Trading incentives to meet the analyst forecast

Sarah McVay · Venky Nagar · Vicki Wei Tang

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Abstract   We examine stock sales as a managerial incentive to help explain the discontinuity around the analyst forecast benchmark. We find that the likelihood of just meeting versus just missing the analyst forecast is strongly associated with subsequent managerial stock sales. Moreover, we provide evidence that managers manage earnings prior to just meeting the threshold and selling their shares. Finally, the relation between just meeting and subsequently selling shares does not hold for non-manager insiders, who arguably cannot affect the earnings outcome, and is weaker in the presence of an independent board, suggesting that good corporate governance mitigates this strategic behavior.

Keywords   Analyst forecasts · Earnings · Managerial compensation · Insider trading · Corporate governance

JEL Classification   M41 · J33 · G34

A disproportionately large number of firms just meet or beat earnings thresholds relative to the number of firms that just miss these thresholds, a phenomenon that many studies interpret as earnings management (Burgstahler & Dichev, 1997; Hayn, 1995). A key assumption underlying the earnings management interpretation of the kinks in the earnings thresholds is that managers benefit in some way by meeting the thresholds (e.g., Degeorge, Patel, & Zeckhauser, 1999). In this paper, we examine

S. McVay (✉)
Stern School of Business, New York University, 44 West Fourth Street, New York, NY 10012, USA
e-mail: smcvay@stern.nyu.edu

V. Nagar
University of Michigan, 701 Tappan Street, Ann Arbor, MI 48109, USA
e-mail: venky@umich.edu

V. W. Tang
Georgetown University, 37th and O Streets, NW, Washington, DC 20057, USA
e-mail: wt29@georgetown.edu

managerial stock sales as a managerial benefit from meeting the analyst forecast threshold.

A significant portion of managerial compensation in the U.S. is in the form of stock-based compensation, and prior literature shows that short-run stock prices are sensitive to meeting analyst forecasts (Bartov, Givoly, & Hayn, 2002; Kasznik & McNichols, 2002; Skinner & Sloan, 2002). Such positive investor reaction to just meeting the analyst forecast creates a favorable environment for managers who plan to sell their shares, thus prompting these managers to exert additional effort to just meet the analyst forecast when they otherwise would have missed the benchmark (Jensen, 2004). Our main prediction, therefore, is that management's upcoming insider sales can help explain the earnings discontinuity around the analyst forecast threshold.

We test our prediction on a sample of 21,952 firm quarters from 1990–1999 that just met (by zero or one cent) or just missed (by one or two cents) the quarterly analyst forecast. Our main result is that the likelihood of just meeting versus just missing the analyst forecast is strongly associated with subsequent managerial stock sales. Sales by managers of the ''just met'' firms (scaled by shares owned) are about 56% higher than those of the ''just missed'' firms. The difference remains significant after controlling for firm-specific and managerial factors such as performance, equity issuances, long-term growth prospects, and lagged insider sales.

We consider our finding to be evidence that managers are strategic. That is, we assume managers anticipate that the market will react differently when the analyst forecast is just missed versus just met, and undertake actions to meet the analyst forecast in order to boost their proceeds from insider sales. An alternative explanation for this empirical result, however, is that insiders sell after good performance (e.g., Heath, Huddart, & Lang, 1999). In other words, the transactions could be a passive response to performance rather than a planned event (Seyhun, 1998, Chapter 2). If we could directly measure the ex ante managerial intent to sell shares, our supposition of causality—that managers who intend to sell shares are more likely to undertake actions to meet the analyst forecast—would be on much stronger grounds. However, managerial intent is hard to measure directly and must be inferred from observable managerial activities such as *ex post* managerial sales.[1] We therefore conduct several additional tests to demonstrate that our findings do not just reflect passive insider trading in response to performance.

First, we control for variables we expect to be associated with just meeting the analyst forecast and insider trading: lagged managerial sales, profitability, stock returns, growth, equity issuances, and firm size. Next, we examine how managers who sell shares meet analyst forecasts. If managers strategically meet the analyst forecast in anticipation of selling their shares, then we may find evidence of earnings or forecast management to meet the analyst forecast. We examine discretionary working capital accruals (e.g., DeFond & Jiambalvo, 1994) and the unexpected earnings forecast measure developed in Matsumoto (2002). In support of managers

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[1] The inability to measure a manager's intent or ''scienter'' directly is well known in the legal literature (Bainbridge, 2000). Economists (and lawyers) therefore use the concept of ''revealed preference'' to infer intent from various patterns in observed data (Kreps, 1990, Chapter 2). From an institutional perspective, the only *ex ante* disclosure that managers have to file is Form 144, in which they document their intent to sell. However, managers are not obligated to sell all the shares they say they will, so most managers just keep a large open balance of shares on Form 144. Therefore, we cannot use Form 144 as a measure of the intent to sell.

actively exerting effort to meet the analyst forecast before selling their shares, we find that firms where managers sell more shares in the following quarter are significantly more likely to meet the analyst forecast threshold using discretionary working capital accruals. More interesting, this result does not hold for non-managerial insiders such as directors and large shareholders. This is important because these insiders, unlike managers, have little power to manage earnings at their convenience (i.e., when they want to sell). Thus, the accrual results are strongly suggestive of strategic behavior by managers and not the passive performance alternative.

Another way for managers to meet the analyst forecast, as Richardson, Teoh and Wysocki, (2004) argue, is to manage analyst expectations. Though we find evidence of downward analyst forecast guidance for firms that just met versus just missed the analyst forecast, we do not find evidence that they manage analyst forecasts downward more when managers sell shares.

If managers are acting opportunistically, we expect managers in well-governed firms to be less able to manipulate the outcome in their favor before selling shares. Along these lines, Bertrand and Mullainathan (2001) and Bushman and Smith (2001) argue that if a given managerial behavior is driven by opportunism (as opposed to alternative hypotheses such as the performance effect), such behavior should be less prevalent in firms with good corporate governance. We therefore examine whether our results are weaker in well-governed firms.

We use board composition as our measure of corporate governance, following Klein (2002), who finds that board composition mitigates earnings management (also see Dechow, Sloan, & Sweeney, 1996). We find that managers' propensity to sell after just meeting analyst forecasts is weaker in firms with a majority representation of outsiders on the boards, once again suggesting that our findings reflect strategic managerial behavior rather than the passive performance alternative.

In sum, by focusing on managerial incentives around the discontinuity, our evidence thus provides a direct test of models (e.g., Degeorge et al., 1999; Guttman, Kadan, & Kandel, 2006) that implicate managers' incentives as a key factor behind the observed patterns of earnings discontinuities. Thus, our paper adds to the debate on the underlying cause of the discontinuities (Ayers, Jiang, & Yeung, 2006; Beaver, McNichols, & Nelson, 2003; Bhojraj, Hribar, & Picconi, 2003; Dechow, Richardson, & Tuna, 2000; Dechow, Richardson, & Tuna, 2003; Durtschi & Easton, 2005; Ke, 2004; Phillips, Pincus, & Rego, 2003).[2]

Our study also adds to the insider trading literature. A major focus of this literature is to explore whether insider sales are informative about future firm performance (Beneish & Vargus, 2002; Beneish, Press, & Vargus, 2004; Ke, 2004; Ke, Huddart, & Petroni, 2003; Lakonishok & Lee, 2001; Noe, 1999; Piotroski & Roulstone, 2005; Roulstone, 2004; Seyhun, 1998). Our study is somewhat different in that

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[2] Durtschi and Easton (2005) has the greatest relevance in our setting, as our focus is on the zero analyst forecast error discontinuity. They argue that the kink around zero analyst forecast error is largely driven by analyst optimism versus pessimism—essentially that when analysts miss, they miss big, creating a dearth of observations in the just missed region that is not necessarily due to earnings management. Their conjecture does not prohibit our examination of this region. The shortage of firms in this region should only serve to weaken the power of our tests, as we examine whether managers who would have just missed exert additional effort to jump the hurdle when they plan to sell their shares. Our claim is not that the discontinuity around the zero analyst forecast is exclusively due to earnings management, but that trading incentives accentuate this kink.

we are not interested in earnings subsequent to insider sales. Rather, we attempt to explain earnings patterns prior to insider sales. Several recent papers have taken this route. For example, Summers and Sweeney (1998) and Beneish (1999) examine earnings prior to insider sales in the extreme cases of earnings fraud and SEC enforcement actions, respectively, and Bartov and Mohanram (2004) find that earnings are abnormally high prior to option exercises.

Finally, our study speaks to the role of earnings in managerial compensation. Because earnings are a key determinant of stock prices, earnings affect compensation both directly through earnings-based contractual arrangements, and indirectly through stock-price contracts. As evidence of the direct effect, Matsunaga and Park (2001) find that managers' cash bonuses increase with meeting analyst forecasts. Our study provides evidence of the indirect effect by showing that managers' proceeds from insider sales increase with meeting analyst forecasts and thereby affect their decision to meet this threshold.[3]

The remainder of the study is organized as follows. Reviewing the literature, we develop our hypotheses in Sect. 1. We explain our data in Sect. 2. Section 3 contains our empirical results, and the final section concludes.

1 Hypothesis development

1.1 Model

In general, it is difficult to provide incontrovertible evidence that reported earnings in a given situation reflect active earnings management and not genuine firm performance (e.g., McNichols, 2000). Consequently, Burgstahler and Dichev (1997) and Degeorge et al. (1999) concentrate on a narrower setting, and point to jumps in the population density of firms around earnings thresholds such as analyst forecasts and zero earnings as evidence of earnings management.

Our paper examines whether managerial incentives can help explain these discontinuities. We use the framework provided in Degeorge et al. (1999) to motivate our empirical analyses. Degeorge et al. (1999) present a two-period model of earnings management (hereafter the model), where managers maximize their personal payoff. The model assumes that the manager's expected reward schedule falls sharply at one or more thresholds. Thus, when latent earnings are slightly below the earnings threshold, the manager is expected to manage earnings upward.

To test the model, therefore, we need (a) an earnings threshold, and (b) a clear threshold-related reward schedule. The business press and CEO surveys indicate that meeting analyst forecasts of quarterly earnings was the key earnings threshold in the 1990s (e.g., Berenson, 2003; Graham, Harvey, & Rajgopal, 2005). Recent accounting literature is also consistent with this assertion (Brown & Caylor, 2005; Dechow et al., 2003). Therefore, we focus primarily on the analyst forecast threshold (though we examine other earnings thresholds in Sect. 3.5).

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[3] In related work, Ke (2004) examines the prior earnings threshold and finds that managers with more equity incentives are more likely to manage earnings to report longer earnings strings. Ke (2004) also finds that these managers sell significant amounts of stock in the two to six quarters prior to a break in a string of consecutive earnings increases. Cheng and Warfield (2005) also examine the role of managerial motives in the context of the analyst forecast error discontinuity. They find that managers with high levels of equity incentives are more likely to have met the analyst forecast.

The second feature of the model is that the manager's welfare depends on meeting the threshold, and managers with greater net personal benefits to meeting the threshold will be more likely to manage earnings. We use stock sales as our measure of managerial incentives, for several reasons. First, stock-based compensation arrangements such as options and shares have been a significant source of incentives for managers in recent years (Hall & Liebman, 1998; Ofek & Yermack, 2000). Second, prior literature has documented a direct link between equity prices and meeting the analyst forecast (Freeman & Tse, 1992; Bartov et al., 2002; Kasznik & McNichols, 2002; Skinner & Sloan, 2002).[4] Thus, the ability to sell stock at favorable terms provides managers a natural threshold-related reward schedule.[5]

1.2 Institutional costs

Clearly, an institutional cost confronting all insiders in their sales decisions is the possibility of insider trading penalties. Insider trading laws such as the 1988 Insider Trading and Securities Fraud Enforcement Act basically prohibit stock trades by any person deemed to be an insider while in possession of material, nonpublic information (Garfinkel, 1997; Seyhun, 1998). Most insider trading investigations are spurred by insider trading that occurs before announcements of earnings, dividends, or takeovers (Seyhun, 1998). Many firms, therefore, have adopted insider trading blackout periods to reduce the likelihood of insider trading infractions (Bainbridge, 2000). As Bettis, Coles, and Lemmon (2000) document, such blackout periods typically occur *before* the earnings announcement. By contrast, we examine insider trading that occurs *after* the earnings announcement. Furthermore, Bartov et al. (2002) show that firms just meeting the earnings threshold (even with accruals) receive an equity premium that persists for at least three years. Thus our setting provides a convenient way for insiders to strategically sell shares without triggering price-drop based penalties.[6]

1.3 Hypothesis development

We are by no means the first to suggest that managers undertake actions to heighten the value of their stock or stock-based compensation—it is a charge often made in

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[4] These empirical studies are validated by theoretical work that shows that stock prices are extraordinarily sensitive to small events such as firms just missing earnings thresholds. This theoretical result obtains both when a) investors have behavioral biases (e.g., Rabin, 2002), and (b) when investors are rational, but have incomplete information about the firm's future prospects (Hart & Kreps, 1986; Stein, 1987). The intuition in Hart and Kreps (1986) is that speculators are always in search of the "the next big stock," resulting in extreme volatility in price relative to small changes in fundamentals.

[5] We realize that in a more complex setting, a rational forward-looking manager will conduct a long-range optimization, weighing the impact of managing earnings today on future period earnings and future period stock incentive dynamics. We abstract from this complex setting and focus on a single period setting (see Bolton, Scheinkman, & Xiong, 2006 for a multi-period model).

[6] To shed light on the possibility of price-drop-based penalties, we examine the subsequent returns following the trades by management, beginning one day following the managerial trade and ending one day before the manager files the trade with the SEC. The subsequent market-adjusted returns following managerial sales, though significantly lower than for those where the manager purchased shares, remain *positive*. This finding is consistent with Bartov et al. (2002)—that regardless of how the benchmark is met, there is a premium to meeting the benchmark. This premium alleviates concerns about price-drop-based insider trading penalties.

the business press (e.g., Berenson, 2003). There is also systematic evidence that stock incentives, both in levels and flows, drive managerial opportunism. With respect to stock holding *levels*, Erickson, Hanlon, and Maydew (2006) find that managers with higher proportions of stock-based compensation and greater pay-for-performance sensitivity are more likely to commit earnings fraud, and Gao and Shrieves (2002) and Cheng and Warfield (2005) show that firms that offer high levels of stock compensation are more likely to have high discretionary accruals. Likewise, Ke (2004) finds that CEOs with higher levels of stock compensation are more likely to manage earnings to sustain strings of earnings increases.

The effect of earnings management on stock price is likely to have a finite horizon, due to factors such as subsequent accrual reversal. Therefore, managers undertaking earnings management to heighten prices must reap the benefits in this horizon. Consequently, the liquid part (or *flow*) of managerial shareholdings can matter more than the illiquid holdings. Bushman and Indjejikian (1995) make this point analytically by showing that managers' motives to change the stock price are associated with the number of shares they wish to trade in the current period, and not their holdings. Prior empirical literature also suggests that managers manage earnings and investor perceptions of firm fundamentals both prior to stock or option inflows (Aboody & Kasznik, 2000; Baker, Collins, & Reitenga, 2003; Yermack, 1997), and prior to stock or option outflows (Bartov & Mohanram, 2004; Beneish, 1999; Ke, 2004; Summers & Sweeney, 1998).

We expect managers to anticipate the differential price reaction to just missing versus just meeting the analyst forecast and exert additional effort to meet the analyst forecast when they plan to sell shares following the earnings announcement. We develop this idea through several stages, and our first hypothesis is:

H1 *Firms that just met the analyst forecast earnings threshold have higher managerial insider sales following the earnings announcement relative to firms that just missed this threshold.*

We posit that managers exert additional effort to meet the analyst forecast and then sell shares (hereafter *active* trading). In the event that our findings are consistent with Hypothesis 1, a competing explanation is one of reverse causality. Prior behavioral research (e.g., Heath et al., 1999) indicates that managers are more likely to sell when stock prices have risen, which is more likely for firms that have just met rather than just missed the analyst forecast. Following Seyhun (1998, Chapter 2), we call this *passive* trading. Clearly active and passive trading are not mutually exclusive, but we want to ensure that our main result is not driven entirely by passive trading.

As a first step towards resolving this issue, we include several controls for performance in our test of Hypothesis 1, such as past and current stock returns. To further distinguish between active and passive trading, we present three additional tests. First, we examine *how* managers meet thresholds. We posit that under active trading, managers will exert effort, through either earnings management or forecast management, to meet the analyst forecast.[7] Under passive trading, however, there is

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[7] Forecast management is the lowering of the analyst forecast to a beatable level through guidance by managers (e.g., Bartov et al., 2002; Cotter, Tuna, & Wysocki, 2004; Matsumoto, 2002; Richardson et al., 2004).

no anticipated systematic relation with outcome management. Therefore, if we find evidence that managers use earnings or forecast management to just meet the analyst forecast before selling shares, we have more confidence in the strategic interpretation of our findings. Thus, our second hypothesis is:

H2 *Managers who sell stock following the earnings announcement are more likely to manage earnings or forecasts to just meet the analyst forecast earnings threshold.*

While our focus is on managerial insiders, the definition of insiders also includes other parties such as directors and large shareholders. These non-managerial insiders are likely to have less power to manage earnings at their convenience (i.e., when they want to sell) compared to managers. However, if our results are merely a result of passive responses to performance, we expect the result to hold for non-managers. Thus, our third hypothesis is:

H3 *The association between the likelihood of meeting the analyst forecast and stock sales following the earnings announcement is stronger for managers' stock sales than for non-manager insiders' stock sales.*

If insiders sell opportunistically, an immediate question is why shareholders do not prevent this opportunistic behavior. Good corporate governance is a prominent tool that shareholders use to reduce managerial opportunism and corporate misreporting (Bushman & Smith, 2001; Klein, 2002). Bertrand and Mullainathan (2001, p. 903) argue that one way to explore if a given managerial behavior reflects opportunism as opposed to other explanations (such as passive performance based trading) is to determine whether such behavior is mitigated in well-governed firms. This leads to our fourth and final hypothesis:

H4 *Firms with poor corporate governance have a stronger association between managers' insider sales and the likelihood of just meeting versus just missing the analyst forecast.*

2 Data and variable definitions

2.1 Data

We study the period 1990–1999. The 1990s saw high levels of stock-based compensation for management (Ofek & Yermack, 2000; Rose & Wolfram, 2000), suggesting that these managers had strong stock-based motives for earnings management. We obtain open market insider trades from Thomson Financial (available through Wharton Research Data Services). This database identifies insider transactions both by the type of transaction (e.g., open market sales or open market purchases) and by insider type (e.g., management, non-management). We obtain financial data from the 2003 Quarterly Compustat File, and analyst forecasts, reported actual earnings, and long-term growth estimates from the 2003 I/B/E/S Unadjusted Summary File. We obtain the proceeds from equity issuances from SDC Platinum. Finally, we obtain our corporate governance measure from the Investor Research Responsibility Center's (IRRC) corporate governance dataset. To be

included in the sample, the firm must be a December year-end firm (to aid in the matching of I/B/E/S and Compustat quarters) and have non-missing data for each of the independent variables used to test Hypothesis 1.

2.2 Variable definitions

2.2.1 Main variables

Our two main variables are (1) whether the manager just met versus just missed the analyst forecast ($Meet_q$) and (2) the magnitude of insider sales following the earnings announcement (Mgr_Sales_{q+1}). $Meet_q$ is an indicator variable that is equal to one if the quarterly consensus analyst forecast error is equal to zero or one cent and zero if the forecast error is equal to negative one or negative two cents. We focus on the un-scaled forecast error following Degeorge et al. (1999) and Kasznik and McNichols (2002). The un-scaled error is what investors see and is therefore most likely to affect prices.[8]

As our focus is on the discontinuity around the analyst forecast threshold, we include only those firms that are just around this threshold. A potential concern with our analysis is that the firms which would have ''just missed'' the analyst forecast may have taken a ''big bath.'' We would miss such firms in our sample. However, it is important to note that the majority of big bath expenses, such as asset write-offs, are considered transitory by analysts. I/B/E/S earnings, both forecasts and realizations, tend to exclude these transitory charges. Therefore, while managers of just missed firms may choose to take big baths, we expect the majority of these firms to continue to be classified as ''just missed'' firms in our sample.[9]

Turning to the measurement of insider trades, we use realized insider sales in our analyses.[10] Because quarter q earnings are released in quarter $q + 1$, we measure insider sales from the day after the earnings announcement until the end of the quarter (Fig. 1).[11] Each firm has many officers, each of whom can make multiple trades each quarter. We therefore must generate a summary statistic of this insider

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[8] The quarterly consensus analyst forecast is the median EPS forecast computed over the set of the analysts' most recent forecasts that are no earlier than two months before the quarterly earnings release date. This procedure avoids the problem of stale analyst forecasts. We use the unadjusted I/B/E/S forecasts to avoid losing the precision in the decimal places of the forecasts due to the I/B/E/S adjustments of prior forecasts for subsequent stock splits (Baber & Kang, 2002; Payne & Thomas, 2003). Actual earnings realizations are also obtained from I/B/E/S. Note that stock splits are not an issue for insider stock sales because we scale this measure by contemporaneous insider stock holdings.

[9] Also note that our tests include all firm-quarters in which the firm just met or just missed the analyst forecast. We do not use a matched sample approach, which Palepu (1986) argues biases the results by distorting the baseline proportions of the treatment firms.

[10] The use of realized outcomes as a proxy for intent is widespread in studies that examine earnings patterns prior to an event such as stock issuance, option grants and cash pay (e.g., Aboody & Kasznik, 2000; Rangan, 1998; Teoh, Welch & Wong, 1998). In all these cases, when managers take the action prior to the event, they are anticipating that the event of interest will subsequently happen. Like our study, these studies use the actual realization of the event in their empirical tests, not the managers' ex ante anticipation.

[11] Ke et al. (2003) use a similar trading window (see pp. 322–323). Results are not sensitive to using the entire quarter, which is reasonable, because insiders typically do not sell prior to earnings releases. In our sample, 92% of all manager insider trades in a quarter (and 88% of non-manager insider trades) occur after the earnings announcement in that quarter.
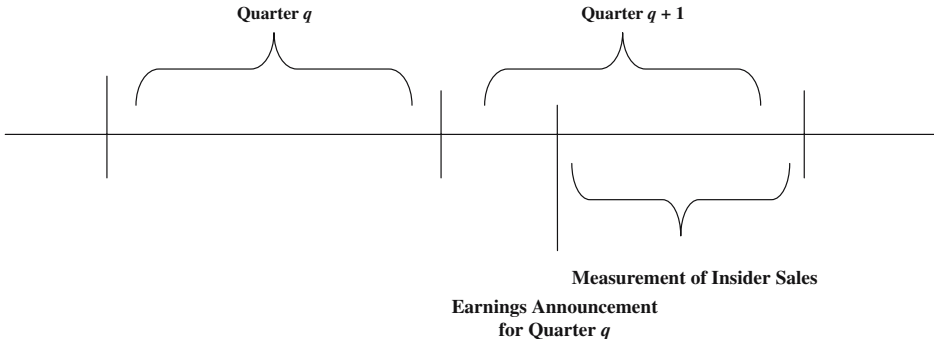
Fig. 1 Timeline of events

trading data. Prior literature does not appear to have converged on an appropriate summary statistic of insider trading data, and each measure has its limitations (Seyhun, 1998, Chapter 1). For example, Noe (1999) uses the square root of the dollar value of insider sales, while Beneish and Vargus (2002) use the net number of shares traded scaled by total shares outstanding, and Lakonishok and Lee (2001) use net purchases scaled by total number of trades. In Bar-Gill and Bebchuk's (2003) model, the manager's opportunistic behavior is a function of the percentage of his shareholdings he intends to unwind—the greater the proportion of intended sales, the greater the incentive for managers to exert effort to increase the price—and none of the above empirical metrics account for insider ownership. Consequently, recent empirical insider trading studies such as Jenter (2005) scale net purchases by managers' holdings. The scaling also facilitates comparison across firms with different levels of managerial ownership and insider sales. Therefore, we measure insider sales as a proportion of managerial ownership. For each firm quarter, we define net open market insider sales as:

$$Mgr\_Sales_{q+1} = \left[\sum_{i=1,h=1}^{I,H} (SS_{ih}/SH_{ih}) - \sum_{i=1,h=1}^{I,H} (SP_{ih}/SH_{ih}) \right]$$

where SS_{ih}, SP_{ih}, SH_{ih} are shares sold in the open market, purchased in the open market, and held by officer i for each post-announcement trade h for the given firm in the given quarter.[12]

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[12] The officer shareholdings listed on the SEC filing of a trade can sometimes be very small. To mitigate the generation of outliers due to this small denominator effect, we add back the shares traded in a transaction to the corresponding ownership level figure for all observations. We also exclude option exercises, because the conversion of an option to a share is not really a true purchase. Of course, we include all sales of such shares. Finally, note that we ignore option holdings in the denominator, because the insider trading data do not include option holdings. Substantiating the validity of our metric, alternative insider trading measures such as the square root of the dollar value of insider sales (Noe, 1999, p. 311), and the Net Shares Traded metric (Beneish & Vargus, 2002, p. 761) are correlated with our metric at .86 and .94, respectively.

2.2.2 Control variables

We regress the meet or beat indicator on managerial sales and an array of control variables, which we now motivate and define; data items are in parentheses and correspond to quarterly Compustat unless otherwise noted. First, we include lagged insider sales as a regressor so that our results cannot be attributed to steady-state differences in insider sales across the firms in our sample (e.g., some managers may be selling more shares because they receive more option-based pay (Ofek & Yermack, 2000)). Recent studies have focused on ''abnormal'' insider trading (e.g., Bartov & Mohanram, 2004; Beneish et al., 2004); by including lagged insider sales, we are effectively conducting a similar test.

In addition, we explicitly control for several variables that potentially influence both the insider sales regressor and whether or not a firm just misses versus just meets the earnings benchmark. Degeorge et al. (1999) find that meeting the analyst forecast is not as important if the firm does not achieve the zero profit benchmark. We therefore include $Profit_q$, an indicator variable that is equal to one if actual earnings in quarter q, as reported by I/B/E/S, is greater than or equal to zero, and zero otherwise.

In addition to $Profit_q$, we use several additional metrics to control for the performance alternative. Return on Assets (ROA_q) is the operating income before depreciation (#21) for quarter q divided by the average total assets (#44) in quarter q. We include the raw quarterly stock return (*Return*) in quarter q and $q + 1$. We also include $Volume_{q+1}$, measured as the average daily trading volume for quarter $q + 1$. $Volume_{q+1}$ is intended to control for the possibility that insider sales simply mirror overall trading levels in the stock.

We include LTG_t, which is the most recent analyst forecast of long-term growth from I/B/E/S at the beginning of year t, and BM_q, the book to market ratio as of the end of quarter q, calculated as book value of equity (#59) divided by price (#14) times shares outstanding (#61). These are important controls because high-growth firms are more likely to have an extreme stock price response to missing forecasts (Skinner and Sloan, 2002), and insider selling is increasing in the growth opportunities of the stock (e.g., Ke et al., 2003).

Rangan (1998) and Teoh et al. (1998) document that managers manage earnings to boost share price in order to issue equity at favorable prices. Firm characteristics such as LTG_t indirectly control for equity issuances, because financing needs differ systematically across firm types. We also explicitly control for external financing with $SEO\$_{q+1}$, which is equal to proceeds received from equity issuances in quarter $q + 1$ scaled by the market value of equity at the beginning of quarter $q + 1$. As a size control we include $Assets_q$, measured as the log of total assets at the end of quarter q. We include year-specific indicator variables because the proportion of small positive earnings surprises versus small negative earnings surprises has increased over time (Brown, 2001). Finally, we include indicator variables for each two-digit SIC code in the sample to control for any additional industry effects.

2.2.3 Earnings and forecast management variables

We measure earnings management with discretionary working capital accruals (e.g., DeFond & Jiambalvo, 1994). We focus on working capital accruals rather than total

accruals because we are trying to pick up last-minute adjustments made by management to reach the analyst forecast. In addition, managers have more discretion over working capital accruals (DeFond & Jiambalvo, 1994). We estimate discretionary working capital accruals (*DWC*) by estimating the following regression equation:

$$WC/Assets = \beta_0(1/Assets) + \beta_1((\Delta Cash\ Sales)/Assets) + \varepsilon \qquad (1)$$

Working capital accruals (*WC*) is equal to ($\Delta Current\ Assets$ (#40) – $\Delta Cash$ (#36)) – ($\Delta Current\ Liabilities$ (#49) – $\Delta Current\ Portion\ of\ Debt$ (#45)). *Assets* is total assets (#44), and $\Delta Cash\ Sales$ is equal to ($\Delta Revenue$ (#2) – $\Delta Receivables$ (#37)). All changes are from the prior quarter, as is total assets. We estimate Eq. 1 by quarter and industry (two-digit SIC code) and decile rank the resulting residual (*DWC*). To be included, each industry quarter must have at least ten observations.[13]

Our second management variable is forecast guidance, the downward guidance of analyst forecasts to beatable levels. Prior research has found that managers, on average, use analyst forecast guidance to meet the analyst forecast (e.g., Bartov et al., 2002; Cotter et al., 2004; Matsumoto, 2002; Richardson et al., 2004). We use the measure developed in Matsumoto (2002) to capture forecast guidance. The unexpected forecast (*UEF*) is equal to the actual analyst forecast less the expected analyst forecast, $UEF = F - E[F_q]$ where F is the analyst forecast error and $E[F_q]$ is the expected forecast error, equal to $EPS_{q-4} + E[\Delta EPS_q]$ with $E[\Delta EPS_q]$ equal to $[\alpha + \beta_1(\Delta EPS_{q-1}/P_{q-5}) + \beta_2\ CRET_q] \times\ P_{q-4}$, where *CRET* is the current quarter return, and *P* is price—see Matsumoto (2002) for a more detailed description. We multiply the unexpected forecast (*UEF*) by negative one so that it is directionally the same as our earnings management measure—both metrics increase with management. As with discretionary working capital accruals, we decile rank *UEF*.

2.3 Descriptive statistics

Table 1 provides the descriptive statistics. Our sample consists of 21,952 firm-quarter observations that just met or just missed the analyst forecast from 1990–1999. To mitigate the effect of outliers, we winsorize each of our variables at 1% and 99%, by year. Significantly more firms (n = 15,183) just meet or beat earnings forecasts than just miss (n = 6,769), consistent with Degeorge et al. (1999). More important, our metric of insider sales jumps from .344 to .537, a 56% increase.

Table 2 provides the correlations between our dependent and independent variables. Insider trades by managers are correlated with insider trades by non-managers and with each of our remaining control variables, warranting these variables' inclusion in our empirical analyses.

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[13] Hribar and Collins (2002) prescribe the cash flow method to calculate accruals. However, using quarterly data, the cash flow method for our sample period results in a reduction of more than half of the sample. We do, however, replicate our results on this subset of the sample and note our results in Sect. 3.2.

Table 1 Descriptive statistics for the sample firms

Variables	Total Sample (n = 21,952)					Just met the analyst forecast (n = 15,183)		Just missed the analyst forecast (n = 6,769)	
	Mean	Median	Std Dev	Min	Max	Mean	Median	Mean	Median
Mgr_Sales_{q+1}	.478	.000	.224	–1.612	13.863	.537	.000	.344***	.000***
$Nmgr\_Sales_{q+1}$	.208	.000	1.202	–3.585	10.000	.235	.000	.147***	.000***
$Profit_q$	.935	1.000	.246	.000	1.000	.950	1.000	.902***	1.000***
ROA_q	.035	.034	.031	–.176	.134	.037	.037	.030***	.031***
$Return_q$	.030	.023	.219	–.597	1.423	.038	.029	.012***	.007***
$Return_{q+1}$	.027	.017	.227	–.656	1.462	.035	.024	.008***	.003***
$Volume_{q+1}$	26.002	8.653	51.010	.174	493.580	27.573	9.384	22.477***	7.459***
LTG_t	.184	.150	.102	.010	.700	.190	.160	.169***	.150***
BM_q	.480	.423	.317	–.423	3.069	.459	.403	.526***	.473***
$SEO\$_{q+1}$	.002	.000	.018	.000	.222	.002	.000	.001***	.000***
$Log(Assets_q)$	6.472	6.280	1.930	2.743	11.449	6.458	6.251	6.503*	6.343**

***, **, * The difference between the sub-groups is statistically significant at a two-tailed p-value $\leq .0001$, $p = .03$, or $p = .11$, respectively, under a t-test (shown on mean value above) or Wilcoxon rank-sum test (shown on median value above).

The total sample consists of 21,952 firm-quarter observations that just missed or just met the consensus analyst quarterly forecast from 1990–1999. The *Just Met* and *Just Missed* samples consist of 15,183 and 6,769 firm-quarter observations, respectively. We define the quarterly consensus analyst forecast as the median EPS forecast for the current quarter q computed over the set of the most recent analyst forecasts that are no earlier than two months before the quarterly earnings release date. *Just Met* is comprised of firms that beat the analyst forecast by zero or one cent. *Just Missed* contains those firms that missed the analyst forecast by one or two cents (computed from I/B/E/S data). $Mgr(Nmgr)\_Sales_{q+1}$ is the net shares sold as a percentage of shares owned, summed over all manager (non-manager) insiders in the firm; all insider transactions are open market. $Profit_q$ is an indicator variable equal to one if I/B/E/S actual earnings for quarter q are greater than or equal to zero, and zero otherwise. ROA_q is operating income before depreciation for quarter q scaled by the average total assets for quarter q. $Return_q$ is the raw stock return for quarter q. $Volume_{q+1}$ is the average daily trading volume (in millions) for quarter $q + 1$. LTG_t is the analysts' long-term EPS growth estimate provided by I/B/E/S at the beginning of year t. BM_q is the book to market ratio at the end of quarter q. $SEO\$_{q+1}$ is the proceeds from equity issuances in quarter $q + 1$ scaled by the market value of equity at the beginning of quarter $q + 1$. $Assets_q$ is total assets (in millions) at the end of quarter q. All variables are winsorized at 1% and 99%

3 Results

3.1 Meeting analyst forecasts

Our main regression specification is:

$$
\begin{aligned}
Prob(Meet_q) =& f(\gamma_0 + \gamma_1 Mgr\_Sales_{q+1} + \gamma_2 Mgr\_Sales_q + \gamma_3 Profit_q + \gamma_4 ROA_q \\
& + \gamma_5 Return_q + \gamma_6 Return_{q+1} + \gamma_7 Volume_{q+1} + \gamma_8 LTG_t + \gamma_9 BM_q \\
& + \gamma_{10} SEO\$_{q+1} + \gamma_{11} Log(Assets_q) + \Sigma_{t=1}^{T} \gamma_{12t} Year \\
& + \Sigma_{k=1}^{K} \gamma_{13k} SIC\_2DIGIT)
\end{aligned}
\tag{2}
$$

where $F(\gamma'X) = [e^{\gamma'X}/(1 + e^{\gamma'X})]$

Table 2 Spearman\pearson correlation matrix

Variables (p-value)	Mgr_Sales_{q+1}	$Nmngr\_Sales_{q+1}$	$Profit_q$	ROA_q	$Return_q$	$Return_{q+1}$	$Volume_{q+1}$	LTG_t	BM_q	$SEO\$_{q+1}$	$Log(Assets_q)$
Mgr_Sales_{q+1}		.294 (.0001)	.028 (.0001)	.088 (.0001)	.123 (.0001)	.130 (.0001)	.161 (.0001)	.107 (.0001)	-.153 (.0001)	.022 (.001)	.019 (.006)
$Nmngr\_Sales_{q+1}$	.298 (.0001)		.006 (.356)	.049 (.0001)	.086 (.0001)	.104 (.0001)	.071 (.0001)	.096 (.0001)	-.100 (.0001)	.063 (.0001)	-.019 (.006)
$Profit_q$	.048 (.0001)	.008 (.212)		.459 (.0001)	.040 (.0001)	-.007 (.308)	-.002 (.816)	-.183 (.0001)	-.026 (.0001)	-.006 (.386)	.175 (.0001)
ROA_q	.116 (.0001)	.099 (.0001)	.342 (.0001)		.035 (.0001)	-.016 (.022)	.068 (.0001)	.012 (.074)	-.275 (.0001)	.016 (.016)	-.120 (.0001)
$Return_q$	.129 (.0001)	.098 (.0001)	.059 (.0001)	.020 (.003)		-.065 (.0001)	.021 (.002)	-.011 (.115)	-.225 (.0001)	.094 (.0001)	.012 (.085)
$Return_{q+1}$	.162 (.0001)	.133 (.0001)	.019 (.004)	-.012 (.084)	-.065 (.0001)		.008 (.230)	.003 (.614)	.059 (.0001)	.031 (.0001)	.002 (.772)
$Volume_{q+1}$	.186 (.0001)	.108 (.0001)	-.008 (.261)	.114 (.0001)	.021 (.002)	.028 (.0001)		.047 (.0001)	-.210 (.0001)	-.005 (.468)	.423 (.0001)
LTG_t	.064 (.0001)	.120 (.0001)	-.121 (.0001)	.209 (.0001)	-.068 (.0001)	-.054 (.0001)	.049 (.0001)		-.222 (.0001)	.068 (.0001)	-.535 (.0001)
BM_q	-.205 (.0001)	-.150 (.0001)	.009 (.1708)	-.411 (.0001)	-.204 (.0001)	.066 (.0001)	-.341 (.0001)	-.293 (.0001)		-.057 (.0001)	.028 (.0001)
$SEO\$_{q+1}$	.024 (.000)	.047 (.0001)	-.004 (.516)	.020 (.003)	.079 (.0001)	.025 (.000)	.038 (.0001)	.060 (.0001)	-.070 (.0001)		-.053 (.0001)
$Log(Assets_q)$	.044 (.0001)	-.059 (.0001)	.176 (.0001)	-.225 (.0001)	.057 (.0001)	.046 (.0001)	.477 (.0001)	-.599 (.0001)	.063 (.0001)	-.034 (.0001)	

The total sample consists of 21,952 firm-quarter observations that just missed or just met the consensus analyst quarterly forecast from 1990–1999. See Table 1 for variable definitions

Table 3 Logistic regression of the probability of just meeting versus just missing analyst forecasts on managerial insider sales

Independent variables	Predicted sign	Dependent variable = $Meet_q$	
		All firms that just met or just missed the analyst forecast Logit estimate (Pr > X^2)	Firms with non-zero insider trading that just met or just missed the analyst forecast Logit estimate (Pr > X^2)
Intercept		.358 (.198)	−.036 (.930)
Mgr_Sales$_{q+1}$	**(+)**	**.033 (.005)**	**.024 (.071)**
Mgr_Sales$_q$		−.000 (.969)	−.010 (.458)
Profit$_q$		.431 (.001)	.483 (.001)
ROA$_q$		6.440 (.001)	7.296 (.001)
Return$_q$		.617 (.001)	.778 (.001)
Return$_{q+1}$		.778 (.001)	.774 (.001)
Volume$_{q+1}$		−.001 (.125)	−.001 (.100)
LTG$_t$		1.867 (.001)	2.524 (.001)
BM$_q$		−.268 (.001)	−.325 (.001)
SEO$\$_{q+1}$		2.589 (.010)	1.536 (.286)
Log(Assets$_q$)		.067 (.001)	.066 (.002)
Year Dummies		*Included*	*Included*
Two-digit SIC Dummies		*Included*	*Included*
Number of observations		21,952	9,012
Likelihood ratio		1,452.46 (.001)	684.87 (.001)

The total sample consists of 21,952 firm-quarter observations that just missed or just met the consensus analyst quarterly forecast from 1990–1999. $Meet_q$ is an indicator variable equal to one if the firm's realized I/B/E/S EPS beats the analyst forecast by zero or one cent, and zero if the firm misses the analyst forecast by one or two cents. See Table 1 for additional variable definitions. All significance levels are two-tailed

Table 3 presents our results. Overall, the regression model has significant explanatory power (the Likelihood Ratio statistic is significant at less than .001). Hypothesis 1 predicts that executives who sell shares have a greater incentive to meet the analyst forecast. In support of Hypothesis 1, in Table 3, Column 1, the coefficient on Mgr_Sales_{q+1} is .033 (*p*-value = .005). Turning to the control variables, lagged managerial sales is not a significant explanatory variable, suggesting that timing matters—it is not merely the steady state level of insider trades that is associated with just meeting the analyst forecast. Further, consistent with Degeorge et al. (1999), firms are more likely to just meet (versus just miss) the analyst forecast if they had nonnegative earnings. High-performing firms are more likely to just meet the analyst forecast, as are high-growth firms and firms that are planning to issue equity.[14] Finally, larger firms are more likely to meet the analyst forecast.

---

[14] Skinner and Sloan (2002) find that high-growth firms have a more negative stock price reaction to missing versus meeting the analyst forecast than non-high-growth firms. Consistent with these firms having a greater incentive to meet the analyst forecast, we find that growth, as a control variable, is positively associated with just meeting versus just missing the analyst forecast. However, it is also possible that there is an interactive effect. To explore this, we interact I/B/E/S expected long-term growth and insider sales. The sign on the interaction term is positive, as expected, but only marginally significant (*p*-value = .109; not tabulated).

The median insider sales by managers is zero (see Table 1). Therefore, in the second column of results, we re-estimate Eq. 2 with only non-zero insider sales (following for example, Rozeff & Zaman, 1998; Piotroski & Roulstone, 2005). Results are similar, suggesting that the magnitude (and not just occurrence) of next quarter insider sales matters in explaining whether the firm just meets or misses this quarter's forecast.

3.1.1 The endogenous nature of insider sales

As we have discussed above, managerial sales may simply be a result of a passive response to meeting analyst forecasts—managers sell following good performance. One way to address this issue is to conduct a two-stage least squares approach where we explicitly model insider trading; the feasibility of this approach relies heavily on the validity of the model (Larcker & Rusticus, 2005). We explore this avenue by first forming a first-stage model of managerial sales. We include lagged insider sales, contemporaneous non-manager insider sales, the number of stock options granted and exercised, and the ownership percentage of managers in the prior year. We also adjust for past market movements (Rozeff & Zaman, 1998) and short-term stock price run-up (Heath et al., 1999) by including the raw stock returns of quarter q and $q + 1$. Finally, we include each of the variables that would be included in the second stage, from our main regression Eq. 2, since all exogenous variables in the second stage should be included in the first-stage regression in a two-stage estimation procedure (Maddala, 1977, p. 232). We compare the F-statistic from this first-stage model, 19.15, to the critical value of 26.80 (Stock, Wright, & Yogo, 2002), and conclude that our first-stage regression is inadequate. Therefore, we focus our tests on our OLS specification (Eq. 2 above). To the extent that our OLS specification does not adequately control for the endogeneity of trades to factors such as performance, our tests of Hypotheses 2, 3, and 4 provide additional assurance that our associations are due to strategic actions rather than a mere passive response to performance.

3.2 How managers meet the analyst forecast benchmark

Hypothesis 2 suggests that managers who sell shares manage earnings or forecasts to reach the analyst forecast threshold. In this section we examine one proxy for each of these actions to shed light on Hypothesis 2. We examine discretionary working capital accruals (DWC) as our measure of earnings management (e.g., DeFond & Jiambalvo, 1994) and the unexpected forecast (UEF) as our measure of forecast guidance (e.g., Matsumoto, 2002). To test Hypothesis 2, we estimate:

$$
\begin{aligned}
Prob(Meet_q) = f(&\gamma_0 + \gamma_1 Rank(DWC_q) + \gamma_2 Rank(UEF_q) + \gamma_3 Mgr\_Sales_{q+1} \\
&+ \gamma_4 Rank(DWC_q \times Mgr\_Sales_{q+1}) + \gamma_5 Rank(UEF_q \times Mgr\_Sales_{q+1}) \\
&+ \gamma_6 Mgr\_Sales_q + \gamma_7 Profit_q + \gamma_8 ROA_q + \gamma_9 Return_q + \gamma_{10} Return_{q+1} \\
&+ \gamma_{11} Volume_{q+1} + \gamma_{12} LTG_t + \gamma_{13} BM_q + \gamma_{14} SEO\$_{q+1} \\
&+ \gamma_{15} Log(Assets_q) + \Sigma_{t=1}^{T} \gamma_{16t} Year + \Sigma_{k=1}^{K} \gamma_{17k} SIC\_2DIGIT)
\end{aligned}
\tag{3}
$$

where $F(\gamma'X) = [e^{\gamma'X}/(1 + e^{\gamma'X})]$

Table 4 Logistic regression of the probability of just meeting versus just missing analyst forecasts on managerial insider sales, earnings management, and analyst forecast guidance

Independent variables	Predicted sign	Dependent variable = $Meet_q$ Logit estimate (Pr $> X^2$)
Intercept		–.562 (.149)
$Rank(DWC_q)$		.002 (.831)
$Rank(UEF_q)$		.046 (.001)
Mgr_Sales_{q+1}		.035 (.017)
$Rank(DWC_q \times Mgr\_Sales_{q+1})$	**(+)**	**.015 (.076)**
$Rank(UEF_q \times Mgr\_Sales_{q+1})$	**(+)**	**.001 (.887)**
Mgr_Sales_q		–.001 (.919)
$Profit_q$		.413 (.001)
ROA_q		6.397 (.001)
$Return_q$		.607 (.001)
$Return_{q+1}$		.739 (.001)
$Volume_{q+1}$		–.001 (.013)
LTG_t		1.745 (.001)
BM_q		–.161 (.040)
$SEO\$_{q+1}$		1.818 (.182)
$Log(Assets_q)$		.089 (.001)
Year Dummies		*Included*
Two-digit SIC Dummies		*Included*
Number of Observations		11,939
Likelihood Ratio		881.60 (.001)

The total sample consists of 21,952 firm-quarter observations that just missed or just met the consensus analyst quarterly forecast from 1990–1999. $Meet_q$ is an indicator variable equal to one if the firm's realized I/B/E/S EPS beats the analyst forecast by zero or one cent, and zero if the firm misses the analyst forecast by one or two cents. DWC_q, is discretionary working capital accruals in quarter q and UEF is the unexpected forecast, equal to the actual analyst forecast less the expected analyst forecast, multiplied by negative one. See Sect. 2.2.3 for additional details on DWC and UEF. See Table 1 for additional variable definitions. All significance levels are two-tailed

Variables are defined in Sect. 2.2.3. Because we rank DWC_q and UEF_q, we also rank $DWC_q \times Mgr\_Sales_{q+1}$ and $UEF_q \times Mgr\_Sales_{q+1}$ by multiplying the unranked measures and then ranking the product in deciles by quarter. Table 4 presents the results. As predicted, the coefficient on the interaction term $Rank(DWC_q \times Mgr\_Sales_{q+1})$ is positive and significant ($\gamma_4 = .015$; *p*-value = .076), suggesting that the more shares managers sell in the next quarter, the more likely they are to manage working capital accruals to meet the analyst forecast.[15] It is important to note that this result is not simply due to high discretionary working capital accruals representing good performance. To the extent that good performance allows the firm to meet the analyst forecast, this would come through in the main effect of discretionary working capital accruals or our other performance variables (e.g., ROA or *Returns*). The significance of the interaction of insider sales and accruals suggests

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[15] As noted in Sect. 2.2.3, Hribar and Collins (2002) prescribe the cash flow method to calculate accruals. However, using quarterly data, the cash flow method for our sample period results in a reduction of more than half of the sample (from 11,939 in Table 4 to 5,204 firm-quarter observations). We replicate our results on this subset of the sample and results are similar, though weaker (.018; *p*-value = .196 vs. .015; *p*-value = .076 in Table 4). This appears to be due to low power, as the main effect on managerial sales is also very weak (.035; *p*-value = .240 vs. .035; *p*-value = .017 in Table 4).

that managers are managing accruals upwards in order to meet the analyst forecast before selling their shares.[16]

Turning to forecast guidance, while the main effect of UEF_q is positive and significant, consistent with managers managing forecasts downwards to beatable levels on average, it does not appear to be the case that managers who sell more shares are more effective in persuading analysts to lower their forecasts.[17] This is consistent with prior studies that show that other factors such as investment banking affiliations are the key drivers of the extent to which managers can persuade analysts to change their forecasts (Lin & McNichols, 1998).

3.3 Insider trades by non-managers

To test Hypothesis 3, we include non-manager trades as an additional regressor ($Nmgr\_Sales_{q+1}$) in Table 5; non-manager trades are those undertaken by other insiders such as directors or large shareholders. The coefficient on $Nmgr\_Sales_{q+1}$ is not statistically different from zero (coefficient = .009; p-value = .538) while Mgr_Sales_{q+1} remains significant (coefficient = .031; p-value = .010). This result is consistent with Hypothesis 3—not only are managerial sales more strongly associated with just meeting the forecast, non-managerial sales are not associated with just meeting the forecast at all after controlling for performance.

To further distinguish between strategic actions by managers and a passive response to performance, we next re-examine our test of how managers met the forecast before selling their shares. If the accrual result in Table 4 reflects managerial manipulation of earnings, it should not be present for non-managers, as these parties have little power to change earnings at their convenience. Column 2 of Table 5 confirms this prediction. There is no relation between insider trading by non-managers and earnings management. In sum, the empirical results for Hypotheses 1 and 2 are not present for non-manager insider sales, suggesting that our findings are not a byproduct of insiders' behavioral responses to performance, but rather evidence of strategic actions taken by managers.[18]

---

[16] As an additional robustness check (not tabulated), we re-estimate Eq. 3 and include the ranked interaction of DWC_q with the quarter q (lagged) insider sales measure. The addition of this new interaction term does not change the results and the new interaction term itself is not significant, suggesting that our results are not simply an artifact of firms that have more insider sales in general. Rather, the timing of insider sales matters.

[17] Note that these results are not consistent with those in Richardson et al. (2004). However, we focus only on those firms that *just* met the analyst forecast, rather than all firms that met the analyst forecast. Furthermore, Richardson et al. (2004) exclude all observations that met the analyst forecast but began the period with a pessimistic forecast. If we regress meeting the analyst forecast versus missing the analyst forecast for the entire earnings forecast region on the interaction of the unexpected forecast and managerial insider sales, we obtain a positive and significant coefficient on the interaction term, consistent with Richardson et al. (2004).

[18] Clearly, there are many differences between managerial and non-managerial insiders beyond their ability to affect earnings outcomes. This test alone does not provide definitive evidence that managers are actively meeting the analyst forecast before selling shares, but instead complements the findings in Hypothesis 1 and Hypothesis 2, adding to our aggregate evidence on active earnings or forecast management by managerial insiders to meet the analyst forecast.

Table 5 Logistic regression of the probability of just meeting versus just missing analyst forecasts on managerial insider and non-managerial insider sales

Independent variables	Predicted sign	Dependent variable = $Meet_q$	
		Logit estimate (Pr > X^2)	Logit estimate (Pr > X^2)
Intercept		.360 (.194)	−.526 (.178)
Rank(DWC$_q$)			.006 (.472)
Rank(UEF$_q$)			.045 (.001)
Mgr_Sales$_{q+1}$		.031 (.010)	.037 (.014)
Nmgr_Sales$_{q+1}$	**(insignificant)**	**.009 (.538)**	**.003 (.861)**
Rank (DWC$_q$ × Nmgr_Sales$_{q+1}$)	**(insignificant)**		**.002 (.843)**
Rank(UEF$_q$ × Nmgr_Sales$_{q+1}$)	**(insignificant)**		**.008 (.347)**
Mgr_Sales$_q$		−.004 (.715)	−.004 (.746)
Nmgr_Sales$_q$		.018 (.142)	.014 (.360)
Profit$_q$		.431 (.001)	.406 (.001)
ROA$_q$		6.437 (.001)	6.43 (.001)
Return$_q$		.609 (.001)	.599 (.001)
Return$_{q+1}$		.776 (.001)	.742 (.001)
Volume$_{q+1}$		−.001 (.112)	−.001 (.012)
LTG$_t$		1.845 (.001)	1.727 (.001)
BM$_q$		−.264 (.001)	−.160 (.042)
SEO\$$_{q+1}$		2.548 (.011)	1.767 (.195)
Log(Assets$_q$)		.067 (.001)	.088 (.001)
Year Dummies		*Included*	*Included*
Two-digit SIC Dummies		*Included*	*Included*
Number of observations		21,952	11,939
Likelihood ratio		1,455.54 (.001)	88.37 (.001)

The total sample consists of 21,952 firm-quarter observations that just missed or just met the consensus analyst quarterly forecast from 1990–1999. $Meet_q$ is an indicator variable equal to one if the firm's realized I/B/E/S EPS beats the analyst forecast by zero or one cent, and zero if the firm misses the analyst forecast by one or two cents. DWC_q, is discretionary working capital accruals in quarter q, and UEF is the unexpected forecast (see Sect. 2.2.3 for additional details). $Mgr(Nmgr)\_Sales_{q+1}$ is the net shares sold as a percentage of shares owned, summed over all manager (non-manager) insiders in the firm. See Table 1 for additional variable definitions. All significance levels are two-tailed

3.4 The effect of corporate governance

To test Hypothesis 4, we consider firms with majority independent board representation to be firms with strong corporate governance. This choice is motivated by prior studies (e.g., Dechow et al., 1996; Klein, 2002) and recent institutional developments such as the NYSE's November 2003 report on the new corporate governance standards for listed companies (http://www.nyse.com), all of which point to outside directors as a key governance factor. We therefore estimate the following regression:

$$(Meet_q) = f(\gamma_0 + \gamma_1 Poor\_CG_t + \gamma_2 Mgr\_Sales_{q+1} \\ + \gamma_3 Poor\_CG_t \times Mgr\_Sales_{q+1} + control\ variables) \tag{4}$$

where $F(\gamma'X) = [e^{\gamma'X}/(1 + e^{\gamma'X})]$ and $Poor\_CG_t$ is an indicator variable that is equal to one if there are fewer than 50% independent board members (Dechow et al., 1996; Klein, 2002) and zero otherwise.

Table 6 Logistic regression of the probability of just meeting versus just missing analyst forecasts on managerial insider sales and corporate governance

Independent variables	Predicted sign	Dependent variable = $Meet_q$ Logit estimate (Pr > X^2)
Intercept		.587 (.114)
$Poor\_CG_t$		.015 (.395)
Mgr_Sales_{q+1}		−.052 (.439)
{$Poor\_CG_t \times Mgr\_Sales_{q+1}$	**(+)**	**.080 (.093)**
Mgr_Sales_q		.010 (.490)
$Profit_q$		.399 (.004)
ROA_q		7.698 (.001)
$Return_q$		.834 (.001)
$Return_{q+1}$		.998 (.001)
$Volume_{q+1}$		−.001 (.102)
LTG_t		1.895 (.001)
BM_q		−.424 (.001)
$SEO\$_{q+1}$		3.826 (.046)
$Log(Assets_q)$		.052 (.028)
Year Dummies		*Included*
Two-digit SIC Dummies		*Included*
Number of observations		9,889
Likelihood ratio		693.63 (.001)

The total sample consists of 21,952 firm-quarter observations that just missed or just met the consensus analyst quarterly forecast from 1990–1999. $Meet_q$ is an indicator variable equal to one if the firm's realized I/B/E/S EPS beats the analyst forecast by zero or one cent, and zero if the firm misses the analyst forecast by one or two cents. $Poor\_CG_t$ is an indicator variable that is equal to one if fewer than 50% of a firm's board members are independent, and zero otherwise. See Table 1 for additional variable definitions. All significance levels are two-tailed

We obtain information on the board composition from the Investor Research Responsibility Center's (IRRC) corporate governance dataset that our institution privately purchased. Data is available only for years 1998–2000. If we required a year-to-year match, we would lose approximately 90% of our firm-quarter observations (from 21,952 to 2,271). We therefore create a firm specific summary measure that is equal to the average percentage of independent directors across the three years, and use this variable for each of the firm-quarter observations in our sample. This provides us with a much larger remaining sample of 9,889 firm-quarter observations.

Table 6 presents the results. The interaction between low corporate governance and insider sales is positive and statistically significant (coefficient = .080; *p*-value = .093), consistent with Hypothesis 4. The control variables are largely consistent with the prior tests. In sum, managers of poorly governed firms are *more* likely to just meet versus just miss the analyst forecast before selling their shares, lending further credence to our strategic hypothesis.[19]

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[19] The existence of a majority of outside directors may mitigate this opportunistic behavior through various mechanisms. For example, these firms may be subject to greater accounting scrutiny (e.g., Klein, 2002) or have additional restrictions on insider trading (Seyhun, 1998). We do not explore the mechanism by which outside directors mitigate this opportunistic behavior.

3.5 Alternative earnings benchmarks

3.5.1 Zero earnings levels and changes

We find evidence that the discontinuity around the zero analyst forecast error is accentuated by managers' trading incentives. We now extend our tests to two additional thresholds in the literature: zero earnings levels and changes (Burgstahler & Dichev, 1997; Degeorge et al., 1999; Hayn, 1995). We re-estimate Eq. 2, our test of Hypothesis 1, for both alternative benchmarks and do not obtain significant results in either specification. While one potential explanation is that these two thresholds do not provide evidence of earnings management (e.g., Durtschi & Easton, 2005), Brown and Caylor (2005) find that investors unambiguously reward (penalize) firms for reporting quarterly earnings meeting (missing) analysts' estimates more than for meeting (missing) the other two thresholds. Our study's focus on the analyst forecast threshold is based on the premise that it is the threshold to which the firm's stock price is most sensitive. The other two thresholds are less relevant to our setting.

Dopuch, Seethamraju, and Xu (2003) find that the market premium is highest for firms that meet the analyst forecast *and* exceed prior period earnings. In results not tabulated, we limit our just met firms to those whose earnings also exceeded their earnings four quarters ago, and our just missed firms to those that also fell below their earning four quarters ago, resulting in a total of 13,351 observations, 10,529 which just met (compared to 15,186 in Table 1) and 2,822 which just missed (compared to 6,769 in Table 1).[20] Consistent with Dopuch et al. (2003), the coefficient on managerial insider sales increases to .039 (from .033 in Table 3) and is significant, thus providing additional confidence in our findings.

3.5.2 Examining the location within the forecast error distribution

Guttman et al. (2006) endogenize the population discontinuity in their analytical model and show that successful earnings management occurs only around the earnings benchmark, and not in other portions of the earnings distribution. We test this premise explicitly by comparing firms that just met the analyst forecast to firms that met the analyst forecast by a lot (at least five cents). Note that, similar to our original setting, we still have two sets of firms, one that outperforms the other. However, in contrast to our setting, we expect the performance effect to dominate here. In results not tabulated, we find that managerial sales are greater for firms that met by a lot than for firms that just met the analyst forecast (consistent with both strategic trading and passive performance trading hypotheses). However, we find that the interaction between managerial stock sales and discretionary working capital accruals is not statistically significant (Hypothesis 2). Further, non-managerial stock sales are also a positive predictor of meeting by a lot, consistent with sales around the wider benchmark being overwhelmingly performance driven (Hypothesis 3). Finally, corporate governance does not play a role around this alternative

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[20] Because the comparable prior period earnings may have been managed, Dopuch et al. (2003) use a time-series model to arrive at a proxy for prior period earnings. This estimation requires at least 16 quarters of data to estimate. For simplicity and to maximize our sample size, we simply use one year ago quarterly earnings.

benchmark (Hypothesis 4), again consistent with the differential trading being driven by the performance effect.

4 Conclusion

A key driver of all earnings management activities is managerial incentives. This study explores whether managerial trading incentives can help explain the earnings discontinuity around zero analyst forecast errors. We hypothesize that the positive investor reaction to just meeting the analyst forecast creates a favorable environment for managers planning to sell their stock, thus prompting them to exert additional effort to meet the analyst forecast. Consistent with this prediction, we find that the likelihood of just meeting versus just missing the analyst forecast is strongly associated with subsequent managerial stock sales.

The importance of documenting clear managerial incentives for engaging in specific earnings management activities is amply clear in the literature. The main contribution of this paper is that it explicitly recognizes and differentiates between two alternative hypotheses, using a battery of tests. Our hypothesis is that managers strategically manage earnings to meet the analyst forecast threshold so that they can sell shares. The alternative is that managers simply sell in response to good performance. We do not dispute the existence of a performance effect, and indeed the performance effect appears to dominate in other parts of the earnings distribution; what our battery of tests indicate is that there is a clear presence of strategic managerial behavior around the analyst forecast threshold.

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