSION	0.03	0.04	0.01	0.04	>***	0.02
ROA_VOLATILITY	0.02	0.02	0.01	0.03	>***	0.01
OP_LEV	0.30	0.31	0.23	0.32	>***	0.30
SPEC_ITEMS	0.08	0.27	0.00	0.12	>***	0.08
INST_OWN	0.57	0.26	0.60	0.49	<***	0.58
SIZE	6.65	1.69	6.52	5.70	<***	6.75

Notes. Our sample consists of 72,118 firm-quarter observations with nonmissing values for the variables included in Equation (1). All variables are defined in the appendix, and continuous variables are winsorized at the 1st and 99th percentiles by year. Pred. diff., predicted difference.

***The variable mean is significantly different between the two groups at the 1% level in the predicted direction using two-tailed *t*-test (one-tailed for directional predictions).

earnings guidance data from the Thomson First Call's Company Issued Guidance database. Although this database begins in 1993, prior research finds these data are not reliable until after 1997 (Chuk et al. 2013). We end our analysis in the third quarter of 2007, before the financial crisis began in December of 2007,[9] as the financial crisis had a material impact on firms' earnings and analysts' earnings forecasts. All continuous variables are winsorized at the 1st and 99th percentiles each year. All variables are defined in detail in the appendix.

Table 1 presents descriptive statistics for the pooled sample and a *t*-test of differences between mean values for the *PES*1 = 1 (*N* = 6,915) and *PES*1 = 0 (*N* = 65,203) firm-years. The *PES*1 = 1 subsample comprises 9.6% of our sample; this percentage is slightly different from 10% due to observations with the same *SURP* values being sorted into the same decile bin. For the full sample, the mean and median unscaled earnings surprise (*SURP_UNSCALED*) is $0.01 per share, with an interquartile range of −$0.01 to $0.04 per share (untabulated), compared to a mean $0.15 per share for *PES*1 = 1 firm-quarters. The statistics for the full sample essentially describe the population of firms with analyst following; there is no management earnings guidance for 72.6% of the firm-quarters, and firms are followed by an average of 6.9 analysts and owned primarily by institutional investors (57.3%).

[9] See http://www.nber.org/cycles/cyclesmain.html (last accessed December 7, 2015).

The last three columns in Table 1 report mean values and *t*-tests of differences in means between *PES*1 = 1 and *PES*1 = 0 observations. The differences in means are broadly consistent with our predictions. Specifically, firm-quarter observations in the *PES*1 = 1 subsample are more likely to have managers who do not provide earnings guidance and expect their firm's positive performance to continue into the future (*PRIVATE_INFO*). PES firms have a larger increase in earnings per share relative to the prior quarter than non-PES firms, and are more likely to be neglected by the market based on our first neglect measure.

Turning to our analyst variables, we find that *PES*1 = 1 firms are followed by fewer analysts with less experience and whose earnings forecasts are older and have greater dispersion. The *PES*1 = 1 observations represent a smaller share of the analyst's value-weighted portfolio relative to non-PES observations (*AN_ECON_IMP*). Firm operating volatility and information environment control variables also indicate that PES observations have higher ROA volatility, more operating leverage, more frequent large special items, lower market capitalizations, and lower institutional ownership.

Table 2 provides Pearson and Spearman correlation coefficients. We note that the three PES specifications are highly correlated. In addition, *NOGUIDE* and *PRIOR_NOGUIDE* are correlated at 0.46, suggesting that earnings guidance is a relatively stable but not perfectly constant firm decision. The correlations between

Table 2 Incentives for a Positive Extreme Earnings Surprise—Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 *PES*1	—	0.93	0.67	−0.11	0.07	0.04	0.21	0.10	0.09	−0.01	0.00	−0.01	−0.16	−0.01	−0.02	−0.15	0.01	0.05	0.17	0.01	0.05	−0.10	−0.18
2 *PES*2	0.93	—	0.64	−0.11	0.06	0.04	0.21	0.10	0.09	−0.01	0.00	−0.01	−0.16	−0.02	−0.03	−0.14	0.01	0.04	0.17	0.01	0.05	−0.10	−0.19
3 *PES*3	0.67	0.64	—	−0.07	0.04	0.02	0.16	0.11	0.07	−0.02	−0.02	−0.00	−0.13	−0.03	−0.02	−0.10	0.02	−0.01	0.12	−0.00	0.04	−0.06	−0.14
4 *NES*1	−0.11	−0.11	−0.07	—	0.05	0.06	−0.23	−0.20	−0.04	−0.05	−0.01	−0.02	−0.20	−0.05	−0.03	−0.15	0.08	0.03	0.16	−0.01	0.11	−0.13	−0.23
5 *NOGUIDE*	0.07	0.06	0.04	0.05	—	0.46	0.05	0.03	0.02	−0.11	0.19	−0.02	−0.19	0.13	−0.08	−0.11	0.03	0.06	−0.05	0.14	−0.06	−0.21	−0.13
6 *PRIOR_NOGUIDE*	0.04	0.04	0.02	0.06	0.46	—	0.01	0.02	0.01	−0.11	0.18	−0.01	−0.18	0.13	−0.08	−0.10	0.05	0.03	−0.06	0.14	−0.03	−0.21	−0.12
7 Δ*EPS*	0.18	0.18	0.12	−0.19	0.04	0.00	—	0.19	0.08	−0.05	0.01	0.00	0.03	0.01	0.01	0.01	−0.01	0.02	0.01	−0.01	−0.04	0.03	0.03
8 *PRIVATE_INFO*	0.08	0.08	0.09	−0.16	0.02	0.02	0.11	—	0.41	−0.07	−0.01	0.01	0.04	0.01	0.01	0.04	−0.01	−0.04	0.01	−0.01	−0.17	0.06	0.07
9 *MKT_NEGLECT*1	0.09	0.09	0.07	−0.04	0.02	0.01	0.07	0.25	—	0.17	0.02	0.00	0.01	0.04	0.02	−0.05	0.00	−0.01	0.01	0.01	−0.05	−0.02	0.00
10 *MKT_NEGLECT*2	−0.01	−0.01	−0.02	−0.05	−0.11	−0.11	−0.02	−0.04	0.17	—	−0.05	0.00	0.17	0.00	0.04	0.04	−0.02	0.00	−0.04	0.01	0.02	0.12	0.10
11 *FIN_NEEDS*	0.00	0.00	−0.02	−0.01	0.19	0.18	0.00	0.01	0.02	−0.05	—	0.05	−0.06	0.37	−0.06	−0.12	0.04	0.06	−0.40	0.31	−0.12	−0.22	0.01
12 *INSIDER*	−0.01	−0.01	−0.00	−0.02	−0.02	−0.01	0.00	0.01	0.00	0.00	0.05	—	0.04	0.05	0.03	0.02	0.00	0.03	−0.06	0.01	−0.01	0.02	0.07
13 *AN_FOLLOW*	−0.13	−0.13	−0.10	−0.17	−0.17	−0.15	0.01	0.02	0.02	0.16	−0.04	0.04	—	0.04	0.16	0.44	−0.07	0.34	−0.08	−0.04	0.00	0.45	0.71
14 *AN_BUSY*	−0.02	−0.02	−0.03	−0.05	0.14	0.14	0.00	0.01	0.04	−0.02	0.38	0.04	−0.03	—	0.21	−0.36	−0.01	0.12	−0.31	0.24	−0.09	−0.05	0.12
15 *AN_EXP*	−0.01	−0.01	−0.01	−0.01	−0.06	−0.06	0.00	0.01	0.02	0.03	−0.06	0.02	0.08	0.17	—	−0.05	−0.03	0.13	−0.05	−0.14	−0.01	0.18	0.25
16 *AN_ECON_IMP*	−0.09	−0.09	−0.06	−0.09	−0.08	−0.06	0.00	0.01	−0.04	0.01	−0.11	0.01	0.32	−0.35	−0.08	—	−0.02	0.11	−0.02	−0.10	−0.01	0.22	0.54
17 *AN_STALE*	0.02	0.02	0.02	0.09	0.03	0.05	0.00	0.00	0.00	−0.03	0.06	0.00	−0.07	0.00	−0.04	0.02	—	−0.02	0.01	0.02	0.00	−0.08	−0.05
18 *AN_DISPERSION*	0.11	0.10	0.03	0.12	0.08	0.06	−0.02	−0.04	−0.01	−0.03	0.10	0.01	0.11	0.07	0.07	−0.01	−0.04	—	0.07	−0.01	0.02	0.21	0.29
19 *ROA_VOLATILITY*	0.15	0.16	0.10	0.12	0.01	0.00	0.01	0.08	0.03	−0.04	−0.18	−0.04	−0.08	−0.17	−0.07	−0.03	0.02	0.03	—	−0.14	0.17	0.02	−0.19
20 *OP_LEV*	0.02	0.01	−0.00	−0.01	0.13	0.13	0.00	0.00	0.01	0.00	0.27	0.01	−0.01	0.21	−0.10	−0.07	0.04	0.03	−0.01	—	−0.03	−0.13	−0.05
21 *SPEC_ITEMS*	0.05	0.05	0.04	0.11	−0.06	−0.03	−0.03	−0.17	−0.05	0.02	−0.12	−0.01	0.00	−0.09	−0.01	0.00	0.00	0.03	0.14	−0.03	—	0.00	−0.05
22 *INST_OWN*	−0.10	−0.10	−0.06	−0.13	−0.21	−0.21	0.01	0.03	−0.02	0.12	−0.22	0.02	0.38	−0.13	0.15	0.07	−0.10	0.13	−0.08	−0.11	0.00	—	0.44
23 *SIZE*	−0.18	−0.19	−0.14	−0.23	−0.13	−0.12	0.01	0.03	0.00	0.11	0.01	0.07	0.71	0.06	0.19	0.43	−0.06	0.16	−0.19	−0.03	−0.05	0.41	—

Notes. Our sample consists of 72,118 firm-quarter observations with nonmissing values for the variables included in Equation (1). All variables are defined in the appendix, and continuous variables are winsorized at the 1st and 99th percentiles by year. Correlations significant at the 5% level or better are in bold.

the PES measures and the other variables are generally consistent with the *t*-tests above.[10]

We examine how PES firm-quarters are distributed across industries (untabulated). Using the Fama and French (1997) 48 industry classification, the percentage of $PES1 = 1$ observations relative to total observations within an industry ranges from 1.9% to 21.6%. Many industries with a low percentage of PES observations are low-beta industries that generate predictable financial results, for example, printing and publishing, candy and soda, and tobacco products. In contrast, PES observations represent more than 20% of the firm-period observations in construction and real estate—industries that have unpredictable earnings streams heavily dependent upon macroeconomic factors. The wide range of frequencies of PES observations by industry highlights the importance of including industry fixed effects.

4. Predicting Extreme Positive Earnings Surprises

4.1. Univariate Difference-in-Difference Tests

Before our main analysis, we first present simple univariate differences in differences to examine whether our manager and analyst variables differed in the PES quarter relative to the prior quarter, and if the change differed between the PES and non-PES observations. This analysis holds stationary many firm and information environment factors, allowing us to see whether something changed for the PES firms in quarter t. For variables based only on quarter t data, the prior period is quarter $t-1$. For variables that incorporate prior quarter data (e.g., *MKT_NEGLECT*1 incorporates data from $t-5$ to $t-1$), the prior period is quarter $t-5$.

The results of the difference-in-difference *t*-tests are presented in Table 3. Because all earnings surprises for PES firms in quarter t are positive (by construction), we compute the absolute value of the surprise ($|SURP|$) to compare the change in earnings surprise from $t-1$ to t between PES and non-PES firms. The first row shows that PES firms experienced significantly larger absolute values of earnings surprises in quarter t than in quarter $t-1$, and the increase was significantly greater than non-PES firms. This result confirms that the earning surprises for the PES firms in quarter t were indeed surprising.

Turning to our manager attention seeking variables, we find that the frequency of managerial

[10] We note several pairwise correlations greater than |0.30| (e.g., *AN_ECON_IMP* and *AN_FOLLOW*, *INST_OWN* and *SIZE*), suggesting that multicollinearity may be an issue later when we estimate our logit model. However, the variance inflation factor value for each independent variable in Equation (1) is less than 4.0 (untabulated), well under the general rule of thumb factor of 20.0 given by Belsley et al. (1980).

Table 3 Variables Predicting a Positive Extreme Earnings Surprise—Univariate Difference-in-Difference Tests (Prior to Current Period Change)

		$PES1_t = 1$			$PES1_t = 0$			$PES1_t = 1$ vs. $PES1_t = 0$	
Variable	Δ period	*N*	Pred.	Mean Δ	*N*	Pred.	Mean Δ	Pred.	Diff.-in-diff.
|*SURP*|	$t-1$ to t	6,915	+	0.002***	65,203	?	0.00***	+	0.002***
NOGUIDE	$t-1$ to t	6,915	+	0.03***	65,203	?	−0.004**	+	0.03***
Δ*EPS*	$t-5$ to t	3,747	+	0.01	40,871	?	0.004***	+	0.002
PRIVATE_INFO	$t-5$ to t	4,216	+	0.01***	44,689	?	−0.001***	+	0.01***
*MKT_NEGLECT*1	$t-5$ to t	4,216	+	0.09***	44,689	?	0.01**	+	0.08***
*MKT_NEGLECT*2	$t-5$ to t	4,216	+	0.11***	44,689	?	0.11***	+	0.001
FIN_NEEDS	$t-1$ to t	6,915	+	0.001	65,203	?	−0.001	+	0.002
INSIDER	$t-1$ to t	6,915	+	0.001	65,203	?	−0.001	+	0.002
AN_FOLLOW	$t-1$ to t	6,915	−	−0.06***	65,203	?	0.09***	−	−0.16***
AN_BUSY	$t-1$ to t	6,915	+	0.07**	65,203	?	0.06***	+	0.005
AN_EXP	$t-1$ to t	6,915	−	0.05	65,203	?	0.05***	−	−0.004
AN_ECON_IMP	$t-1$ to t	6,915	−	−0.005***	65,203	?	−0.002***	−	−0.003***
AN_STALE	$t-1$ to t	6,915	+	0.68***	65,203	?	0.26***	+	0.42**
AN_DISPERSION	$t-1$ to t	6,915	+	0.001**	65,203	?	0.00**	+	0.001**

Notes. All variables are defined in the appendix, and continuous variables are winsorized at the 1st and 99th percentiles by year. The number of observations for Δ*EPS* is smaller relative to other variables measured from $t-5$ to t because Δ*EPS* requires data from $t-6$. Pred., prediction.

**Significantly different from zero at the 5% level; ***significantly different from zero at the 1% level (using a two-tailed *t*-test; one-tailed for directional predictions).

guidance decreased for the PES observations (*NOGUIDE* increased), whereas the frequency of guidance marginally decreased over the same period for the non-PES firms (*NOGUIDE* decreased). The difference in differences is 3% and significant. PES firms also had unusually good news in quarter t—the Δ*EPS* is significantly higher than for the same quarterly change a year earlier—and the non-PES observations saw a small decrease in Δ*EPS* over the same period. Similarly, the manager's *PRIVATE_INFO* about future performance improvements is significantly better in period t than it was a year earlier; the same measure decreased marginally for the non-PES firms. The frequency of market neglect as measured by *MKT_NEGLECT*1 increased 9% for the PES firms, significantly more than the small increase seen for the non-PES firms. However, we find no significant difference in differences for *MKT_NEGLECT*2, *FIN_NEEDS*, or *INSIDER*. These results do not directly control for the firm's information environment and operational volatility (beyond the controls offered by a difference-in-differences design). However, they are consistent with managers of neglected firms, who have good current and expected future performance, intentionally allowing the PES to occur.

Our analyst variables also experienced changes consistent with less attention in quarter t relative to $t-1$. Analyst following decreased from quarter $t-1$ to quarter t for PES observations, but increased for non-PES observations over the same period; the changes, and difference between the two changes, are small but significant. As analysts following PES firms became significantly busier and more experienced in period t, analysts following non-PES firms became similarly busy and more experienced, with no significant difference in differences. We also find that PES firms became a less economically important component of their analysts' portfolio in quarter t, and this decline in economic importance was significantly greater than that experienced by non-PES firms. Finally, we find that analyst forecast staleness and dispersion increased from quarter $t-1$ to quarter t for the PES firms, and significantly more than the increase seen for the non-PES firms. As with the managerial attention seeking results, these results do not control for the firm's information environment or operating volatility, but they are suggestive of analyst inattention contributing to the earnings surprise.

4.2. Multivariate Results

To test our hypotheses, we estimate the following logit regression (firm j and period t subscripts omitted):

$$\begin{aligned} &PES1 \text{ (or } PES2 \text{ or } PES3) \\ &= \alpha + \beta_1 NOGUIDE + \beta_2 PRIOR\_NOGUIDE \\ &\quad + \beta_3 \Delta EPS \times NOGUIDE + \beta_4 \Delta EPS + \beta_5 PRIVATE\_INFO \\ &\quad + \beta_6 MKT\_NEGLECT1 + \beta_7 MKT\_NEGLECT2 \\ &\quad + \beta_8 FIN\_NEEDS + \beta_9 INSIDER + \beta_{10} AN\_FOLLOW \\ &\quad + \beta_{11} AN\_BUSY + \beta_{12} AN\_EXP + \beta_{13} AN\_ECON\_IMP \\ &\quad + \beta_{14} AN\_STALE + \beta_{15} AN\_DISPERSION \\ &\quad + \beta_{16} ROA\_VOLATILITY + \beta_{17} OP\_LEV \\ &\quad + \beta_{18} SPEC\_ITEMS + \beta_{19} INST\_OWN + \beta_{20} SIZE \\ &\quad + \sum_{t=1}^{39} QTR_t + \sum_{h=1}^{48} IND_h + \varepsilon. \end{aligned} \tag{1}$$

The model includes seven variables (plus one lagged value and one interaction specification) that serve as proxies for managerial incentives to attract attention,

six variables that serve as proxies for analyst inattention, and five variables that control for a firm's operating volatility and information environment. We include calendar-quarter and industry fixed effects (*QTR* and *IND*, respectively) to control for unforeseen economywide shocks and industry differences that could contribute to a positive extreme earnings surprise. Standard errors are clustered by firm and calendar quarter to correct for time-series and cross-sectional correlation in the Equation (1) residuals (Petersen 2009).

We report the results from estimating Equation (1) in panel A of Table 4. The dependent variables are *PES*1, *PES*2, and *PES*3 in columns (1)–(3), respectively. To assess the size of each variable's marginal effect on *PES*1, for column (1) we report the odds ratio of a one-standard deviation change in a continuous variable or a one unit change in an indicator variable; the untabulated odds ratios for the other PES measures are qualitatively similar. An odds ratio of one means the variable has no effect on the probability of observing a PES; the greater the deviation from one (in either direction), the more the variable changes the odds.[11] All seven of the managerial attention seeking variables are significant in at least two of the three columns. The probability that a firm will experience a PES is significantly higher if the firm does not provide earnings guidance (*NOGUIDE*), if the firm's stock has been neglected by the market (*MKT_NEGLECT*1 and *MKT_NEGLECT*2), if the firm needs external financing (*FIN_NEEDS*), and if insiders are net purchasers of the stock prior to the earnings announcement (*INSIDER*). The probability of PES also increases with the change in EPS (Δ*EPS*) and the difference between future and past performance (*PRIVATE_INFO*). Of the variables intended to capture why management might want a PES in this particular quarter (as discussed in §2.1.1), Δ*EPS*, *PRIVATE_INFO*, and *MKT_NEGLECT*1 have the largest *t*-statistics and odds ratios. We caution again that if management does not know Δ*EPS*, this variable would more rightly be classified as a control. One of the highest odds ratios is for *MKT_ NEGLECT*1. After controlling for all the other variables in the model, the odds of $PES1 = 1$ are 1.51 higher when this variable indicates that the firm is neglected versus when it is not. Both of the variables intended to capture managerial actions (as discussed in §2.1.2) are significant. The significant results for *NOGUIDE* are particularly interesting because they are incremental to *PRIOR_NOGUIDE*; as such, they are likely to reflect the impact of not providing guidance in the PES quarter, rather than a consistent firm policy of no guidance. We do not find evidence that the impact of Δ*EPS* depends on *NOGUIDE*. The variable *INSIDER* is also significant across all three PES measures, although the odds ratio is not particularly large. Although we cannot directly observe managerial intent or all their communications, our results are consistent with managers of neglected firms being aware of their firm's current and future good performance and both purchasing stock during the quarter and abstaining from giving earnings guidance or communicating their information in any other way to report an extreme positive earnings surprise.

Four of the six analyst inattention variables are significant in at least two of the three columns in panel A of Table 4. A PES is more likely when fewer analysts follow the firm, the analysts who do provide forecasts are busier, and the firm is economically less important to the analyst. Analyst forecast dispersion is also higher for PES firms, and this variable has the highest odds ratio for the analyst variables; the odds of a PES are 1.33 higher when forecast dispersion (*AN_DISPERSION*) is one standard deviation higher. We find no evidence that analyst experience (*AN_EXP*) or forecast staleness (*AN_STALE*) is associated with PES. In sum, there are fewer analysts following PES firms, they are more dispersed in their forecasts, they cover a larger number of firms, and the PES firm is a smaller part of their portfolios. Although the odds ratios are modest for most of these variables, there is significant evidence that analyst inattention also contributes to the PES event.

The final five variables in the model are control variables intended to hold constant the firm's operating volatility and information environment. As expected, we find that the likelihood of observing a PES increases with the firm's past earnings volatility (*ROA_VOLATILITY*), with its operating leverage (*OP_LEV*), and when large special items (*SPEC_ITEMS*) are present. The likelihood of PES decreases with institutional ownership and firm size. In terms of marginal effects, the largest effect in the entire model comes from a one-standard-deviation increase in *SIZE*, which lowers the odds of a PES by 0.48. It is difficult for a large firm to create the information gap necessary for a PES, and they have little reason to do so, given the attention they already receive from the market.

To assess the collections of variables that measure managerial attention seeking or analyst inattention, we construct a joint odds ratio, computed as the product of the individual odds ratios (after inverting values less than one). After controlling for the other variables in Equation (1), the combined effect of increases in

[11] To illustrate the computation of the odds ratio for an indicator variable, suppose that the probability of $PES1 = 1$ given $MKT\_NEGLECT1 = 1$ is 0.30, conditional on all the other variables in the model. The odds of $PES1 = 1$ given $MKT\_NEGLECT1 = 1$ are thus $0.30 \div (1 - 0.30)$, or 0.43 to 1. Similarly, suppose the conditional probability of $PES1 = 1$ when $MKT\_NEGLECT1 = 0$ is 0.22, so that the odds of $PES1 = 1$ when $MKT\_NEGLECT1 = 0$ are $0.22 \div (1 - 0.22)$, or 0.282 to 1. The odds ratio for *MKT_NEGLECT*1 is then $0.43 \div 0.28 = 1.52$, meaning that the odds of $PES1 = 1$ are 1.52 times higher when $MKT\_NEGLECT1 = 1$ than when $MKT\_NEGLECT1 = 0$.

Table 4 Predicting a Positive Extreme Earnings Surprise—Multivariate Analyses

Panel A: Primary analyses

Variables	Pred.	(1) $Y = PES1$	Odds ratio	(2) $Y = PES2$	(3) $Y = PES3$
NOGUIDE	+	0.22***	1.25	0.22***	0.23***
		(5.10)		(4.78)	(3.53)
PRIOR_NOGUIDE	±	−0.02	0.98	−0.02	−0.09
		(−0.45)		(−0.53)	(−1.63)
NOGUIDE × Δ*EPS*	+	0.25	1.06	0.24	0.17
		(1.20)		(1.07)	(0.88)
Δ*EPS*	+	1.96***	1.70	1.99***	1.57***
		(11.22)		(10.46)	(9.16)
PRIVATE_INFO	+	3.45***	1.15	3.44***	5.58***
		(9.84)		(9.64)	(11.86)
*MKT_NEGLECT*1	+	0.41***	1.51	0.41***	0.40***
		(12.24)		(12.38)	(9.10)
*MKT_NEGLECT*2	+	0.17***	1.19	0.19***	0.01
		(3.47)		(3.70)	(0.09)
FIN_NEEDS	+	0.23***	1.26	0.24***	−0.07
		(3.60)		(3.50)	(−0.76)
INSIDER	+	0.14***	1.15	0.14***	0.18***
		(2.99)		(3.05)	(3.21)
AN_FOLLOW	−	−0.02**	0.91	−0.02**	−0.04***
		(−1.94)		(−1.92)	(−3.08)
AN_BUSY	+	0.01**	1.06	0.01*	−0.002
		(1.81)		(1.62)	(−0.34)
AN_EXP	−	0.004	1.01	0.002	0.01
		(0.49)		(0.20)	(0.61)
AN_ECON_IMP	−	−0.60***	0.92	−0.55***	−0.60***
		(−3.45)		(−3.12)	(−2.54)
AN_STALE	+	0.001	1.01	0.001	0.002**
		(0.50)		(0.39)	(1.73)
AN_DISPERSION	+	7.74***	1.33	7.87***	3.53***
		(14.41)		(13.65)	(6.69)
ROA_VOLATILITY	+	5.55***	1.14	5.37***	2.95***
		(9.15)		(9.78)	(3.61)
OP_LEV	+	0.22***	1.07	0.21***	0.12
		(2.82)		(2.53)	(1.16)
SPEC_ITEMS	+	0.38***	1.46	0.37***	0.42***
		(10.17)		(10.80)	(7.22)
INST_OWN	−	−0.70***	0.83	−0.73***	−0.39***
		(−6.39)		(−6.57)	(−2.62)
SIZE	−	−0.43***	0.48	−0.44***	−0.41***
		(−16.26)		(−17.77)	(−13.72)
Intercept	±	0.30		−0.001	−0.26
		(0.44)		(−0.00)	(−0.52)
N where $Y = 1$		6,915		6,859	3,278
Total *N*		72,118		72,118	72,118
Log pseudolikelihood		−18,460		−18,220	−11,230
Fixed effects		IND and QTR		IND and QTR	IND and QTR
SE clustered by		Firm and QTR		Firm and QTR	Firm and QTR
Pseudo-R^2		0.19		0.20	0.16

the seven variables measuring managerial attention seeking is to increase the odds of a PES by 6.36. If we exclude Δ*EPS* from the list, the joint odds ratio is 3.75. In comparison, the joint odds ratio for the four significant analyst inattention variables (*AN_FOLLOW, AN_ECON_IMP, AN_BUSY*, and *AN_DISPERSION*) is only 1.69, with most of the contribution coming from forecast dispersion. Finally, after controlling for the manager and analyst variables, the five control variables have a joint odds ratio of 4.46, highlighting the importance of controlling for the firm's operating volatility and information environment. Collectively, the joint odds ratio for all the independent variables is 47.98; a one unit (standard deviation) change in the binary (continuous) independent variables increases the odds of a PES by nearly 50-fold.

Table 4 (Continued)

Panel B: Supplemental analyses

Variables	Pred.	(1) $Y = PES1$	Odds ratio	(2) $Y = PES2$	(3) $Y = PES3$
ΔREV	+	0.20***	1.50	0.18***	0.04
		(5.33)		(4.55)	(0.65)
$\Delta OPEXP$	−	−0.19***	0.72	−0.16***	−0.07
		(−4.27)		(−3.48)	(−1.11)
PE_RANK	−	−0.83***	0.77	−0.79***	0.16
		(−9.81)		(−8.98)	(1.56)
NOGUIDE	+	0.21***	1.23	0.21***	0.23***
		(3.68)		(3.44)	(2.83)
PRIOR_NOGUIDE	±	−0.11**	0.89	−0.13***	−0.17**
		(−2.32)		(−2.67)	(−2.08)
$NOGUIDE \times \Delta EPS$	+	−0.03	0.99	−0.05	−0.02
		(−0.17)		(−0.22)	(−0.08)
ΔEPS	+	1.76***	1.68	1.78***	1.18***
		(10.72)		(9.79)	(5.71)
PRIVATE_INFO	+	6.36***	1.23	6.30***	5.14***
		(7.10)		(6.67)	(4.94)
*MKT_NEGLECT*1	+	0.50***	1.65	0.50***	0.48***
		(11.17)		(10.40)	(7.71)
*MKT_NEGLECT*2	+	0.05	1.05	0.07	−0.01
		(0.69)		(1.02)	(−0.14)
FIN_NEEDS	+	0.07	1.08	0.07	0.15
		(0.84)		(0.78)	(1.10)
INSIDER	+	0.19***	1.21	0.19***	0.21***
		(2.95)		(3.16)	(2.83)
AN_FOLLOW	−	−0.04***	0.81	−0.04***	−0.06***
		(−3.36)		(−3.45)	(−3.93)
AN_BUSY	+	0.01**	1.07	0.01**	−0.002
		(1.96)		(1.74)	(−0.21)
AN_EXP	−	0.003	1.01	−0.00	−0.01
		(0.27)		(−0.02)	(−0.39)
AN_ECON_IMP	−	−0.35*	0.95	−0.31*	−0.43*
		(−1.64)		(−1.43)	(−1.51)
AN_STALE	+	0.01***	1.06	0.01***	0.01***
		(2.92)		(2.65)	(4.10)
AN_DISPERSION	+	7.52***	1.32	7.68***	5.11***
		(12.78)		(12.06)	(6.68)
ROA_VOLATILITY	+	8.28***	1.14	8.69***	7.00***
		(6.39)		(6.56)	(4.76)
OP_LEV	+	0.30**	1.09	0.28**	0.17
		(2.53)		(2.28)	(1.06)
SPEC_ITEMS	+	0.61***	1.83	0.60***	0.65***
		(7.17)		(6.87)	(5.56)
INST_OWN	−	−0.51***	0.88	−0.53***	−0.49***
		(−4.02)		(−3.85)	(−2.49)
SIZE	−	−0.39***	0.53	−0.39***	−0.43***
		(−12.29)		(−12.09)	(−10.55)
Intercept	±	0.54		0.08	−0.46
		(0.94)		(0.18)	(−1.04)
N where $Y = 1$		3,279		3,181	1,593
Total *N*		47,323		47,323	47,323
Log pseudolikelihood		−9,785		−9,568	−6,034
Fixed effects		IND and QTR		IND and QTR	IND and QTR
SE clustered by		Firm and QTR		Firm and QTR	Firm and QTR
Pseudo-R^2		0.18		0.18	0.13

Notes. All variables are defined in the appendix, and continuous variables are winsorized at the 1st and 99th percentiles by year. Pred., prediction.

*Significantly different from zero at the 10% level; **significantly different from zero at the 5% level; ***significantly different from zero at the 1% level (using a two-tailed *z*-test; one-tailed for directional predictions).

The results in columns (2) and (3) of panel A of Table 4 generally mirror the results in column (1), indicating that any of the definitions of an extreme positive earnings surprise are successful in identifying extreme events. The results for *PES*2 are virtually identical to the results for *PES*1, both in terms of coefficient estimates and significance levels. PES3 reclassifies just over half of the $PES1 = 1$ observations as $PES3 = 0$. This change renders *MKT_NEGLECT*2, *FIN_NEEDS*, *AN_BUSY*, and *OP_LEV* insignificant, but noticeably increases the coefficient on *PRIVATE_INFO* and decreases the coefficient on *AN_FOLLOW*. The *PES*3 model also has a lower pseudo-R^2 than the other two models. Nonetheless, all three models provide significant evidence in support of both the managerial attention seeking hypothesis and the analyst inattention hypothesis.

4.3. Supplemental Analyses

We consider three additional variables that measure managerial incentives to allow a PES to occur. These analyses are supplemental because data requirements reduce our sample size by 34%. We first examine whether the PES is due to increases in revenues or decreases in expenses. We conjecture that a large positive earnings surprise driven by revenue growth is more eye catching to analysts and investors than an earnings surprise driven by cost-cutting measures. As one investment adviser notes in his quarterly letter to clients:

> There are two ways we can see a company grow its bottom line. One is through cost cutting…[but] the problem with these types of gains is they are not sustainable. …After a certain point, companies will have wrung all the gains from cost cutting that are available. The only way net income rises after that is from gains in revenues, [which is] a much more sustainable model for growth. (Myers 2010)

Although it is possible that both revenue growth and expense reductions explain the change in EPS, we expect revenue growth to play a greater role in explaining PES relative to expense reductions. We measure revenue growth (ΔREV) and expense growth ($\Delta OPEXP$) as the seasonal quarterly per-share changes in revenues and operating expenses, respectively. We expect ΔREV ($\Delta OPEXP$) to be positively (negatively) related to PES.

We also consider the decile-ranked value of a firm's industry-adjusted price-to-earnings ratio (*PE_RANK*) as an additional attention proxy. Managers care a great deal about "the multiple" investors use to value their firm's earnings (Liu et al. 2002), and it is plausible that managers with a low multiple feel neglected by the market. Lower values indicate the market places less weight on each dollar of income a firm generates, and we predict a negative relation between *PE_RANK* and PES. Because negative price-to-earnings ratios are not meaningful, we drop firms with cumulative losses in the prior four quarters. By eliminating loss firms, which accounts for the 34% sample size reduction, the sample in these supplemental tests is not directly comparable to the sample in our main tests (as given in panel A of Table 4).

Panel B of Table 4 shows the results from reestimating Equation (1) after adding these three variables. Using the *PES*1 and *PES*2 definitions, we find that the likelihood of a PES increases with the change in revenue and decreases with the change in expense. However, the coefficients on ΔREV and $\Delta OPEXP$ are of roughly the same magnitude ($p > 0.10$, untabulated), which is not consistent with revenue increases being more predictive of PES than expense decreases. Although both variables have odds ratios far from one, the distinction between revenue changes and expense changes does not appear particularly relevant.

We also find that a firm's industry-adjusted price-to-earnings ratio is negatively associated with *PES*1 and *PES*2, adding more evidence that neglected firms are more likely to experience an extreme positive earnings surprise. It appears that *PE_RANK* and *MKT_NEGLECT*2 capture similar aspects of investor underappreciation, because *MKT_NEGLECT*2 is insignificant when *PE_RANK* is included in the model. Reestimating column (1) after omitting *PE_RANK* in this supplemental sample (which excludes loss firms) yields a positive and significant *MKT_NEGLECT*2 coefficient ($p < 0.10$; untabulated). None of the three new variables are significant in the *PES*3 model. We note that the more stringent *PES*3 definition, combined with the new data requirements in panel B, leaves only 3.4% of the sample coded as $PES3 = 1$. The results for the remaining variables in the *PES*3 model mirror the results for *PES*1 and *PES*2.

The most notable difference between the main tests and these supplemental tests is the change in significance of the *PRIOR_NOGUIDE* coefficient. For all three PES definitions, the coefficient on *PRIOR_NOGUIDE* is significantly negative; this variable was negative but insignificant in the main tests. In the main tests, the important action is that management did not provide guidance in the current period ($NOGUIDE = 1$); what happened in the prior period is not relevant. However, in these supplemental tests, if the firm changed its guidance behavior ($NOGUIDE = 1$ and $PRIOR\_NOGUIDE = 0$), the impact on PES is significantly greater than if the firm did not provide guidance in either period ($NOGUIDE = 1$ and $PRIOR\_NOGUIDE = 1$). When the sample is limited to firms with positive earnings over the prior four quarters, ceasing earnings guidance is a more powerful predictor of PES than simply not providing guidance in either period.

It is possible that large positive earnings surprises arise during auditors' quarterly reviews or annual

audits, such that neither managers nor analysts were aware of the pending surprise during the quarter. We believe that large and unexpected earnings *increases* as the result of audit adjustments are unlikely. Data limitations prevent us from testing this possibility, as only postreview/postaudit financial statement numbers are publicly available.

4.4. Predicting Extreme Negative Earnings Surprises

In this section we investigate the ability of our independent variables to predict an extreme *negative* earnings surprise (NES). Our manager attention seeking hypothesis posits that managers perceive their firm to be neglected and attempt to increase investor attention with an extreme positive earnings surprise. If this reasoning is correct, then our manager variables should *not* be related to extreme *negative* earnings surprises in the same direction as they are related to PES. In contrast, our analyst variables and control variables should predict large earnings surprises in either direction. We view this analysis as a falsification test of our managerial attention seeking variables.

We reestimate Equation (1) using *NES*1, an indicator variable set equal to one if a firm-year observation is in the negative extreme earnings surprise decile in quarter t and set equal to zero otherwise. In our sample, firm-years in the negative extreme earnings surprise group have a median earnings realization of −0.08 per share, whereas the median analyst expectation is 0.05 per share (untabulated). This is an earnings surprise equal to −1.3% of stock price (untabulated). We make no prediction about the relation between *NES*1 and management-provided earnings guidance, as there is evidence that managers preempt bad news (Skinner 1994, 1997; Kasznik and Lev 1995) and delay bad news (Kothari et al. 2009). We predict that our remaining manager variables, which are positively related to *PES*1, will be negatively related to *NES*1. We expect the analyst inattention and firm environment variables to exhibit similar relations with both *PES*1 and *NES*1.

Table 5 presents regression results generally consistent with our expectations. None of the manager variables that predict extreme positive earnings surprises have the same relation with negative extreme earnings surprises. Specifically, a firm is *less* likely to experience an extreme negative earnings surprise when the current and future performance of the firm is good (Δ*EPS* and *PRIVATE_INFO*), or when the firm is neglected by the capital markets (*MKT_NEGLECT*1 and *MKT_NEGLECT*2). In addition, current period managerial earnings guidance (*NOGUIDE*) and net insider purchases (*INSIDER*) are not associated with NES. In contrast to the sign changes between *PES*1 and *NES*1 for the manager variables, four of the six analyst inattention variables and four of the five control variables

Table 5 Predicting a Negative Extreme Earnings Surprise—Falsification Test

Variables	Pred.	$Y = NES1$
NOGUIDE	±	0.14
		(1.59)
PRIOR_NOGUIDE	±	0.24***
		(3.92)
NOGUIDE × Δ*EPS*	±	0.38
		(1.63)
Δ*EPS*	−	−2.40***
		(−11.11)
PRIVATE_INFO	−	−7.15***
		(−18.08)
*MKT_NEGLECT*1	−	−0.12**
		(−2.10)
*MKT_NEGLECT*2	−	−0.22***
		(−4.46)
FIN_NEEDS	−	0.12*
		(1.81)
INSIDER	−	0.03
		(0.80)
AN_FOLLOW	−	−0.04***
		(−4.76)
AN_BUSY	+	−0.02
		(−3.31)
AN_EXP	−	0.01
		(1.57)
AN_ECON_IMP	−	−0.51***
		(−2.77)
AN_STALE	+	0.02***
		(12.65)
AN_DISPERSION	+	10.08***
		(15.42)
ROA_VOLATILITY	+	5.17***
		(6.62)
OP_LEV	+	0.10
		(1.34)
SPEC_ITEMS	+	0.61***
		(12.04)
INST_OWN	−	−0.43***
		(−2.88)
SIZE	−	−0.56***
		(−19.97)
Intercept	±	0.24
		(0.50)
N where $Y = 1$		6,945
Total *N*		72,067[a]
Log pseudolikelihood		−17,350
Fixed effects		IND and QTR
SE clustered by		Firm and QTR
Pseudo-R^2		0.24

Notes. All variables are defined in the appendix, and continuous variables are winsorized at the 1st and 99th percentiles by year. Pred., prediction.

[a]We lose 51 observations due to all tobacco products industry observations having an *NES*1 value equal to zero.

*Significantly different from zero at the 10% level; **significantly different from zero at the 5% level; ***significantly different from zero at the 1% level (using a two-tailed z-test; one-tailed for directional predictions).

Table 6 Conditions Where Results Should Be Stronger and Weaker

Panel A: Conditions based on significant manager variables					
	STRONG_MGR	Pred.	*MEDIUM_MGR*	Pred.	*WEAK_MGR*
*PES*1 *N*	647		65,970		5,501
*PES*1 mean	0.24	$>^{***}$	0.10	$>^{***}$	0.03
Panel B: Conditions based on significant analyst variables					
	STRONG_ANL	Pred.	*MEDIUM_ANL*	Pred.	*WEAK_ANL*
*PES*1 *N*	8,328		51,388		12,402
*PES*1 mean	0.17	$>^{***}$	0.10	$>^{***}$	0.01

Notes. In panel A, *STRONG_MGR* = 1 if *NOGUIDE* = 1, *MKT_NEGLECT*1 = 1, *INSIDER* = 1, and Δ*EPS* and *PRIVATE_INFO* are in the top half of the sample by calendar quarter; *WEAK_MGR* = 1 if *NOGUIDE* = 0, *MKT_NEGLECT*1 = 0, *INSIDER* = 0, and Δ*EPS* and *PRIVATE_INFO* are in the bottom half of the sample by calendar quarter; *MEDIUM_MGR* = 1 if *STRONG_MGR* = 1 and *WEAK_MGR* = 1. In panel B, *STRONG_ ANL* = 1 if *AN_FOLLOW* and *AN_ECON_IMP* are in the bottom half of the sample and *AN_DISPERSION* is in the top half of the sample by calendar quarter; *WEAK_ANL* = 1 if *AN_FOLLOW* and *AN_ECON_IMP* are in the bottom half of the sample and *AN_DISPERSION* is in the top half of the sample by calendar quarter; *MEDIUM_ANL* = 1 if *STRONG_ANL* = 0 and *WEAK_ANL* = 0. Pred., prediction.

***Significantly different from zero at the 1% level using a two-tailed *t*-test (one-tailed for directional predictions).

are significantly associated in the same direction with *NES*1 as with *PES*1. These findings illustrate that our managerial incentives variables generally predict only extreme *positive* earnings surprises, whereas our analyst inattention and firm environment variables capture both extreme earnings surprises in both directions.

4.5. Subsamples Where Results Should Be Stronger or Weaker

In this section we quantify the impact of our manager attention seeking variables and analyst inattention variables by examining combinations of variables where the frequency of PES should be highest and lowest. The significance of these variables was established in the logit models of §4.2; these results serve only to illustrate the size of the effect. Panel A of Table 6 describes the results for different combinations of managerial variables that should produce large differences in PES. To capture where the managerial effect should be strongest, we define *STRONG_MGR* = 1 if *NOGUIDE* = 1, *MKT_NEGLECT*1 = 1, *INSIDER* = 1, and Δ*EPS* and *PRIVATE_INFO* are in the top half of the sample by calendar quarter. To capture where the effect should be weakest, we define *WEAK_MGR* = 1 if *NOGUIDE* = 0, *MKT_NEGLECT*1 = 0, *INSIDER* = 0, and Δ*EPS* and *PRIVATE_INFO* are in the bottom half of the sample by calendar quarter. To capture the observations where we expect neither a strong nor weak effect, we define *MEDIUM_MGR* = 1 if *STRONG_MGR* = 0 and *WEAK_MGR* = 0. The results in Panel A of Table 6 are striking. The frequency of *PES*1 = 1 in the *STRONG_MGR* = 1 subsample is 0.24, but it is only 0.03 in the *WEAK_MGR* = 1 subsample, nearly an eightfold difference.

Panel B of Table 6 describes the results for different combinations of analyst variables that should produce large differences in PES. To capture where the analyst effect should be strongest, we define *STRONG_ANL* = 1 if *AN_FOLLOW* and *AN_ECON_IMP* are in the bottom half of the sample by calendar quarter and *AN_DISPERSION* is in the top half of the sample by calendar quarter. We define *WEAK_ANL* = 1 if *AN_FOLLOW* and *AN_ECON_IMP* are in the top half of the sample by calendar quarter and *AN_DISPERSION* is in the bottom half of the sample by calendar quarter. Conversely, *MEDIUM_ANL* = 1 if *STRONG_ANL* = 0 and *WEAK_ANL* = 0. The frequency of *PES*1 = 1 is 0.17 in the *STRONG_ANL* = 1 subsample, but only 0.01 in the *WEAK_ANL* = 1 subsample, nearly a 13-fold difference (prior to rounding). Both the managerial attention seeking variables and the analyst inattention variables are powerful predictors of an extreme positive earnings surprise.

5. Consequences of an Extreme Positive Earnings Surprise

The most intriguing results from the previous section are that managers appear to be intentionally allowing the PES to occur to attract the market's attention, although this result is also the most difficult to establish. If this indeed is the intent of management, and managers have an accurate assessment of the impact a PES has on the capital market, then capital market attention should increase following a PES. In this section, we ask whether the number of analysts, the number of institutional investors, the percentage of shares institutions hold, and the firm's trading volume increase following a PES.

Following a research design employed by Bushee and Miller (2012), we test whether attention increases after an extreme positive earnings surprise by regressing variables that capture future changes in investor and analyst attention on our PES indicator and other

variables that are likely to affect investor attention. Our regression specification is as follows:

$$\begin{aligned}\Delta Y = {} & \alpha + \beta_1 PES1 \text{ (or } PES2 \text{ or } PES3) + \beta_2 \Delta EPS \\ & + \beta_3 PES1 \text{ (or } PES2 \text{ or } PES3) \times \Delta EPS \\ & + \beta_4 PRIOR\_RET + \beta_5 \Delta FUTURE\_ROA + \beta_6 SIZE \\ & + \beta_7 AGE + \beta_8 PRIOR\_Y + \beta_9 \Delta OTHER\_Y \\ & + \sum_{t=1}^{39} QTR_t + \sum_{h=1}^{48} IND_h + \varepsilon. \end{aligned} \quad (2)$$

The dependent variable ΔY is the change in one of five variables that capture investor and analyst attention: a firm's percentage of institutional owners ($\Delta INST\_OWN$), number of institutional owners ($\Delta INST\_CNT$), long-term trading volume (ΔVOL_LT), short-term trading value (ΔVOL_ST), and analyst following (ΔAN_FOLLOW). The variables $\Delta INST\_OWN$, $\Delta INST\_OWN$, and ΔAN_FOLLOW are measured from quarter t to $t+12$, and the variable ΔVOL_LT is measured from the last month of quarter t to the last month of t+12. The variable ΔVOL_ST is measured as the change in average trading volume in the five days following the quarter t earnings announcement relative to the five days preceding the announcement. The coefficient of interest is β_1; $\beta_1 > 0$ indicates that PES observations experience an incremental increase in attention relative to non-PES observations.

We control for ΔEPS because improvements in economic performance are expected to attract investor and analyst attention. This control variable also ensures that the PES coefficient is capturing changes in investor and analyst attention in response to an extreme positive earnings surprise, not just to the improvement in economic performance. We also interact *PES*1 (or *PES*2 or *PES*3) with ΔEPS, because it is possible that the presence of both a large increase in earnings and a PES has an incremental impact on investor and analyst attention. We control for a firm's prior year industry-adjusted stock return (*PRIOR_RET*) based on Lehavy and Sloan's (2008) finding that institutional investors and analysts are attracted to past stock market winners. We also control for improvements in future accounting performance ($\Delta FUTURE\_ROA$), measured as the change in ROA from the four quarters prior to the PES to the four quarters after the PES, under the expectation that future profitability will also attract investor attention. We include market capitalization (*SIZE*) and the number of years a firm has been publicly traded (*AGE*) to control for the business life cycle, because smaller and younger firms are expected to have greater increases in investor and analyst attention relative to larger and more established firms. We also control for the level of Y in the prior year (*PRIOR_Y*), computed as the average over the four prior quarters, to control for mean reversion in the attention proxies. For example, when the dependent variable is the percentage change in institutional investors ($\Delta INST\_OWN$), the variable *PRIOR_Y* is the average percentage of firm j stock owned by institutional investors in the four quarters before the PES quarter (*PRIOR_INST_OWN*). Finally, we control for contemporaneous changes in the other dependent variables ($\Delta OTHER\_Y$), because a change in one type of attention could affect another type of attention. For example, when we examine the relation between PES and a change in institutional ownership ($\Delta INST\_OWN$), we control for $\Delta INST\_CNT$ ΔVOL_LT, and ΔAN_FOLLOW. We include calendar-quarter and industry fixed effects (QTR_t and IND_h, respectively) to control for unforeseen economywide or industry-level economic shocks that could impact investor and analyst attention. Standard errors are clustered by firm and calendar quarter to correct for time-series and cross-sectional correlation in the Equation (2) residuals (Petersen 2009). See the appendix for a detailed explanation of how each variable is calculated.

Panel A of Table 7 provides descriptive statistics for the variables in Equation (2). The sample is reduced from 72,118 to 44,525 firm-quarters, mainly due to the requirement of three future years of data. This necessarily imposes a survivorship bias on the results. For the full sample, the average firm gains 30 institutional investors, who collectively own 4% more of the stock over the three years subsequent to quarter t. The last three columns of panel A show that PES firms experience greater increases in the percentage of shares held by institutional investors, greater increases in long-term and short-term trading volume, and greater increases in analyst following than the non-PES firms. These univariate findings are generally consistent with the premise that extreme positive earnings surprises attract investor and analyst attention. Correlations presented in panel B of Table 7 yield similar inferences.

Panels A–C of Table 8 report the results from estimating Equation (2) for each of the five dependent variables that measure a change in investor or analyst attention. The variable of interest in panel A is *PES*1. Reading across the first row, PES firms experience significant increases in institutional ownership, the number of institutions, long-term and short-term volume, and analyst following. For example, the results in column (2) show that PES firms gain 2.26 more institutions in the subsequent three years relative to non-PES firms. This result holds after controlling for a host of performance and information environment factors, including the current period news (ΔEPS), the future increase in ROA, and the concurrent change in the percentage of institutional holdings, long-term volume, and analyst following. The results for *PES*2 in panel B and *PES*3 in panel C are very similar to the results for *PES*1. The biggest difference is that *PES*2 is not

Table 7 Consequences of a Positive Extreme Earnings Surprise—Descriptive Statistics and Correlations

Panel A: Descriptive statistics

Variable	Mean	S.D.	P50	*PES*1 = 1 mean	Pred. diff.	*PES*1 = 0 mean
Δ*INST_OWN*	0.04	0.27	0.07	0.08	>***	0.04
Δ*INST_CNT*	30.01	51.06	21.00	29.63	>	30.05
Δ*VOL_LT*	0.002	0.01	0.001	0.003	>***	0.001
Δ*VOL_ST*	0.004	0.01	0.001	0.004	>***	0.004
Δ*AN_FOLLOW*	0.67	3.48	0.00	0.92	>***	0.64
Δ*EPS*	0.003	0.27	0.01	—	—	—
PRIOR_RET	0.13	0.59	0.02	—	—	—
Δ*FUTURE_ROA*	−0.001	0.04	0.00	—	—	—
SIZE	6.79	1.66	6.66	—	—	—
AGE	2.57	0.82	2.51	—	—	—
PRIOR_INST_OWN	0.57	0.25	0.60	—	—	—
PRIOR_INST_CNT	141.83	146.69	97.00	—	—	—
PRIOR_VOL	0.01	0.01	0.01	—	—	—
PRIOR_AN_FOLLOW	6.88	5.51	5.25	—	—	—

Panel B: Correlations matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Δ*INST_OWN*	—	**0.25**	**0.13**	**−0.06**	**0.19**	**0.06**	**0.06**	**0.05**	0.00	−0.01	0.00	**−0.21**	**−0.11**	**−0.25**	**−0.21**	**−0.06**	**−0.17**
2	Δ*INST_CNT*	**0.20**	—	**0.26**	**−0.04**	**0.33**	0.00	0.01	**0.01**	**0.06**	**0.12**	**0.07**	**0.18**	**0.09**	0.01	**0.14**	**−0.06**	**0.14**
3	Δ*VOL_LT*	**0.01**	**0.17**	—	**−0.03**	**0.12**	**0.04**	**0.03**	**0.03**	**0.04**	0.00	**0.04**	**0.07**	**0.10**	**0.07**	**0.08**	**−0.15**	**0.01**
4	Δ*VOL_ST*	**−0.09**	**−0.05**	**−0.13**	—	0.00	**0.03**	**0.03**	**0.04**	**0.05**	**0.08**	**0.08**	**0.08**	**−0.06**	**0.25**	**0.13**	**0.36**	**0.15**
5	Δ*AN_FOLLOW*	**0.17**	**0.31**	**0.10**	0.00	—	**0.02**	**0.02**	**0.02**	**0.02**	**0.21**	**0.07**	**−0.01**	**−0.04**	**−0.03**	**−0.04**	0.00	**−0.17**
6	*PES*1	**0.04**	−0.01	**0.03**	**0.02**	**0.02**	—	**0.92**	**0.66**	**0.20**	**−0.06**	**0.10**	**−0.18**	**−0.06**	**−0.09**	**−0.15**	0.00	**−0.14**
7	*PES*2	**0.04**	0.00	**0.03**	**0.02**	**0.02**	**0.93**	—	**0.63**	**0.20**	**−0.06**	**0.09**	**−0.18**	**−0.06**	**−0.09**	**−0.14**	0.01	**−0.13**
8	*PES*3	**0.04**	0.01	**0.04**	**0.04**	**0.02**	**0.66**	**0.63**	—	**0.14**	**−0.02**	**0.10**	**−0.13**	**−0.03**	**−0.07**	**−0.11**	−0.01	**−0.11**
9	Δ*EPS*	−0.01	**0.03**	**0.03**	**0.01**	**0.01**	**0.18**	**0.18**	**0.11**	—	**0.08**	**0.18**	**0.02**	**0.02**	**0.02**	**0.02**	0.00	**0.02**
10	*PRIOR_RET*	**0.02**	**0.09**	**−0.07**	**0.09**	**0.19**	**−0.04**	**−0.04**	−0.00	**0.04**	—	**0.29**	**0.11**	**0.03**	**0.01**	**0.02**	**0.03**	**−0.05**
11	Δ*FUTURE_ROA*	0.00	**0.04**	**0.03**	**0.04**	**0.03**	**0.08**	**0.08**	**0.09**	**0.11**	**0.20**	—	**0.05**	**0.02**	**0.02**	**0.02**	0.00	0.00
12	*SIZE*	**−0.18**	**0.21**	**0.07**	**0.03**	**−0.03**	**−0.18**	**−0.19**	**−0.14**	0.01	**0.08**	**0.03**	—	**0.41**	**0.41**	**0.90**	**0.17**	**0.71**
13	*AGE*	**−0.09**	**0.09**	**0.09**	**−0.09**	**−0.05**	**−0.07**	**−0.07**	**−0.04**	0.01	**−0.01**	**0.02**	**0.42**	—	**0.18**	**0.47**	**−0.14**	**0.19**
14	*PRIOR_INST_OWN*	**−0.27**	0.01	**0.04**	**0.21**	**−0.04**	**−0.09**	**−0.09**	**−0.07**	0.00	**−0.03**	0.00	**0.41**	**0.20**	—	**0.60**	**0.46**	**0.45**
15	*PRIOR_INST_CNT*	**−0.15**	**0.20**	**0.06**	−0.01	**−0.08**	**−0.12**	**−0.12**	**−0.08**	0.01	**−0.02**	**0.01**	**0.84**	**0.47**	**0.37**	—	**0.30**	**0.75**
16	*PRIOR_VOL*	**−0.06**	**−0.05**	**−0.24**	**0.35**	0.01	**0.01**	**0.01**	−0.01	−0.01	**0.07**	**−0.03**	**0.10**	**−0.13**	**0.25**	**0.05**	—	**0.36**
17	*PRIOR_AN_FOLLOW*	**−0.14**	**0.18**	**0.03**	**0.10**	**−0.20**	**−0.12**	**−0.11**	**−0.09**	0.01	**−0.04**	0.01	**0.70**	**0.21**	**0.40**	**0.72**	**0.22**	—

Notes. Our sample consists of 44,525 firm-quarter observations with nonmissing values for the variables included in Equation (2). Pearson (Spearman) correlations are presented in the lower left (upper right). All variables are defined in the appendix, and continuous variables are winsorized at the 1st and 99th percentiles by year. In panel B, correlations significant at the 5% level or better are in bold. Pred. diff., predicted difference.

***Variable mean is significantly different between the two groups at the 1% level in the predicted direction using a two-tailed *t*-test (one-tailed for directional predictions).

significantly related to Δ*INST_OWN* in panel B, while *PES*3 has a larger coefficient with increased significance for Δ*INST_OWN* in panel C. The results across all three panels are consistent with analysts and investors paying more attention to PES firms subsequent to the earnings surprise. For all three specifications, the coefficients on the prior year values of institutional ownership, long-term volume, and analyst following are significantly negative, implying that these variables mean revert.

Our findings for the consequences of PES are incremental to controlling for known determinants of increases in investor and analyst attention (e.g., changes in past performance as measured by earnings and market returns, changes in future performance, firm size, and firm age). In addition, controlling for the contemporaneous change in the alternate attention proxies reduces the likelihood that correlated omitted variables are driving our findings. In sum, we find that investor and analyst attention increase after an extreme positive earnings surprise. If managers were attempting to attract attention with the earnings surprise, they were successful.[12]

6. Robustness Tests

We perform multiple robustness tests to ensure that our results are robust to different matching procedures, variable definitions, and data subsamples. We focus on Equation (1) with *PES*1 as a dependent variable, and so all results in this section are relative to those in column (1) of panel A in Table 4 (unless specified otherwise). For brevity, we do not tabulate the results.

[12] In an untabulated analysis, we add the independent variable *NES*1 to the regression specifications presented in panel A of Table 8. We observe no change in inferences with the exception of *PES*1 becoming insignificant in column (1) (one-tailed $p = 0.11$), and note that the *NES*1 coefficient is insignificant in four of the five regression specifications.

Table 8 Consequences of a Positive Extreme Earnings Surprise—Multivariate Analyses

Variables	Pred.	(1) $Y = \Delta INST\_OWN$	(2) $Y = \Delta INST\_CNT$	(3) $Y = \Delta VOL\_LT$	(4) $Y = \Delta VOL\_ST$	(5) $Y = \Delta AN\_FOLLOW$
Panel A: *PES*1 as the variable of interest						
*PES*1	+	0.01*	2.26**	0.001***	0.001***	0.15***
		(1.39)	(2.02)	(2.50)	(3.66)	(2.48)
Δ*EPS*	+	−0.01	4.04***	0.001***	0.00	−0.02
		(−1.55)	(4.32)	(3.76)	(0.99)	(−0.29)
*PES*1 × Δ*EPS*	+	−0.02**	−3.31	0.00	0.001**	−0.08
		(−2.13)	(−1.09)	(1.13)	(1.76)	(−0.56)
PRIOR_RET	+	−0.01***	1.62	−0.001***	0.001***	0.69***
		(−2.70)	(0.96)	(−4.56)	(4.85)	(8.86)
Δ*FUTURE_ROA*	+	−0.01	23.83***	0.002	0.01***	−0.79
		(−0.22)	(4.12)	(1.25)	(4.07)	(−1.39)
SIZE	−	−0.01***	4.92***	0.00	0.00	0.58***
		(−6.03)	(5.16)	(1.26)	(1.38)	(11.72)
AGE	−	−0.01**	−0.99	0.00	−0.00***	−0.27***
		(−1.92)	(−0.96)	(1.58)	(−4.66)	(−4.89)
PRIOR_INST_OWN	−	−0.23***				
		(−4.62)				
PRIOR_INST_CNT	−		0.05***			
			(2.86)			
PRIOR_VOL	−			−0.25***	0.30***	
				(−11.22)	(11.83)	
PRIOR_AN_FOLLOW	−					−0.28***
						(−17.50)
Δ*INST_OWN*	+		50.85***	0.01***	−0.001	1.81***
			(12.37)	(3.42)	(−1.30)	(4.04)
Δ*INST_CNT*	+	0.001***		0.00***	−0.00	0.02***
		(9.72)		(5.16)	(−0.80)	(17.55)
Δ*VOL_LT*	+	3.16***	764.12***		−0.05***	27.93***
		(5.40)	(5.75)		(−3.82)	(4.26)
Δ*AN_FOLLOW*	+	0.01***	3.82***	0.00***	0.00	
		(9.41)	(17.99)	(5.08)	(1.12)	
Constant	±	0.17***	−12.01	−0.001	0.001	−1.95***
		(9.64)	(−1.29)	(−0.52)	(0.83)	(−2.64)
Observations		44,525	44,525	44,525	44,525	44,525
Adjusted R^2		0.68	0.25	0.22	0.18	0.25
Fixed effects		IND and QTR	IND and QTR	IND and QTR	IND and QTR	IND and QTR
Clustered SEs		Firm and QTR	Firm and QTR	Firm and QTR	Firm and QTR	Firm and QTR
Panel B: *PES*2 as the variable of interest						
*PES*2	+	0.003	2.41**	0.001***	0.001***	0.13**
		(0.73)	(2.09)	(2.41)	(3.13)	(2.05)
Δ*EPS*	+	−0.01**	3.36***	0.001***	0.00	−0.02
		(−2.49)	(3.09)	(3.59)	(0.70)	(−0.38)
*PES*2 × Δ*EPS*	+	−0.003	0.75	0.00	0.002***	−0.11
		(−0.17)	(0.19)	(0.68)	(4.78)	(−0.56)
PRIOR_RET	+	−0.01***	1.64	−0.001***	0.001***	0.69***
		(−2.70)	(0.98)	(−4.55)	(4.84)	(8.85)
Δ*FUTURE_ROA*	+	−0.004	23.50***	0.002	0.01***	−0.78
		(−0.18)	(4.03)	(1.23)	(4.00)	(−1.36)
SIZE	−	−0.01***	4.94***	0.00	0.00	0.58***
		(−6.08)	(5.17)	(1.26)	(1.40)	(11.75)
AGE	−	−0.01**	−0.99	0.00	−0.00***	−0.27***
		(−1.92)	(−0.97)	(1.58)	(−4.67)	(−4.89)
PRIOR_INST_OWN	−	−0.23***				
		(−4.62)				
PRIOR_INST_CNT	−		0.05***			
			(2.86)			
PRIOR_VOL	−			−0.25***	0.30***	
				(−11.20)	(11.85)	

Table 8 (Continued)

Variables	Pred.	(1) $Y = \Delta INST\_OWN$	(2) $Y = \Delta INST\_CNT$	(3) $Y = \Delta VOL\_LT$	(4) $Y = \Delta VOL\_ST$	(5) $Y = \Delta AN\_FOLLOW$
Panel B: *PES*2 as the variable of interest (continued)						
PRIOR_AN_FOLLOW	−					−0.28*** (−17.49)
Δ*INST_OWN*	+		50.86*** (12.37)	0.01*** (3.42)	−0.001 (−1.31)	1.82*** (4.04)
Δ*INST_CNT*	+	0.001*** (9.74)		0.00*** (5.14)	−0.00 (−0.82)	0.02*** (17.55)
Δ*VOL_LT*	+	3.17*** (5.40)	763.56*** (5.74)		−0.05*** (−3.82)	27.95*** (4.26)
Δ*AN_FOLLOW*	+	0.01*** (9.41)	3.82*** (17.99)	0.00*** (5.08)	0.00 (1.11)	
Constant	±	0.17*** (9.59)	−12.28 (−1.31)	−0.001 (−0.49)	0.001 (0.93)	−1.94*** (−2.63)
Observations		44,525	44,525	44,525	44,525	44,525
Adjusted R^2		0.68	0.25	0.22	0.18	0.25
Fixed effects		IND and QTR	IND and QTR	IND and QTR	IND and QTR	IND and QTR
Clustered SEs		Firm and QTR	Firm and QTR	Firm and QTR	Firm and QTR	Firm and QTR
Panel C: *PES*3 as the variable of interest						
*PES*3	+	0.02*** (3.79)	2.62** (1.85)	0.001*** (2.40)	0.001*** (5.20)	0.13* (1.59)
Δ*EPS*	+	−0.01 (−1.47)	3.85*** (4.04)	0.001*** (3.73)	0.00 (1.04)	−0.02 (−0.28)
*PES*3 × Δ*EPS*	+	−0.02** (−2.33)	−1.22 (−0.42)	0.001* (1.54)	0.001** (1.91)	0.004 (0.03)
PRIOR_RET	+	−0.01*** (−2.71)	1.59 (0.95)	−0.001*** (−4.61)	0.001*** (4.83)	0.69*** (8.78)
Δ*FUTURE_ROA*	+	−0.01 (−0.39)	23.88*** (4.02)	0.002* (1.31)	0.01*** (3.94)	−0.77 (−1.34)
SIZE	−	−0.01*** (−6.01)	4.88*** (5.14)	0.00 (1.20)	0.00 (1.39)	0.58*** (11.67)
AGE	−	−0.01** (−1.96)	−1.00 (−0.98)	0.00 (1.57)	−0.00*** (−4.73)	−0.27*** (−4.89)
PRIOR_INST_OWN	−	−0.23*** (−4.61)				
PRIOR_INST_CNT	−		0.05*** (2.87)			
PRIOR_VOL	−			−0.25*** (−11.19)	0.30*** (11.83)	
PRIOR_AN_FOLLOW	−					−0.28*** (−17.44)
Δ*INST_OWN*	+		50.84*** (12.35)	0.01*** (3.42)	−0.001 (−1.35)	1.82*** (4.05)
Δ*INST_CNT*	+	0.001*** (9.72)		0.00*** (5.18)	−0.00 (−0.81)	0.02*** (17.58)
Δ*VOL_LT*	+	3.16*** (5.40)	764.44*** (5.76)		−0.05*** (−3.82)	27.98*** (4.27)
Δ*AN_FOLLOW*	+	0.01*** (9.42)	3.82*** (18.03)	0.00*** (5.08)	0.00 (1.11)	
Constant	±	0.16*** (9.27)	−11.62 (−1.26)	−0.00 (−0.40)	0.001 (0.86)	−1.92*** (−2.62)
Observations		44,525	44,525	44,525	44,525	44,525
Adjusted R^2		0.68	0.25	0.22	0.18	0.25
Fixed effects		IND and QTR	IND and QTR	IND and QTR	IND and QTR	IND and QTR
Clustered SEs		Firm and QTR	Firm and QTR	Firm and QTR	Firm and QTR	Firm and QTR

Notes. All variables are defined in the appendix, and continuous variables are winsorized at the 1st and 99th percentiles by year. Pred., prediction.

*Variable mean is significantly different between the two groups at the 10% level; **variable mean is significantly different between the two groups at the 5% level; ***variable mean is significantly different between the two groups at the 1% level (in the predicted direction using a two-tailed *t*-test; one-tailed for directional predictions).

6.1. Propensity Score Matching

In our main analysis, we control for five operating volatility and information environment variables, but do so within the specific structure of a logistic function applied to a linear combination of the variables. If the relation between these variable and PES does not fit this structure, or interact in some way, then our controls could be misspecified. As an alternative approach, we use propensity score matching (PSM) to identify treatment and control observations that are very similar with respect to their operating volatility and information environment. There are several limitations to PSM (Armstrong et al. 2010, Tucker 2010). First, PSM assumes the potential bias arises only from the observable portion of a PES event. PSM cannot address bias due to unobservable characteristics, such as the managers' private information set. In particular, Tucker (2010, p. 33, Footnote 3) warns that PSM "might not be useful in accounting and finance where managers have more discretion, the decisions involve more parties, and the decision-making process is more opaque to researchers." As all three points apply to our setting, we encourage readers to interpret our PSM results with these caveats in mind.

We match treatment ($PES1 = 1$) and control ($PES1 = 0$) observations based on propensity scores obtained from a logit model of $PES1$ on our five firm operating and information environment control variables given in Equation (1). We use a one-to-one match and a caliper of 0.03, following Lawrence et al. (2011), which yields a sample of 13,820 observations. Matching firms with similar operating and information environments means that remaining variation in PES is unlikely to be due to differences in these attributes. Mean values of these five variables are not significantly different between treatment and control groups after our matching procedure ($p > 0.10$). We reestimate Equation (1) using this PSM sample after removing the five control variables and observe no change in inferences regarding any of our managerial attention seeking and analyst inattention variables, with the exception that $NOGUIDE * \Delta EPS$ becomes positive and significant. We also match on the five control variables and the six analyst inattention variables and reestimate Equation (1) with only the managerial attention seeking variables as independent variables. We find no change in inferences with the exception that *INSIDER* loses significance ($p > 0.10$).

6.2. Eliminating Negative Earnings Surprise Observations

It is possible that firms with negative earnings surprises are subject to other forces not in our model and therefore are not a good benchmark for our PES firms. To address this concern, we eliminate observations with a negative earnings surprise in quarter t, which results in a sample of 39,477 observations (a 54.7% sample reduction). We reestimate Equation (1) and observe no change in inferences for any of our managerial attention seeking variables or control variables. We do find that *AN_BUSY* becomes insignificant ($p > 0.10$) and *AN_ STALE* becomes positive and significant ($p < 0.01$), as predicted. These results suggest that firms with negative earnings surprises are not unduly affecting our inferences.

6.3. Eliminating Observations with a Low Stock Price

Given that our *SURP* variable is scaled by stock price per share, it is possible that observations with a low price per share are overrepresented in the top earnings surprise decile. Because low share price firms may be more neglected, we could simply be capturing a low price per share effect. To address this concern, we eliminate observations with a stock price less than \$5.00 per share in quarter t, which results in a sample of 65,986 observations (an 8.5% sample reduction). We reestimate Equation (1) and observe no change in any inferences with the exception that *AN_STALE* becomes positive and significant, as predicted ($p < 0.01$).

6.4. Defining PES as the Top 5% of the Earnings Surprise Distribution

In case the top decile of earnings surprises is not considered sufficiently extreme, we create a fourth specification of PES that captures even more extreme earnings surprises. We create an indicator variable set equal to one when a firm-quarter observation is in the top fifth percentile of *SURP* values by calendar quarter and zero otherwise. We reestimate Equation (1) using this dependent variable and observe no change in any inferences with the exception of *AN_STALE* becoming positive and significant, as predicted ($p < 0.01$).

6.5. Litigation Risk as a Correlated Omitted Variable

It is possible that litigation risk affects whether a manager is willing to forgo issuing earnings guidance and acquire additional stock in advance of a PES. Following Kasznik and Lev (1995) and Sengupta (2004), we measure litigation risk with an indicator set equal to one if the firm is in a "high-tech" industry, defined by the Standard Industrial Classification codes 2833–2836 (drugs), 8731–8734 (research and development), 7371–7379 (programming), 570–3577 (computers), and 3600–3674 (electronics), and zero otherwise. We reestimate Equation (1) after including this litigation risk indicator and observe no change in any inferences. We note that the litigation indicator coefficient is positive and significant ($p < 0.05$), which is inconsistent with PES being a proxy for low litigation risk.

6.6. Alternate Analyst Forecast Consensus Definition

Because I/B/E/S calculates a firm's consensus forecast once a month (for the historical files), it is possible that the I/B/E/S-constructed analyst consensus forecast and dispersion measures reflect stale data. We address this issue by constructing our own measure of the analyst consensus defined as the median analyst forecast issued within the three days prior to the earnings announcement. This new consensus measure affects our earnings surprise calculation (*SURP*), and this changes which firms are classified as PES observations each quarter. The new consensus measure also affects forecast staleness (*AN_STALE*) and forecast dispersion (*AN_DISPERSION*). We recalculate *SURP*, *PES*1, *AN_STALE*, and *AN_DISPERSION* using this alternate definition and reestimate Equation (1). We observe no change in any inferences with the exception that *AN_FOLLOW* becomes insignificant ($p > 0.10$). We do not use this measure of the analyst consensus in our primary tests for two reasons. First, we want to be consistent with prior literature that uses the I/B/E/S-provided consensus number (for a literature review, see Ramnath et al. 2008) so readers can more easily assess where our findings fit in the literature. Second, this alternate definition discards forecasts that are legitimately stale, and this is part of what we are trying to capture with our analyst inattention variables.

7. Conclusion

This study examines the incentives for and consequences of extreme positive earnings surprises. We find evidence consistent with the hypothesis that managers of neglected firms, who have good current and future news, choose to surprise the market at earnings announcements with extremely good news to attract the market's attention. Although we cannot observe all communication, or lack of communication, between the firm and market participants, we find that firms with extreme positive earnings surprises are less likely to have issued earnings guidance. Furthermore, in a sample that excludes loss firms, the impact is much larger if the firm discontinued guidance that was offered in the prior period. In addition, we find that managers are net purchasers of the firm's stock prior to the earnings surprise, and therefore personally benefit from the surprise. We also find that analysts are relatively less attentive to these firms, consistent with the hypothesis that their inaccurate forecasts also contribute to the earnings surprise. In the three years subsequent to the surprise, the firm's institutional ownership, trading volume, and analyst following all significantly increase, suggesting that the extreme positive earnings surprise was successful in attracting attention to the firm.

Given the increases in attention we document, it is likely that PESs also have valuation consequences. Although exploring valuation consequences is beyond the scope of our paper, we believe our findings have implications for the extensive literature on the post–earnings announcement drift (Foster et al. 1984; Bernard and Thomas 1989, 1990). Prior research has considered extreme earnings surprises as exogenous events that precipitate other important capital market events, most notably a drift in stock price subsequent to an earnings announcement (Livnat and Mendenhall 2006, Doyle et al. 2006). Our results show that extreme positive earnings surprises are partly predictable, suggesting that a portion of the explanation for the post–earnings announcement drift could be due to factors that give rise to the earnings surprise in the first place. Whereas the purpose of our paper is to establish the causes and consequences of extreme positive earnings surprises, we encourage future research to explore how earnings surprise predictability could affect inferences in the post–earnings announcement drift literature.

Acknowledgments

This paper has benefited from insightful comments by Ryan Ball, Phil Berger, David Burgstahler, Brian Cadman, Carol Cain (AAA discussant), Asher Curtis, David Hirshleifer, Jared Jennings, Jon Karpoff, Sarah McVay, Mort Pincus, Shiva Rajgopal, Scott Richardson, Devin Shanthikumar (FARS discussant), Terry Shevlin, Lakshmanan Shivakumar, Sarah Shonka, Doug Skinner, Abbie Smith, Siew Hong Teoh, and Irem Tuna; workshop participants at Arizona State University, London Business School, Melbourne University, University of Auckland, University of California at San Diego, University of California at Irvine, the University of Chicago, University of New South Wales, University of Queensland, University of Technology Sydney, University of Utah, and University of Washington; and conference participants at the AAA annual meeting, the FARS mid-year meeting, and the Universities of British Columbia, Oregon, and Washington (UBCOW) Conference.

Appendix. Variable Definitions

Variable	Definitions
	Dependent variables: Incentives tests
$PES1_{jt}$	Positive extreme earnings surprise indicator (primary specification); binary variable set equal to 1 if a firm is in the highest *SURP* decile by calendar quarter and set equal to 0 otherwise. Source: I/B/E/S.
$PES2_{jt}$	Positive extreme earnings surprise indicator (2nd specification); binary variable set equal to 1 if a firm's *SURP* value is greater than or equal to 0.005 (i.e., the unscaled earnings surprise is > 0.5% of end of quarter stock price (Compustat *prccq*)) and set equal to 0 otherwise. Source: I/B/E/S and Compustat.

Appendix. (Continued)

Variable	Definitions
	Dependent variables: Incentives tests (continued)
$PES3_{jt}$	Positive extreme earnings surprise indicator (3rd specification); binary variable set equal to 1 if a firm is in the highest *SURP* decile by calendar quarter (e.g., $PES1 = 1$) *and* the earnings surprise is at least 50% of the absolute value of forecasted earnings, and set equal to 0 otherwise. Source: I/B/E/S.
$NES1_{jt}$	Negative extreme earnings surprise indicator; binary variable set equal to 1 if a firm is in the lowest *SURP* decile by calendar quarter and set equal to 0 otherwise. Source: I/B/E/S.
	Dependent variables: Consequences tests
ΔAN_FOLLOW_{jt}	Change in analyst following; three-year change in the number of analysts issuing forecasts included in firm j's I/B/E/S analyst consensus EPS forecast (quarter t to $t+12$). Source: I/B/E/S.
$\Delta INST\_CNT_{jt}$	Change in number of institutional investors; three-year change in the number of institutional investors that hold firm j's shares (quarter t to $t+12$). Source: Thomson Reuters Institutional (13F) Holdings.
$\Delta INST\_OWN_{jt}$	Change in institutional ownership percentage; three-year change in the percentage of firm j's outstanding shares held by institutional investors (quarter t to $t+12$). Source: Thomson Reuters Institutional (13F) Holdings.
ΔVOL_LT_{jt}	Change in long-term trading volume; percentage change in the ratio of average daily trading volume to daily shares outstanding ($vol \div 1{,}000$) $\div$ ($shrout$), measured as the difference between volume during the last month of period $t+12$ and volume during the last month of period t. Source: CRSP.
ΔVOL_ST_{jt}	Change in short-term trading volume; percentage change in the ratio of average daily trading volume to daily shares outstanding ($vol \div 1{,}000$) $\div$ ($shrout$) measured in the five days before and five days after firm j's period t earnings announcement. Source: CRSP.
	Independent variables: Managerial incentives
FIN_NEEDS_{jt}	Ex ante financing needs; indicator variable set equal to 1 if cash flow from operations (Compustat *oancfy*) less capital expenditures (*capxy*) averaged over the past 12 quarters as a percentage of current assets (*actq*) is less than -0.5, and set equal to 0 otherwise. Source: Compustat.
$INSIDER_{jt}$	Insider stock purchases; indicator variable set equal to 1 if the sum of all shares traded by the five highest paid firm j executives during the four weeks preceding the week of firm j's earnings announcement is positive (indicating a net purchase), and set equal to 0 otherwise. Source: Thomson Reuters Insider database.
$MKT\_NEGLECT1_{jt}$	Market neglect (1st specification); binary variable set equal to 1 if (i) average ROA ($niq \div atq$) in periods $t-4$ through $t-1$ is greater than industry median ROA over the same period, and (ii) $PRIOR\_RET < 0$, and set equal to 0 otherwise. Source: Compustat and CRSP.
$MKT\_NEGLECT2_{jt}$	Market neglect (2nd specification); binary variable set equal to 1 if (i) firm j meets or beats the analyst consensus forecast in at least three of the four prior quarters and (ii) $PRIOR\_RET < 0$, and set equal to 0 otherwise. Source: I/B/E/S and Compustat.
$NOGUIDE_{jt}$	Absence of managerial earnings guidance indicator; indicator variable set equal to 0 if a manager provides any type of EPS guidance regarding period t prior to the earnings announcement date, and set equal to 1 otherwise. Source: Thomson First Call's Company Issue Guidance.
$PRIOR\_NOGUIDE_{jt}$	The prior quarter's value of *NOGUIDE*. Source: Thomson First Call's Company Issue Guidance.
$PRIVATE\_INFO_{jt}$	Manager's private information; change in firm j's Fama–French 48 industry-adjusted four-quarter ROA. ROA is measured as sum of net income (*niq*) over four quarters divided by prior quarter total assets (*atq*). The change is measured as the difference between quarters $t+1$ through $t+4$ and quarters $t-1$ through $t-4$. Source: Compustat.
ΔEPS_{jt}	Change in firm j's unsplit-adjusted realized earnings per share scaled by stock price per share (quarter $t-1$ to t). Source: I/B/E/S.
	Independent variables: Analyst incentives
AGE_{jt}	Firm age; natural log of the number of years firm j has been traded on a public stock exchange [(Compustat *datadate* less earliest CRSP *caldt*) $\div$ 365.33] as of period t. Source: Compustat and CRSP.
AN_BUSY_{jt}	Analyst busyness; mean number of firms that each analyst (whose EPS forecast is included in the consensus EPS forecast) is providing earnings forecasts for in period t. Source: I/B/E/S.
$AN\_DISPERSION_{jt}$	Analyst dispersion; standard deviation of individual analyst EPS forecasts that comprise the consensus EPS forecast. Source: I/B/E/S.
$AN\_ECON\_IMP_{jt}$	Economic importance of firm j to analyst k; market capitalization (Compustat $cshoq * prccq$) of firm j relative to the market capitalization of all other firms followed by the analysts whose EPS forecast is included in the analyst consensus EPS forecast. Source: Compustat and I/B/E/S.
AN_EXP_{jt}	Analyst experience; mean number of years the analysts whose EPS forecast is included in the analyst consensus forecast have provided earnings forecasts to I/B/E/S for any firm as of period t. Source: I/B/E/S.

Appendix. (Continued)

Variable	Definitions
	Independent variables: Analyst incentives (continued)
AN_FOLLOW_{jt}	Analyst following; number of analysts (I/B/E/S *analys*) issuing forecasts included in the most recent I/B/E/S analyst consensus EPS forecast prior to the earnings announcement date. Source: I/B/E/S.
AN_STALE_{jt}	Analyst forecast staleness; number of days between the most recent I/B/E/S analyst consensus EPS forecast prior to the earnings announcement date. We require the analyst consensus estimate date to occur before the earnings announcement date so all *FORECAST_STALE* values are positive. Source: I/B/E/S.
$INST\_OWN_{jt}$	Institutional ownership; percentage of firm j's outstanding shares held by institutional investors as of the end of the calendar quarter ending prior to quarter t. Source: Thomson Reuters Institutional (13F) Holdings.
OP_LEV_{jt}	Operating leverage; slope coefficient from regressing change in quarterly earnings before interest and taxes ($niq + xintq + txtq$) on change in quarterly sales (*revtq*), estimated via rolling regressions using the 20 quarters of data prior to period t, with missing quarterly values reset to the industry quarter median. Source: Compustat.
PE_RANK_{jt}	Price-to-earnings ratio rank; firm j's price-to-earnings ratio (price per share (*prccq*) divided by quarterly earnings per share ($niq \div cshoq$)), cumulated from quarters $t-4$ to $t-1$ less the industry median price-to-earnings ratio measured over the same period, decile ranked so the largest industry-adjusted price-to-earnings values are in the highest rank. Firm-quarter observations with negative cumulative earnings from $t-4$ to $t-1$ ($N = 23{,}032$) are set equal to missing. Source: Compustat.
$PRIOR\_AN\_FOLLOW_{jt}$	Prior year analyst following; mean number of analysts issuing forecasts included in the I/B/E/S analyst consensus EPS forecast in quarters $t-4$ through $t-1$. Source: I/B/E/S.
$PRIOR\_INST\_CNT_{jt}$	Prior year number of institutional owners; mean number of institutional investors as of the end of the calendar quarter in quarters $t-4$ through $t-1$. Source: Thomson Reuters Institutional (13F) Holdings.
$PRIOR\_INST\_OWN_{jt}$	Prior year institutional ownership; mean percentage of outstanding shares held by institutional investors as of the end of the calendar quarter in quarters $t-4$ through $t-1$. Source: Thomson Reuters Institutional (13F) Holdings.
$PRIOR\_RET_{jt}$	Prior year stock return; prior year market-adjusted buy-and-hold stock return (CRSP *ret*) measured beginning 252 trading days before and ending two trading days before firm j's period t earnings announcement date (I/B/E/S *anndats*). The market adjustment is made by subtracting the return on a value-weighted market portfolio from firm j's raw stock return each day. Source: CRSP and I/B/E/S.
$PRIOR\_VOL_{jt}$	Prior year trading volume; mean percentage of the ratio of average daily trading volume to daily shares outstanding ($vol \div 1{,}000) \div (shrout$) in quarters $t-4$ through $t-1$. Source: CRSP.
$PRIOR\_Y_{jt}$	One of four variables (*PRIOR_INST_OWN*, *PRIOR_INST_CNT*, *PRIOR_VOL*, or *PRIOR_AN_FOLLOW*), depending upon the regression specification.
$ROA\_VOLATILITY_{jt}$	Earnings volatility; standard deviation of quarterly ROA in periods $t-4$ through $t-1$, where ROA is defined as net income (*niq*) ÷ total assets (*atq*). Source: Compustat.
$SIZE_{jt}$	Firm size; natural log of market capitalization measured at the beginning of the quarter, defined as millions of shares outstanding (*cshoq*) multiplied by price per share (*prccq*). Source: Compustat.
$SPEC\_ITEMS_{jt}$	Special items indicator; binary variable set equal to 1 if the absolute value of quarterly special items (*spiq*) is greater than 1% of total assets (*atq*), with missing values ($N = 6{,}426$) set equal to 0. Source: Compustat.
$SURP_{jt}$	Earnings surprise; unsplit-adjusted realized EPS less the most recent I/B/E/S median analyst consensus EPS forecast issued prior to the earnings announcement date, scaled by stock price per share. Source: I/B/E/S.
$SURP\_UNSCALED_{jt}$	Earnings surprise; unsplit-adjusted realized EPS less the most recent I/B/E/S median analyst consensus EPS forecast issued prior to the earnings announcement date. Source: I/B/E/S.
$\Delta FUTURE\_ROA_{jt}$	Change in future ROA; change in firm j's Fama–French 48 industry-adjusted four-quarter ROA, where ROA is the sum of net income (*niq*) over four quarters divided by prior quarter total assets (*atq*), and the change is measured as the difference between quarters $t+1$ through $t+4$ and quarters $t-1$ through $t-4$. Source: Compustat.
$\Delta OPEXP_{jt}$	Change in operating expenses; seasonal quarterly change in operating expenses (*xoprq*) from $t-4$ to t, scaled by millions of shares outstanding (*cshoq*) in quarter $t-4$. Source: Compustat.
$\Delta OTHER\_Y_{jt}$	Contemporaneous change in one of four variables (Δ*_INST_OWN*, Δ*_INST_CNT*, Δ*_VOL,* or Δ*_ AN_ FOLLOW*), depending upon the regression specification.
ΔREV_{jt}	Change in revenues; seasonal quarterly change in revenue (*revtq*) from $t-4$ to t, scaled by millions of shares outstanding(*cshoq*) in quarter $t-4$. Source: Compustat.

Appendix. (Continued)

Variable	Definitions
	Sorting variables based on conditions where results should be stronger and weaker (Table 6)
$MEDIUM\_MGR_{jt}$	Setting where manager variables should be neither most nor least important; indicator variable set equal to 1 if $STRONG\_MGR = 0$ and $WEAK\_MGR = 0$ and set equal to 0 otherwise.
$MEDIUM\_ANL_{jt}$	Setting where analyst variables should be neither most nor least important; indicator variable set equal to 1 if $STRONG\_ANL = 0$ and $WEAK\_ANL = 0$ and set equal to 0 otherwise.
$STRONG\_MGR_{jt}$	Setting where manager variables should be most important; indicator variable set equal to 1 if $NOGUIDE = 1$, $MKT\_NEGLECT1 = 1$, $INSIDER = 1$, and ΔEPS and *PRIVATE_INFO* are in the top half of the sample by calendar quarter, and set equal to 0 otherwise.
$STRONG\_ANL_{jt}$	Setting where analyst variables should be most important; indicator variable set equal to 1 if *AN_FOLLOW* and *AN_ECON_IMP* are in the bottom half of the sample by calendar quarter and *AN_DISPERSION* is in the top half of the sample by calendar quarter.
$WEAK\_MGR_{jt}$	Setting where manager variables should be least important; indicator variable set equal to 1 if f $NOGUIDE = 0$, $MKT\_NEGLECT1 = 0$, $INSIDER = 0$, and ΔEPS and *PRIVATE_INFO* are in the bottom half of the sample by calendar quarter, and set equal to 0 otherwise.
$WEAK\_ANL_{jt}$	Setting where analyst variables should be least important; indicator variable set equal to 1 if *AN_FOLLOW* and *AN_ECON_IMP* are in the top half of the sample by calendar quarter and *AN_DISPERSION* is in the bottom half of the sample by calendar quarter.

References

Alford A, Berger P (1999) A simultaneous equations analysis of forecast accuracy, analyst following and trading volume. *J. Accounting, Auditing Finance* 14(3):219–240.

Amihud Y, Mendelson H (1986) Asset pricing and the bid-ask spread. *J. Financial Econom.* 17(2):223–249.

Anilowski C, Feng M, Skinner D (2007) Does earnings guidance affect market returns? The nature and information content of aggregate earnings guidance. *J. Accounting Econom.* 44(1–2):36–63.

Armstrong C, Jagolinzer A, Larcker D (2010) Chief executive officer equity incentives and accounting irregularities. *J. Accounting Res.* 48(2):225–271.

Baber W, Kang S (2002) The impact of split adjusting and rounding on analysts' forecast error calculations. *Accounting Horizons* 16(4):277–289.

Barber B, Odean T (2008) All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. *Rev. Financial Stud.* 21(2):785–818.

Barron OE, Kim O, Lim SC, Stevens DE (1998) Using analysts' forecasts to measure properties of analysts' information environment. *Accounting Rev.* 73(4):421–433.

Belsley DA, Kuh E, Welsch RE (1980) *Regression Diagnostics* (Wiley-Interscience, New York).

Bernard V, Thomas J (1989) Post-earnings-announcement drift: Delayed price response or risk premium? *J. Accounting Res.* 27(Supplement):1–48.

Bernard V, Thomas J (1990) Evidence that stock prices do not fully reflect the implications of current earnings for future earnings. *J. Accounting Econom.* 13(4):305–341.

Brown S, Hillegeist S, Lo K (2009) The effect of earnings surprises on information asymmetry. *J. Accounting Econom.* 47(3):208–225.

Burgstahler D, Chuk E (2010) Earnings precision and the relations between earnings and returns. Working paper, University of Washington, Seattle.

Burgstahler D, Dichev I (1997) Earnings management to avoid earnings decreases and losses. *J. Accounting Econom.* 24(1):99–126.

Burgstahler D, Eames M (2006) Management of earnings and analysts' forecasts to achieve zero and small positive earnings surprises. *J. Bus. Finance Accounting* 33(5–6):633–652.

Bushee B, Miller G (2012) Investor relations, firm visibility, and investor following. *Accounting Rev.* 87(3):867–897.

Busse J, Green C (2002) Market efficiency in real time. *J. Financial Econom.* 65(3):415–437.

Chen S, Matsumoto D, Rajgopal S (2011) Is silence golden? An empirical analysis of firms that stop giving quarterly earnings guidance. *J. Accounting Econom.* 51(1–2):134–150.

Chuk E, Matsumoto D, Miller G (2013) Assessing methods of identifying management forecasts: CIG vs. researcher collected. *J. Accounting Econom.* 55(1):23–42.

Darrat AF, Mukherjee TK (1995) Inter-industry differences and the impact of operating and financial leverages on equity risk. *Rev. Financial Econom.* 4(2):141–155.

Dechow P, Ge W, Larson C, Sloan R (2011) Predicting material accounting misstatements. *Contemporary Accounting Res.* 28(1): 17–82.

Doyle J, Jennings J, Soliman M (2013) Do managers define non-GAAP earnings to meet or beat analyst forecasts? *J. Accounting Econom.* 56(1):40–56.

Doyle J, Lundholm R, Soliman M (2006) The extreme future stock returns following I/B/E/S earnings surprises. *J. Accounting Res.* 44(5):849–887.

Fama EF, French KR (1997) Industry costs of equity. *J. Financial Econom.* 43(2):153–193.

Foster G, Olsen C, Shevlin T (1984) Earnings releases, anomalies and the behavior of security returns. *Accounting Rev.* 59(4):574–603.

Freeman R, Tse S (1992) A non-linear model of security price responses to unexpected earnings. *J. Accounting Res.* 30(2): 185–209.

Gu F, Li J (2007) The credibility of voluntary disclosure and insider stock transactions. *J. Accounting Res.* 41(5):867–890.

Houston JF, Lev B, Tucker JW (2010) To guide or not to guide? Causes and consequences of stopping quarterly earnings guidance. *Contemporary Accounting Res.* 27(1):143–185.

Huddart S, Ke B (2007) Information asymmetry and cross-sectional determinants of insider trading. *Contemporary Accounting Res.* 24(1):195–232.

Irvine P (2003) The incremental impact of analyst initiation of coverage. *J. Corporate Finance* 9(4):431–451.

Kasznik R, Lev B (1995) To warn or not to warn: Management disclosures in the face of an earnings surprise. *Accounting Rev.* 70(1):113–134.

Ke B, Huddart S, Petroni K (2003) What insiders know about future earnings and how they use it: Evidence from insider trades. *J. Accounting Econom.* 35(3):315–346.

Kinney W, Burgstahler D, Martin R (2002) Earnings surprise "materiality" as measured by stock returns. *J. Accounting Res.* 40(5): 1297–1329.

Kothari SP, Shu S, Wysocki P (2009) Do managers withhold bad news? *J. Accounting Res.* 47(1):241–276.

Lang M, Lundholm R (1993) Cross-sectional determinants of analyst ratings of corporate disclosures. *J. Accounting Res.* 31(1):246–271.

Lang M, Lundholm R (1996) Corporate disclosure policy and analyst behavior. *Accounting Rev.* 71(2):467–492.

Lawrence A, Minutti-Meza M, Zhang P (2011) Can Big 4 versus non-Big 4 differences in audit-quality proxies be attributed to client characteristics? *Accounting Rev.* 86(1):259–286.

Lehavy R, Sloan R (2008) Investor recognition and stock returns. *Rev. Accounting Stud.* 13(2–3):327–361.

Liu J, Nissim D, Thomas J (2002) Equity valuation using multiples. *J. Accounting Res.* 40(1):135–172.

Livnat J, Mendenhall R (2006) Comparing the post-earnings announcement drift for surprises calculated from analyst and time series forecasts. *J. Accounting Res.* 44(1):177–205.

Maguire T (2002) Surprises keep the market on its toes. *Daily Telegraph* (Sydney, Australia) (March 11).

McVay S (2006) Earnings management using classification shifting: An examination of core earnings and special items. *Accounting Rev.* 81(3):501–531.

Merton RC (1987) A simple model of capital market equilibrium with incomplete information. *J. Finance* 42(3):483–510.

Myers A (2010) It's no surprise—We have earnings growth. Accessed September 26, 2011, http://www.aeriecapitalmgmt.com/2010/11/29/its-no-surprise-we-have-earnings-growth.

Odean T (1999) Do investors trade too much? *Amer. Econom. Rev.* 89(5)1279–1298.

Owens E, Wu J, Zimmerman J (2015) Heterogeneity in firm underlying economics and abnormal accrual models. Working paper, Emory University, Atlanta.

Payne JL, Thomas WB (2003) The implications of using stock-split adjusted I/B/E/S data in empirical research. *Accounting Rev.* 78(4):1049–1067.

Petersen M (2009) Estimating standard errors in finance panel data sets: Comparing approaches. *Rev. Financial Stud.* 22(1):435–480.

Ramnath S, Rock S, Shane P (2008) Financial analyst forecasting literature: A taxonomy and suggestions for future research. *Internat. J. Forecasting* 24(1):34–75.

Skinner D (1994) Why firms voluntarily disclose bad news. *J. Accounting Res.* 32(1):38–61.

Skinner D (1997) Earnings disclosures and stockholder lawsuits. *J. Accounting Econom.* 23(3):249–283.

Sengupta P (2004) Disclosure timing: Determinants of quarterly earnings release dates. *J. Accounting Public Policy* 23(6):457–482.

Thomson Reuters (2010) Methodology for estimates—A guide to understanding Thomson Reuters methodologies, terms and policies for the first call and I/B/E/S estimates databases. Thomson Reuters, New York.

Tucker J (2010) Selection bias and econometric remedies in accounting and finance research. *J. Accounting Literature* 29(Winter):31–57.

Watts R, Zimmerman J (1978) Towards a positive theory of the determination of accounting standards. *Accounting Rev.* 53(1):112–134.

Watts R, Zimmerman J (1986) *Positive Accounting Theory* (Prentice-Hall, Englewood Cliffs, NJ).