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Managerial incentives and management forecast precision

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Abstract:
Managers have great discretion in determining management forecast characteristics, but little is known about how managerial incentives affect these characteristics. In this paper, we examine whether managers strategically choose the precision of their earnings forecasts for self-serving purposes. Building on prior research demonstrating that the market reaction to vague management forecasts is weaker than its reaction to precise forecasts, we find that for management forecasts disclosed before insider sales, more positive (negative) news forecasts are more (less) precise than other management forecasts. The opposite applies to management forecasts disclosed before insider purchases. These results are consistent with managers strategically choosing the precision of their earnings forecasts to increase stock prices before insider sales and to decrease stock prices before insider purchases. Additional analyses indicate that the impact of managerial incentives on forecast precision is less pronounced when institutional ownership is high or when disclosure risk is high, and is more pronounced when it is difficult for investors to assess the precision of managers' information.

Keywords: Management Forecast; Managerial Incentives; Insider Trading; Forecast Precision

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1. Introduction

Issuing earnings forecasts is an important channel that managers use to convey information to investors. Unlike mandatory disclosures such as annual reports, management forecasts are voluntary, and managers have considerable discretion on whether and how to provide earnings forecasts. Motivated by the usefulness of management forecasts, prior research has examined extensively what determines their frequency (e.g., Skinner 1994, 1997; Lang and Lundholm 2000; Cheng and Lo 2006). Yet despite the considerable discretion that managers have in issuing the forecasts and the importance of such characteristics as forecast precision and horizon to market reactions, it is not well understood how managers' incentives affect these characteristics (Hirst et al. 2008).

In this paper, we focus on one important characteristic of management forecasts – forecast precision – and examine how managerial incentives affect the choice of forecast precision. We choose to focus on forecast precision (or specificity, as it is sometimes referred to in the literature) for two reasons. First, precision is one of the most important forecast characteristics over which managers have a great deal of discretion. Managers can issue qualitative or quantitative forecasts, and the latter may take the form of point forecasts, range forecasts, or open-ended forecasts. More than 80% of the quantitative forecasts compiled by Thomas Financial are in the range format (i.e., estimates with explicit upper and lower bounds), and there is a large degree of variation in forecast width (i.e., the difference between the upper and lower bounds). One might even argue that managers have greater discretion over the precision of their earnings forecasts than over whether to provide forecasts in the first place (Hirst et al. 2008). Managers cannot always withhold information because it is part of their fiduciary duty to update and correct previous disclosures. Furthermore, withholding information can lead to considerable

litigation risks and can cause great damage to a manager's reputation (Skinner 1994).

Second, forecast precision has a significant effect on market reactions to management forecasts. A number of theoretical papers, such as Kim and Verrecchia (1991) and Subramanyam (1996), argue that the magnitude of the market reaction to a disclosure is positively related to its precision, and empirical studies examining the impact of management forecast precision on stock returns and analyst forecast revisions provide support for this argument (e.g., Baginski et al. 1993; Baginski et al. 2007).

Building on prior research, we identify the most frequently investigated managerial incentive in the voluntary disclosure literature, insider trading, and examine whether it provides managers with incentives to choose forecast precision strategically. Given that the precision of management forecasts has a significant effect on stock prices – more precise forecasts have a larger impact on stock prices than vague forecasts – we argue that trading incentives affect forecast precision and that the effect depends on both the sign and magnitude of the news. As managers prefer a higher stock price prior to insider sales, we predict that good news disclosed before insider sales is more precise, and that the more positive the news is, the more precise the forecast is.[1] Similarly, we hypothesize that bad news disclosed before insider sales is less precise, and that the more negative the news is, the more vague the forecast. In other words, we predict a positive association between forecast news and the precision for management forecasts issued before insider sales. Given that prior research finds that there is, on average, a positive association between forecast news and precision (e.g., Skinner 1994; Choi et al. 2010), these arguments imply that the association is more positive for management forecasts issued before insider sales than for those not followed by insider trading. In contrast, as managers benefit from

[1] In line with prior research, we calculate forecast news as the difference between the mid-point estimate of management forecast of earnings per share (EPS) and the consensus analyst forecast, scaled by the pre-release share price.

a lower stock price before insider purchases, we predict the opposite for management forecasts disclosed before insider purchases, i.e., a less positive association between forecast news and the precision for management forecasts issued before insider purchases than for those not followed by insider trading.

To test our hypotheses, we examine a sample of 10,799 management earnings forecasts issued in the 1999-2006 period. We use the negative of forecast width (the magnitude of the range for range forecasts and zero for point forecasts) to measure forecast precision. To test our predictions, we regress forecast precision on forecast news, trading incentives (indicators for insider sales or purchases), and their interactions. We also control for other determinants of forecast precision, such as managers' information uncertainty, market demand for information, the passage of Regulation Fair Disclosure, equity issuance, and the precision of past management forecasts.

Consistent with prior research, we find an overall positive association between forecast news and forecast precision; the more positive the news is, the more precise the forecast is. More importantly, we find that, consistent with our hypotheses, trading incentives systematically affect the association between forecast news and precision. We find that forecast precision is more positively correlated with forecast news for management forecasts issued before insider sales than for other management forecasts. For those issued before insider purchases, we find a less positive correlation between forecast news and precision. To highlight the notion that the direction of insider trading's effect on forecast precision depends on the sign of the news, in an additional analysis we replace the continuous forecast news variable with indicators for the sign of the news. We find that compared with management forecasts issued at other times, good news issued before insider sales is more precise and bad news before insider sales is less precise,

whereas good news issued before insider purchases is less precise and bad news before insider purchases is more precise. Overall, these results indicate that managers choose to issue forecasts in a form that increases these forecasts' impact if that impact is desirable and reduces it if it is undesirable.

To obtain further support for our main inferences and to provide additional insights, we also examine three conditioning variables that can affect the relation between managerial incentives and forecast precision. First, previous research shows that institutional investors play an important monitoring role and demand more transparent disclosure than individual investors (e.g., Bushee 1998; Ajinkya et al. 2005; Chen et al. 2007). If this is the case, then managers' strategic behavior is likely to be mitigated by the presence of institutional investors. Consistent with this prediction, we find that the effect of trading incentives on the association between forecast news and precision is weaker when institutional ownership is high than when it is low.

Second, while the risk of strategically changing forecasts precision is lower than the risk associated with other forms of managerial discretion in the voluntary disclosure domain, such as withholding news, it is not risk-free and the extent of the risk varies. We argue that the strategic decision on forecast precision is associated with a higher degree of risk for good news forecasts issued before insider sales and for bad news forecasts issued before insider purchases, because managers have incentives to increase the precision of forecasts in these two scenarios, thus leading to a greater likelihood of forecasts being proven wrong (i.e., a greater likelihood of actual earnings falling outside the forecast range). In contrast, the strategic decision on forecast precision is associated with lower risk for bad news forecasts issued before insider sales and for good news forecasts issued before insider purchases, because managers have incentives to decrease forecast precision in these two scenarios, thereby leading to a lower likelihood of

forecasts being proven incorrect. Hence, we posit that managerial incentives are less likely to affect forecast precision in the cases of good news preceding insider sales and bad news preceding insider purchases than in the cases of bad news preceding insider sales and good news preceding insider purchases. Our results are consistent with this prediction.

Third, managers' ability to choose forecast precision for self-serving purposes depends on investors' ability to assess the precision of managers' information. If investors are able to "see through" the precision game and react accordingly, then strategically choosing forecast precision will not benefit managers. Thus, we expect that managers are more likely to strategically choose forecast precision when investors have greater difficulty in evaluating the precision of their information. Using several variables to capture the level of this difficulty, we find results consistent with our prediction.

We also conduct several additional tests to enrich our analyses and to ensure the robustness of our results. First, we validate the assumption that precise forecasts are associated with stronger market reactions than vague forecasts. Second, we find that our results are not driven by the reverse causality (i.e., disclosure precision affecting the existence of insider trading) or self-selection in the issuance of management forecasts. Third, we find that our results are robust to alternative research design choices, such as using the magnitude of insider trading rather than indicators for such trading, and to controlling for the effect of contemporaneous earnings announcements for bundled management forecasts.

Our study contributes to the voluntary disclosure literature in several important ways. First, Hirst et al. (2008) suggest that forecast characteristics such as forecast precision are the most controllable, yet least studied, dimension of management forecasts. Although several studies (Baginski and Hassell 1997; Ajinkya et al. 2005) have examined the economic determinants of

forecast precision, we extend this line of research by demonstrating the importance of managerial incentives in determining forecast precision. We also investigate the conditions under which the impact of managerial incentives is weaker or stronger.

Second, this study extends the corporate disclosure literature by providing evidence that managers strategically determine forecast precision for self-serving purposes. Although several studies find that managerial incentives affect corporate disclosure in general and management forecast practices in particular, their primary focus is on whether managers overstate earnings (e.g., Beneish 1999), disclose information (e.g., Cheng and Lo 2006), or bias the information they disclose (e.g., Rogers and Stocken 2005). Our study complements these studies by focusing on managers' discretion in choosing the precision of their forecasts.

This study builds upon and extends Rogers (2008). Rogers argues that when deciding the quality of disclosure in response to insider trading incentives, managers face a tradeoff between maintaining their information advantage and reducing litigation risk. He finds that managers tend to issue forecasts with high disclosure quality before insider sales to reduce litigation risk, but to issue forecasts with low disclosure quality before insider purchases to maintain their information advantage. There are two key differences between our study and Rogers (2008). First, we argue that managers' disclosure decisions are a joint function of insider trading incentives and the nature of the news disclosed. It is in managers' best interests to increase (decrease) the quality of the disclosure when the market reaction to that disclosure is favorable (unfavorable) to them. Our empirical analyses confirm that the quality of management forecasts disclosed before insider sales (purchases) varies with forecast news, and it is not uniformly better (worse). For example, for management forecasts issued before insider sales, managers prefer to issue more precise forecasts for more positive news but less precise forecasts for more negative news. While the

former can be regarded as of high quality, the latter can be regarded as of low quality. Second, Rogers (2008) uses the change in liquidity around disclosures as a measure of disclosure quality. In contrast, we examine an observable action taken by managers and are thus able to provide more contextual evidence. The drawback of our approach is that forecast precision is only one aspect of managers' disclosure decisions. In sum, taken together the two studies provide a more complete picture of the managerial decision-making process in the choice of voluntary disclosure quality.

The remainder of the paper proceeds as follows. Section 2 discusses the related literature on management forecasts and develops our hypotheses. Section 3 describes the data and research design. Section 4 reports the empirical results. Section 5 presents additional analyses, and Section 6 concludes.

2. Related Literature and Hypothesis Development

2.1 Related prior research

Managers have an information advantage over outside investors, and they rely on both mandatory reporting and voluntary disclosure to reduce this information asymmetry. Management earnings forecast is one of the most common types of voluntary disclosure and prior research finds that management forecasts provide important information to the capital markets (e.g., Baginski and Hassell 1990; Pownall et al. 1993; Coller and Yohn 1997; Rogers and Stocken 2005; Rogers 2008). See Healy and Palepu (2001) and Hirst et al. (2008) for a review of this literature.

Because management forecasts are voluntary, managers have considerable discretion as to whether, when, and what to disclose. The extant literature indicates that while managers use

voluntary disclosure to reduce information asymmetry, they also exploit their discretion over such disclosure for self-serving purposes. For example, Aboody and Kasznik (2000) document that managers reduce the exercise price of option grants by disclosing bad news and withholding good news prior to option grant dates. Lang and Lundholm (2000) find that firms increase the frequency of disclosure and issue more favorable news prior to raising external capital. Cheng and Lo (2006) document that managers disclose more bad news before buying stocks on their personal accounts. Brockman et al. (2008) find that the frequency and magnitude of bad news (good news) disclosures are higher (lower) before share repurchases, presumably to deflate stock prices so that firms can buy back shares at a lower price. Overall, the evidence in this area indicates that the frequency of management forecasts is affected by managers' incentives.

Although managers have opportunities to exploit their discretion over earnings forecasts, investors can use subsequent audited earnings reports and information from other sources to evaluate the credibility of these forecasts. If managers are thought to have withheld information or issued biased forecasts, investors may sue them, and managers' reputations might be damaged (Skinner 1994, 1997). The risk of such litigation is particularly high when insider trading is involved. Insider trading is subject to the "disclose or abstain" rule, which requires that insiders in possession of material nonpublic information either disclose it to the public before trading or abstain from trading. Such litigation risk and ex post discipline greatly restrain managerial discretion over whether and what to disclose. Consistent with the notion that managers are concerned about litigation risk, Cheng and Lo (2006) find that managers are not more likely to withhold bad news or issue good news before insider sales. Consistent with the disciplinary role of subsequent earnings reports in reducing management forecast bias, Rogers and Stocken (2005) find that managers have incentives to provide biased forecasts only when investors have

difficulty in detecting that bias.

In this study, we take the decision to issue management forecasts as a given and explore how managerial incentives affect managers' decisions regarding forecast precision. Compared to withholding information or providing biased forecasts, providing information with desirable precision is subject to lower litigation risk. Managers can issue point, range, or qualitative estimates, and for range forecasts, they can choose the size of the range. The literature suggests that forecast precision affects the market reaction to earnings guidance. For example, Kim and Verrecchia (1991) and Subramanyam (1996) show that more precise information leads to a larger market reaction. Consistent with the theoretical prediction, Baginski et al. (1993) find that point forecasts are associated with a greater market reaction than range forecasts.[2] If more precise forecasts are associated with stronger market reactions, then managers can strategically choose forecast precision to influence the market reaction for self-serving purposes. Indeed, Hughes and Pae (2004) show analytically that entrepreneurs who plan to sell shares choose high precision for good news to increase stock prices and low precision for bad news to mitigate the decline in stock prices.

In the next section, we discuss how managerial incentives can affect the precision of management forecasts. We focus on the incentive that prior research examines most: insider trading.

2.2 Hypothesis development – Insider trading, forecast news, and forecast precision

When managers trade shares of their companies on their personal accounts, they have incentives to increase trading gains by utilizing their information advantage. Penman (1982) and

[2] Other studies (e.g., Pownall et al. 1993), however, find an insignificant relation between market response and forecast form. In a recent working paper, Baginski et al. (2007) confirm the finding in Baginski et al. (1993). We also confirm these results in this study. See Section 5.1 for details.

Noe (1999) find that managers sell more shares after good news than after bad news, and buy more shares after bad news than after good news, suggesting that managers strategically choose the timing of their trading activities to increase insider trading gains. Building on these findings, Cheng and Lo (2006) argue that managers may change the frequency of voluntary disclosure before insider trading and they find that managers are more likely to disclose bad news before buying shares. Using the change in liquidity to proxy for disclosure quality, Rogers (2008) finds that managers strategically change disclosure quality in response to personal trading incentives. He finds that disclosure quality is on average higher before insider sales and lower before insider purchases. Rogers and Stocken (2005) document that when the market has difficulty detecting managers' misreporting, managers are more likely to issue optimistic (pessimistic) earnings forecasts before insider sales (purchases).

However, withholding information or issuing biased forecasts is subject to substantial litigation risk (e.g., Skinner 1994; Cheng and Lo 2006). Under the "disclose or abstain" rule, managers are obligated to issue forecasts before engaging in insider trading. We argue that given the disclosure of news, managers can increase trading gains by manipulating forecast precision to influence the market response to the news. Since the benefit of selling shares increases with stock prices, we expect that managers are more likely to be vague when issuing negative news before insider sales and are more likely to be precise when issuing positive news before insider sales. In contrast, managers benefit from a lower stock price when buying shares. Thus, we posit that when managers are about to buy stocks, they are more likely to be vague when issuing positive news and they are more likely to be precise when issuing negative news.

Note that we expect both the sign and magnitude of the news to affect the forecast precision decision. The sign of the news (good or bad) affects the direction of insider trading's

impact on management forecast precision, whereas the magnitude of the news affects the size of that impact. Because news of greater magnitude has a larger impact on stock prices and insider trading gains, managers' incentives to influence forecast precision are expected to be stronger when the magnitude of the news is greater. Therefore, we consider how the impact of insider trading on forecast precision varies with forecast news. As previous research (e.g., Skinner 1994; Choi et al. 2010) finds that on average, better news is more precise than worse news, we expect this positive association to be more pronounced for management forecasts issued before insider sales and less pronounced for those issued before insider purchases.[3]

The above discussion leads to our main hypothesis:

H1: *The association between forecast precision and news is more positive for management forecasts issued before insider sales and less positive for those issued before insider purchases than it is for other management forecasts*.

2.3 Hypothesis Development – Conditioning factors

Institutional ownership

By strategically disclosing either vague or precise information before insider trading, managers can influence the market reaction to management forecasts in the direction that is beneficial to them. Such self-serving behavior comes at the expense of current and/or potential shareholders. It thus follows that such behavior is less likely to be tolerated when shareholders are able to monitor managers effectively. Prior research documents that institutional investors can serve as effective monitors and usually demand more transparent corporate disclosure (e.g., Bushee and Noe 2000; Healy and Palepu 2001). Institutional investors often attend conference calls and closely follow management earnings forecasts. In addition, they collect firm-specific

[3] Prior research attributes the positive association between forecast news and precision to managers' preference for higher stock prices in general, or in other words, to their preference for stronger reactions to good news and weaker reactions to bad news. It is because of this general trend that we do not state our hypothesis as the net association between forecast news and precision before insider trading.

information from various sources on an ongoing basis and strive to reduce their information disadvantage. Consistent with these arguments, Bamber and Cheon (1998) find that firms with block shareholders issue more precise forecasts, and Ajinkya et al. (2005) find that firms with higher institutional ownership are more likely to issue precise earnings forecasts.

Thus, if institutional investors can effectively monitor managers' forecast behavior and demand more transparent disclosure, then they can restrain managers from engaging in strategic behavior in choosing forecast precision. Thus our second hypothesis is as follows:

> ***H2:*** *The impact of insider trading incentives on management forecast precision, as hypothesized in H1, is less pronounced for firms with high institutional ownership than for firms with low institutional ownership.*

Disclosure risk

Although we argue that a strategic decision regarding management forecast precision is subject to less risk than withholding news or providing biased forecasts, it is not risk-free, and the extent of the risk varies. The risk that is associated with the disclosure of forward-looking information, or disclosure risk in short, arises in our setting if the information disclosed is subsequently proven to be wrong (Cheng and Lo 2006). As previously discussed, managers have incentives to increase the precision of management forecasts when they disclose good news before selling shares or when they disclose bad news before buying shares. The more precise the forecast is, the more likely it is to be proven wrong (i.e., the actual earnings may fall outside the forecast range), thus leading to greater disclosure risk (Choi et al. 2010). In contrast, when managers disclose bad news before selling shares or good news before buying shares, they have incentives to decrease the precision of their forecasts. Such a strategy is subject to lower disclosure risk because forecasts with wider ranges are less likely to be proven wrong (i.e., the actual earnings are more likely to fall inside the forecast range). Because managers are less likely

to engage in strategic behavior when the litigation risk is high (e.g., Baginski et al. 2002), we expect that managers are less likely to act strategically in choosing management forecast precision in the high disclosure risk scenario (good news preceding insider sales or bad news preceding insider purchases) than in the low risk scenario (bad news preceding insider sales or good news preceding insider purchases).[4]

The above discussion leads to the following hypothesis:

> ***H3:*** *The impact of insider trading incentives on management forecast precision, as hypothesized in H1, is less pronounced in the high disclosure risk scenario (good news preceding insider sales or bad news preceding insider purchases) than in the low risk scenario (bad news preceding insider sales or good news preceding insider purchases).*

Investors' ability to assess the precision of managers' information

Rogers and Stocken (2005) argue that the likelihood of managers providing biased forecasts depends on investors' ability to evaluate the accuracy of their information. In a similar vein, we argue that investors' ability to assess the precision of management's information is important if managers want to strategically choose the forecast precision and guide the market for their own benefit. When investors can estimate the precision of managers' information with a fair degree of accuracy, they are doubtful of forecasts that deviate from the expected precision level. For example, if investors assume that managers have received a precise signal about future earnings, managers cannot use their discretion to blur the forecast. Similarly, if investors believe that managers cannot precisely estimate future performance, managers have less discretion in choosing forecast precision levels. In contrast, if investors do not know the precision level of the information that managers have, managers can strategically choose the forecast precision level. Thus our final hypothesis is:

[4] Note that the discussion of the variation in disclosure risk underlying H3 is within the setting of strategically choosing forecast precision. It has no bearing on other strategic decisions, such as the withholding of information.

H4: *The impact of insider trading incentives on management forecast precision, as hypothesized in H1, is more pronounced if investors have greater difficulty in assessing the precision of managers' information.*

3. Data and Empirical Design

3.1 Sample and data

We obtain our sample of management forecasts over the 1999-2006 period from the First Call Historical Database. We include both quarterly and annual forecasts of earnings per share (EPS) for the current quarter or year.[5] To focus on voluntary earnings forecasts, we exclude pre-announcement forecasts issued after the corresponding fiscal period-end.[6] Unlike some previous studies (e.g., Cheng and Lo 2006), we cannot use the market reaction to earnings forecasts to capture the nature of news because our focus – forecast precision – affects the magnitude of market reaction. Instead, we determine the nature of news based on the comparison between management forecasts and the prevailing consensus analyst forecasts. Accordingly, we exclude qualitative and open-ended forecasts. The foregoing procedure leaves us with an initial sample of 41,543 management forecasts.

From this initial sample, we exclude forecasts for which the other data we require for analyses are missing. First, we exclude 15,387 observations for which the data needed to calculate regression variables (other than forecast news) are missing from the Compustat, Center for Research in Security Prices (CRSP), or Institutional Brokers' Estimate System (I/B/E/S) databases. Second, we exclude 11,616 management forecasts for which there are no corresponding analyst forecast data and for which we are thus unable to determine forecast

[5] If there are both quarterly and annual forecasts on the same day, we retain only the former because quarterly forecasts, on average, have a larger effect on the market than annual forecasts (e.g., Pownall et al. 1993; Baginski et al. 1993).
[6] Earnings forecasts issued during a quarter do not need to be furnished to the U.S. Securities and Exchange Commission (SEC), whereas a pre-announcement after the quarter end must be.

news.[7] Finally, when the consensus analyst forecast for an observation falls within the range of the management forecast, we cannot unambiguously classify it as good or bad news. To increase the power of our tests, we thus follow Baginski et al. (1993) and exclude 3,741 such observations, although including them in the analyses leads to qualitatively similar results. This sample selection procedure leaves us with a final sample of 10,799 management earnings forecasts issued by 1,991 unique firms.

Panel A of Table 1 reports the yearly and quarterly distribution of management forecasts. The table indicates an overall increase in forecast frequency and/or First Call coverage over the sample period, with 267 forecasts issued in 1999 and 2,169 issued in 2006. Management forecasts are distributed roughly evenly across the four fiscal quarters, with fewer in the first quarter and more in the fourth. In our sample, 2,185 management forecasts (20.23% of the sample) are point estimates and 8,614 (79.77%) are range estimates. This untabulated distribution highlights the variation in forecast precision.

Panel B of Table 1 reports the frequency of management forecasts by the sign of the forecast news. Forecast news is calculated as the difference between the mid-point estimate of the management forecast of EPS and the consensus analyst forecast, scaled by the pre-release share price. Because we use the average of analyst forecasts and the point estimate or mid-point of the range forecast to calculate forecast news, this variable is rarely exactly zero (less than 0.5% of the sample). Following prior research (e.g., Clement et al. 2003; Rogers and Van Buskirk 2011), we treat management forecasts with forecast news of a small magnitude as neutral forecasts. More specifically, we classify management forecasts for which the absolute value of the forecast news is in the bottom quintile of the sample distribution as neutral news. We classify

[7] As an alternative, we also use the random walk model to determine the market expectation for observations without analyst forecasts, and doing so leads to qualitatively similar results.

other forecasts as good (bad) news forecasts if forecast news is positive (negative). As reported in Panel B, 3,555 management forecasts (33% of the sample) are classified as good news, 5,067 (47%) as bad news, and 2,177 (20%) as neutral news.[8] The higher frequency of bad news is consistent with the literature starting with Skinner (1994) and suggests that managers are more likely to disclose bad news, presumably to reduce litigation risk.

3.2 Measurement of key variables

Management forecast range (*Width*) and forecast precision (*Precision*). Management forecast range (*Width*) is calculated as the difference between the upper- and lower-end estimates, divided by the absolute value of the mid-point forecast, and it is 0 for point forecasts.[9] As reported in Table 2, the mean (median) of *Width* is 0.117 (0.053), suggesting that the mean (median) range is 11.7% (5.3%) of the mid-point of the forecast. More importantly, there is a large variation in forecast width, which ranges from 0 (5^{th} percentile) to 0.462 (95^{th} percentile).

For ease of interpretation, we use the negative of the forecast range as the dependent variable; that is, forecast precision (*Precision*) is *Width* times -1. A larger value of *Precision* indicates a more precise management forecast.

Management forecast news (*FN*). *FN* is calculated as the difference between the point or the mid-point estimate of the management forecast of EPS and the consensus analyst forecast, scaled by the pre-release share price. The consensus analyst forecast is calculated as the average of the analyst forecasts issued in the 90 days before the management forecast.[10] To be consistent with quarterly forecasts, *FN* is divided by 4 for annual forecasts. Both the mean and median of

[8] The proportions of good, bad, and neutral news forecasts are similar to those reported in the prior research (e.g., Lennox and Park 2006). Using other criteria to define neutral news, such as the bottom 10%, 15%, 25%, or 30%, leads to quantitatively similar results.

[9] We find similar results when we use the pre-forecast stock price as the deflator.

[10] We use the 90-day period to reduce the influence of stale analyst forecasts. Furthermore, if an analyst issues more than one earnings forecast in this period, we run a robustness test using only the most recent forecast issued by that analyst, and obtain similar results.

FN are significantly negative ($p < 0.01$ based on untabulated tests).

Insider trading (*InsiderSell, InsiderBuy*). We obtain insider trading data from Thomson Financial. An insider is defined as a person who serves as the CEO, president, or a director. We include all open market transactions of a firm's shares or options. As the volume of insider trading is highly skewed, we define two indicator variables, *InsiderSell* and *InsiderBuy*, to capture the existence of insider trading over the 30-day window after the management forecast. *InsiderSell* equals 1 when the net insider trading is a net sale (i.e., insider sales are higher than insider purchases), and 0 otherwise. *InsiderBuy* equals 1 when the net insider trading is a net purchase, and 0 otherwise. Within our sample, 2,831 forecasts (26% of the sample) are followed by insider sales, 1,417 (13%) by insider purchases, and the remainder (61%) by no insider trading.[11]

As prior research finds that managers are more likely to disclose good news before insider sales and bad news before insider purchases, it is important to determine whether there are any observations in our sample with bad news before insider sales and good news before insider purchases. For this purpose, in Panel B of Table 1, we present the distribution of management forecasts according to whether they are followed by insider sales or purchases. Of the management forecasts issued before insider sales, 41% are good news forecasts and 31% are bad news forecasts. Of those issued before insider purchases, 28% are good news forecasts and 52% are bad news forecasts. In other words, there are more good news forecasts than bad news forecasts before insider sales and more bad news forecasts than good news forecasts before insider purchases. This observation is consistent with the findings in previous studies (e.g.,

[11] Rogers (2008) also finds that there are more management forecasts followed by insider sales than by insider purchases. However, the total proportion of management forecasts followed by insider trading is higher in our study than in his, most likely for two non-exclusive reasons. First, our sample periods are different. Rogers's sample period is 1994-2002, whereas ours is 1999-2006. We find that insider trading activities have increased substantially in recent years. Second, our sample selection criteria are different. Unlike Rogers (2008), we require analyst forecast data and exclude qualitative forecasts.

Penman 1982; Noe 1999; Cheng and Lo 2006). However, the frequency with which bad news appears prior to insider sales and good news prior to insider purchases is not trivial and this is not surprising given managers' fiduciary duty to provide information that updates and corrects previous disclosures (Skinner 1994; Cheng and Lo 2006).

3.3 Empirical Design

We estimate the following model to examine the effect of insider trading incentives on forecast precision (*Precision*), or more precisely, on the relation between forecast news and forecast precision:[12]

$$\begin{aligned} Precision = {} & \beta_0 + \beta_1 FN + \beta_2 InsiderSell + \beta_3 FN \times InsiderSell \\ & + \beta_4 InsiderBuy + \beta_5 FN \times InsiderBuy + \boldsymbol{\delta}\,\mathbf{Control\ Variables} + \varepsilon, \end{aligned} \tag{1}$$

where *Precision* is management forecast precision, *FN* is forecast news, *InsiderSell* is an indicator for net insider sales, and *InsiderBuy* is an indicator for net insider purchases. As previously discussed, we expect forecast precision and forecast news to be positively correlated, implying that β_1 is expected to be positive. To test H1, we interact *FN* with *InsiderSell* and *InsiderBuy*, respectively. H1 predicts that β_3 is positive and β_5 is negative. We use firm-clustering adjusted standard errors to account for the possible correlations between observations of the same firm, as suggested in Peterson (2009).

The control variables include a set of variables that likely influence management forecast precision. For example, prior research finds that forecast precision (1) decreases with the uncertainty that managers face when providing forecasts, which we proxy by forecast error (*FE*), an indicator variable of negative earnings (*Loss*), forecast horizon (*Horizon*), return volatility (*RetVol*), and research and development expenditure (*R&D*); (2) increases with the demand for

[12] Because *Precision* is 0 for point forecasts, we also use Tobit regression to estimate Equation (1) and the other models in the paper in an untabulated sensitivity test, and the inferences remain the same.

information, which we proxy by analyst coverage (*Analyst*), institutional ownership (*INST*), firm size (*Size*), and the market-to-book ratio (*M*/*B*); and (3) is lower in the post-Regulation Fair Disclosure period (*FD*) and in industries with high litigation risk (*Litigation*). We also include indicator variables for optimistic management forecasts (*Optimism*) and annual forecasts (*Annual*) because of their potential impact on forecast precision. In addition, we include the square of forecast news to control for potential non-linearity and the interactions between forecast news and several control variables (i.e., *Litigation*, *Horizon*, and *Loss*) to control for their potential effects on the relation between forecast news and forecast precision. In a sensitivity test, we also include the interaction terms between *FN* and all of the other control variables, and our results on insider trading remain the same. Like insider sales, equity issuance can also motivate managers to strategically choose forecast precision to increase stock prices and thus proceeds. Accordingly, we include an indicator for equity issuance (*EquIssue*) and its interaction with forecast news. Finally, we include past management forecast precision (*PPrecision*) to control for the impact of time-invariant omitted factors. To save space, we relegate the measurement of the control variables to Appendix A and the arguments underlying their predictions to Appendix B.

Table 2 presents descriptive statistics on control variables. The average forecast error is 0.003; 7.3% of the firms have a loss; the average forecast horizon is 124 days; the average return volatility is 0.027; the average R&D expenditure is 5.1% of sales; the average analyst coverage is 8.21; the average institutional ownership is 65.1%; the average M/B is 3.64; and the average firm size is $9.2 million. About 94% of the forecasts are issued after 2000; 29.8% are issued by firms in industries with high litigation risk; 30.5% are optimistic when compared with ex post earnings realization; 30% of past forecasts are point forecasts; 1% of the forecasts are followed

by equity issuance; and 35.1% are annual forecasts.[13] Table 3 provides the correlations for the independent variables. None of the correlation coefficients is sufficiently large to constitute a multi-collinearity problem.[14]

4. Main Analyses

In this section, we first examine the impact of managerial incentives on forecast precision, and we then examine how the three conditioning factors affect the relation between managerial incentives and forecast precision.

4.1 Managerial incentives, forecast news, and forecast precision – Results for H1

Panel A of Table 4 reports the regression results for Equation (1) using the continuous variable of forecast news. To facilitate comparison with the findings of Rogers (2008), Column (1) reports the results for the base model. As reported in the table, *FN* has a positive coefficient, thus confirming the positive correlation between forecast news and forecast precision. As previously discussed, Rogers (2008) uses the change in liquidity as a measure of disclosure quality and finds that disclosures before insider sales are of higher quality and those before insider purchases are of lower quality. To the extent that more (less) precise forecasts are of higher (lower) quality, Rogers' results imply a positive coefficient on *InsiderSell* and a negative coefficient on *InsiderBuy*. Consistent with Rogers (2008), we find that the coefficient on *InsiderSell* is significantly positive ($p = 0.059$), suggesting that management forecasts issued before insider sales are more precise. However, the coefficient on *InsiderBuy*, although negative, is insignificant. The difference in results between the two studies may be driven by differences in

[13] The descriptive statistics on control variables are similar to those reported in other studies (e.g., Rogers 2008; Rogers et al. 2009; Yang 2012).

[14] Based on the variance inflation factor (VIF) test, the regressions are not subject to multi-collinearity problem.

the samples and the measurement of disclosure quality.[15] Overall, our results are consistent with Rogers's (2008) for insider sales, but not for insider purchases.

Column (2) of Table 4, Panel A reports the test of H1. The coefficient on *FN* × *InsiderSell* is significantly positive (p = 0.001), suggesting that the positive correlation between forecast news and precision is stronger for management forecasts issued before insider sales than for those issued at other times. In other words, consistent with H1, prior to insider sales managers issue more precise forecasts when the news is more positive to increase the positive price reaction, and they issue less precise forecasts when the news is more negative to reduce the price drop.

Also as expected, the coefficient on *FN* × *InsiderBuy* is significantly negative (p = 0.001), indicating that the positive correlation between forecast news and precision is weaker for forecasts issued before insider purchases. In other words, consistent with H1, prior to insider purchases managers issue less precise forecasts when the news is more positive to decrease the positive price reaction, and they issue more precise forecasts when the news is more negative to increase the price drop.

This analysis highlights the difference between our study and Rogers (2008). Rogers focuses on the main effect of insider trading on the quality of management forecasts regardless of the nature of the news, whereas our analysis examines how the impact of insider trading on management forecast precision varies with forecast news. The positive coefficient on *InsiderSell* indicates that management forecasts issued before insider sales are more precise than those that are not followed by insider trading. This finding is consistent with Rogers'. However, we find that more positive news is associated with more precise forecasts and more negative news is

[15] A closer look at Rogers (2008) indicates that his findings on disclosure quality before insider purchases are relatively weak, with the impact of insider purchases on disclosure quality being insignificant in several of his model specifications.

associated with less precise forecasts. Similarly, for management forecasts issued before insider purchases, the negative coefficient on *InsiderBuy* is consistent with Rogers's findings, but we find that the more positive the news is, the less precise the forecast is, and the more negative the news is, the more precise the forecast is. Put together, the findings of the two studies imply that both litigation concerns (as Rogers [2008] argues) and insider trading considerations (as we emphasize in this study) are important determinants of management forecast quality in general and forecast precision in particular.[16]

The results for most of the control variables are consistent with our predictions. For example, we find that managers with an uncertain information set are more likely to provide vague forecasts and are more likely to provide precise forecasts when the market demand for information is higher. Furthermore, managers are more likely to issue vague forecasts when the forecast is optimistic, potentially because of litigation concerns, and they are more likely to issue precise forecasts when the forecast is an annual forecast. We also find forecast precision to be sticky; firms that issued more precise forecasts in the past continue to issue precise forecasts in the future. With respect to the interaction terms, we find that the positive association between forecast news and precision is stronger in industries with greater litigation risk, weaker for firms reporting a loss, and stronger for management forecasts issued before equity issuance.

Overall, we find the impact of insider trading on forecast precision to vary with forecast news. For management forecasts issued before insider sales, the more positive the news, the more precise the forecast, and vice versa. Such a strategy can increase the stock price (or reduce the blow of bad news) before insider sales. In contrast, for management forecasts issued before insider purchases, the more positive the news, the less precise the forecast, and vice versa. This

[16] Rogers (2008) also discusses the impact of insider trading incentives. However, he posits that these incentives prompt managers to issue low-quality forecasts to maintain their information advantage, regardless of the nature of the news.

evidence is consistent with our hypothesis that managers strategically choose forecast precision for self-serving purposes.

Our hypothesis suggests that both the sign and magnitude of forecast news matter in the relation between insider trading and forecast precision, and accordingly we use the continuous variable of forecast news (*FN*) in Equation (1) to capture the effects of both. However, it is unclear whether the results reported thus far are driven only by the magnitude of a given sign. To investigate whether the results hold for the sign of the news and to further highlight the notion that the direction of insider trading's impact on forecast precision depends on the sign of the news, we estimate the following regression:

$$\begin{aligned} Precision = {} & \beta_{00} + \beta_{01} Good + \beta_{02} Bad \\ & + \beta_{11} InsiderSell + \beta_{12} InsiderSell \times Good + \beta_{13} InsiderSell \times Bad \\ & + \beta_{21} InsiderBuy + \beta_{22} InsiderBuy \times Good + \beta_{23} InsiderBuy \times Bad + \boldsymbol{\delta}\,\mathbf{Control\ Variables} + \varepsilon \end{aligned}, \quad (1')$$

where *Good* is an indicator variable for good news forecasts and *Bad* is an indicator variable for bad news forecasts. Our hypothesis implies that β_{12} and β_{23} are positive and that β_{13} and β_{22} are negative. The research design is similar to Equation (1).

Panel B of Table 4 reports the regression results. The coefficient on *InsiderSell* × *Good* is significantly positive, and that on *InsiderSell* × *Bad* is significantly negative, thus suggesting that good (bad) news forecasts issued before insider sales are more (less) precise than good (bad) news forecasts not followed by insider trading. Also in line with our expectations, we find the coefficient on *InsiderBuy* × *Good* to be significantly negative and that on *InsiderBuy* × *Bad* to be significantly positive. This result suggests that good (bad) news forecasts issued before insider purchases are less (more) precise than good (bad) news forecasts not followed by insider trading. That is, the results reported in Table 4, Panel B confirm that the results reported above hold for the sign of the news.

In untabulated analysis, we further separate small good news from large good news and

small bad news from large bad news. We find a significant incremental effect for large news, indicating that the magnitude of the news is also important. This finding is intuitive. As we argue that managers strategically determine forecast precision to increase insider trading gains (to increase trading profits or to reduce trading losses), the more extreme the news, the greater the potential gain, and thus the stronger the incentive to make a strategic decision concerning forecast precision. Given that the continuous variable *FN* captures both the sign and magnitude of forecast news, we use it in the following analyses. Using good news and bad news indicators leads to the same inferences.

4.2 Conditioning analyses

We use the following regression model to test hypotheses H2-H4:

$$\begin{aligned} Precision = {} & \beta_0 + \beta_1 FN \\ & + \beta_{20} InsiderSell + \beta_{21} FN \times InsiderSell + \beta_{22} FN \times InsiderSell \times Conditioning\_Variable \\ & + \beta_{30} InsideBuy + \beta_{31} FN \times InsiderBuy + \beta_{32} FN \times InsiderBuy \times Conditioning\_Variable \\ & + \boldsymbol{\delta}\,\mathbf{Control\ Variables} + \varepsilon \end{aligned}, \quad (2)$$

where *Conditioning_Variable* is one of the three conditioning factors used to test hypotheses H2-H4. In this regression specification, coefficients β_{22} and β_{32} capture the way in which the conditioning factor affects the strategic behavior related to insider trading, or more specifically, the effect that insider trading has on the association between forecast news and forecast precision.

H2 predicts that managers' incentive to strategically choose forecast precision is weaker in firms with higher institutional ownership. To test H2, we replace the conditioning variable in Equation (2) with *IH*, the decile rank of institutional ownership standardized to [0,1]. H2 implies that β_{22} is negative and β_{32} is positive. Column (1) of Table 5 reports the regression results. The coefficient on *FN* × *InsiderSell* × *IH* is significantly negative (p = 0.004), and that on *FN* × *InsiderBuy* × *IH* is significantly positive (p = 0.043), suggesting that managers are less likely to

strategically choose forecast precision when institutional ownership is high than when it is low. This result is consistent with the argument underlying H2 that institutional investors' monitoring acts as a restraint against managers' opportunistic behavior in choosing forecast precision.[17]

H3 predicts that managers are less likely to use forecast precision for self-serving purposes when good news precedes insider sales or when bad news precedes insider purchases. In both cases, managers have to balance the potential benefits of an increase in forecast precision with the potential increase in disclosure risk arising from more precise forecasts being more likely to be proven wrong. We construct an indicator variable, *DRISK*, which is 1 for these cases and 0 for others (i.e., bad news preceding insider sales and good news preceding insider purchases), and then interact it with *FN* × *InsiderSell* and *FN* × *InsiderBuy*. H3 implies that β_{22} is negative and β_{32} is positive. Column (2) of Table 5 reports the regression results. The coefficient on *FN* × *InsiderSell* × *DRISK* is significantly negative (p = 0.001), and that on *FN* × *InsiderBuy* × *DRISK* is significantly positive (p = 0.001), suggesting that managers are less likely to choose forecast precision strategically when disclosure risk is high than when it is low.

H4 predicts that managers are more likely to choose forecast precision for self-serving purposes when investors have difficulty in assessing the precision of the information that managers possess. To investigate this issue, we follow Rogers and Stocken (2005) and construct a variable to capture such difficulty. More specifically, we construct a common factor based on six variables: the standard deviation of analyst forecasts outstanding when the management forecast is released; the standard deviation of analyst forecast errors in the five years prior to the management forecast release; an indicator for whether the firm has a loss preceding the forecast;

[17] Another commonly used proxy for external monitoring is board independence. We conduct a similar analysis and find some evidence that the strategic behavior is less pronounced in firms with high board independence. This relatively weak evidence is consistent with the mixed findings in prior research. Karamanou and Vafeas (2005) find forecast precision to increase with board independence, whereas Ajinkya et al. (2005) find no such evidence.

the standard deviation of daily stock returns in the year before the forecast date; the average bid-ask spread for the 10 days before the forecast date; and the standard deviation of the management forecast ranges before the current forecast. We then construct a variable (*DIFF*), which is the decile rank of the difficulty factor standardized to [0,1], and interact it with *FN* × *InsiderSell* and *FN* × *InsiderBuy*. H4 implies that β_{22} is positive and β_{32} is negative.[18]

Column (3) of Table 5 reports the regression results. The coefficient on *FN* × *InsiderSell* × *DIFF* is significantly positive (p = 0.003), and that on *FN* × *InsiderBuy* × *DIFF* is significantly negative (p = 0.029). These results indicate that, as H4 predicts, when investors have difficulty in assessing the precision of managers' information, managers are more likely to choose forecast precision strategically.

In Column (4) of Table 5, we include all of the aforementioned interaction terms to test the three hypotheses simultaneously. The results are consistent with those previously discussed, indicating that the three conditioning variables capture different constructs affecting managers' strategic use of forecast precision to influence market perceptions.

In sum, we find that managers' strategic behavior in the choice of forecast precision for self-serving purposes is mitigated by institutional investors' monitoring and the risk concerns arising from an increase in the precision of forecasts, but facilitated by investors' difficulty in evaluating the precision of managers' information.

5. Additional Analyses

In this section, we first examine whether precise forecasts are associated with stronger

[18] We conduct a series of sensitivity tests to ensure that our results are robust to alternative measures of *DIFF*. For example, we use a common factor after dropping any one of the six variables, or a common factor after dropping the two variables with the lowest loadings in common factor analysis. The results of these tests are qualitatively similar.

market reactions than vague forecasts, as reported in prior research. We then conduct several tests to evaluate the robustness of our results.

5.1 Are more precise forecasts associated with stronger market reactions?

As discussed in Section 2, one of the key assumptions in our theoretical argument is that more precise forecasts are associated with stronger market reactions than less precise forecasts. In this section, we examine whether this is indeed the case in our sample. To do so, we estimate the following regression:

$$Ret = \beta_0 + \beta_1 FN + \beta_2 Precision + \beta_3 FN \times Precision + \boldsymbol{\delta}\mathbf{Control\ Variables} + \varepsilon, \qquad (3)$$

where *Ret* is the cumulative stock return from the forecast release date to one day after, minus the size-decile-matched CRSP index return in the same period. We expect a positive coefficient on forecast news (*FN*). If more precise forecasts are associated with stronger market reactions, then we would expect a positive coefficient on *FN* × *Precision*. We also control for a set of variables that prior research suggests is likely to affect the association between stock return and forecast news (e.g., Baginski et al. 1993; Pownall et al. 1993).

Table 6 reports the regression results. As expected, the coefficient on *FN* is significantly positive, which suggests that the market reaction increases with management forecast news. More importantly, the coefficient on *FN* × *Precision* is significantly positive, indicating that the market response to management forecasts is stronger when the forecast is more precise. This result validates one key assumption used in our hypothesis development.

5.2 Self-selection of management forecast issuance

The sample used in the foregoing analyses only includes firms with management forecasts. As management forecasts are voluntary, these analyses might be subject to self-selection bias. As is common in the literature, we use Heckman's (1979) two-stage model to control for the

potential self-selection bias. In the first stage, we follow Lennox and Park (2006) and Feng et al. (2009) in modeling the likelihood of management forecasts. The untabulated results are similar to those reported in prior research. For the second stage regression, we add the inverse Mills ratio to Equation (1), and obtain results quantitatively similar to those reported in Panel A of Table 4.

5.3 Use of the actual magnitude of insider trading

In the foregoing analyses, we follow previous studies (e.g., Rogers 2008) in using dummy variables to indicate whether managers buy or sell on their own accounts. The use of dummy variables makes it easier to interpret the results and increases the power of the tests because doing so imposes no restrictions on the specific form of the relation between insider trading and managers' incentives. At the same time, however, the use of dummy variables neglects the effect of the magnitude of trading because the incentive to increase trading gains likely increases with the magnitude of trading. In a robustness test, we replicate our main analysis using two alternative measures of the magnitude of insider trading. The first is the log transformation of net insider sales (or purchases) in dollars, and the second measure adjusts the first for the average of insider trading in the previous 12-month period. Managers of some companies may trade more than their counterparts in others for such reasons as a difference in stock-based compensation. Table 7 reports the regression results. As reported in the table, the inference based on the magnitude of insider trading remains the same: the positive association between forecast news and precision increases with insider sales and decreases with insider purchases.

5.4 Bundled management forecasts

Rogers and Van Buskirk (2011) find that management forecasts are usually issued together with earnings announcements, which could result in noise and bias in the calculation of forecast news. We use two approaches to address this issue. First, following previous studies (e.g.,

Waymire 1984), we replicate the analyses after including unexpected earnings as an additional control variable if the management forecast is issued around an earnings announcement. Second, we follow the method proposed and validated by Rogers and Van Buskirk (2011) to correct the measurement bias of management forecast news. This method estimates the unobservable analyst expectation at the time of the earnings announcement and then uses it to calculate forecast news. The inferences remain the same when we use these two methods (the results are not tabulated).

5.5 The direction of causality

In the foregoing analyses, we take insider trading as a given and examine how insider trading incentives affect the precision of management forecasts. An alternative interpretation is that the precision of management forecasts affects stock prices, which in turn affect insider trading. This concern is not as serious in the current study as it is in prior research that uses the market reaction to measure forecast news. Nevertheless, following Cheng and Lo's (2006) research design, we adopt a two-stage least squares (2SLS) approach to address this concern. We first predict insider trading and then use the predicted insider trading to capture managerial incentives. The untabulated results are similar to those reported.

6. Conclusion

This study examines whether managers strategically choose the level of forecast precision for self-serving purposes. We find that the positive relation between forecast news and forecast precision is stronger for management forecasts issued before insider sales and weaker for those issued before insider purchases than for other management forecasts. As more precise forecasts are associated with stronger market reactions, these results are consistent with our hypothesis that managers strategically choose the level of forecast precision to influence the market reaction

to their forecasts, thereby increasing their trading gains.

We also examine three conditioning variables that affect managers' tendency to manage forecast precision. We find that managers are less likely to manage forecast precision when institutional ownership is high, presumably because institutional investors can constrain managers' opportunistic behavior through their monitoring. We also find that managers are less likely to do so when such a strategy is associated with greater disclosure risk. In contrast, we find that managers are more likely to manage forecast precision when investors have difficulty in assessing the precision of their information.

Our study contributes to the voluntary disclosure literature by examining how managers strategically determine forecast precision. Although managers have considerable discretion in choosing the characteristics of their forecasts, the research to date sheds little light on how managerial incentives affect these characteristics (Hirst et al. 2008). The analyses in this study show that managerial incentives can affect forecast precision, thereby furthering our understanding of the managerial decision-making process in the issuance of earnings forecasts.

References

Aboody, D., and R. Kasznik. 2000. CEO stock option awards and the timing of corporate voluntary disclosures. Journal of Accounting and Economics 29: 73-100.

Ajinkya, B., S. Bhojraj, and P. Sengupta. 2005. The association between outside directors, institutional investors and the properties of management earnings forecasts. Journal of Accounting Research 43: 343-376.

Baginski, S. P., E. J. Conrad, and J. M. Hassell. 1993. The effects of management forecast precision on equity pricing and on the assessment of earnings uncertainty. The Accounting Review 68: 913-927.

Baginski, S. P., and J. M. Hassell. 1990. The market interpretation of management earnings forecasts as a predictor of subsequent financial analyst forecast revision. The Accounting Review 65: 175-190.

Baginski, S. P., and J. M. Hassell. 1997. Determinants of management forecasts precision. The Accounting Review 72: 303-312.

Baginski, S. P., J. M. Hassell, and M. D. Kimbrough. 2002. The effect of legal environment on preemptive disclosure: evidence from earnings management forecasts issued in U.S. and Canadian markets. The Accounting Review 77: 25-50.

Baginski, S. P., J. M. Hassell, and M. M. Wieland. 2007. Does management earnings forecast form matter? Working paper, University of Georgia.

Bamber, L. S., and Y. S. Cheon. 1998. Discretionary management earnings forecast disclosures: antecedents and outcomes associated with forecast venue and specificity choices. Journal of Accounting Research 36: 167-190.

Beneish, M. D. 1999. Incentives and penalties related to earnings overstatements that violate GAAP. The Accounting Review 74 (4): 425-457.

Brockman, P., I. K. Khurana, and X. Martin. 2008. Voluntary disclosures around share repurchases. Journal of Financial Economics 89: 175-191.

Bushee, B. 1998. The influence of institutional investors on myopic R&D investment behavior. The Accounting Review 73: 305-333.

Bushee, B., and C. Noe. 2000. Corporate disclosure practices, institutional investors, and stock return volatility. Journal of Accounting Research 38: 171-202.

Chen, X., K. Li, and J. Harford. 2007. Monitoring: which institutions matter? Journal of Financial Economics 86: 279-305.

Cheng, Q., and K. Lo. 2006. Insider trading and voluntary disclosures. Journal of Accounting Research 44: 815-848.

Choi, J., L. A. Myers, Y. Zang, and D. A. Ziebart. 2010. The roles that forecast surprise and forecast error play in determining management forecast precision. Accounting Horizons 24: 165-188.

Clement, M., R. Frankel, and J. Miller. 2003. Confirming management earnings forecasts, earnings uncertainty, and stock returns. Journal of Accounting Research 41 (4): 653-679.

Coller, M., and T. L. Yohn. 1997. Management forecasts and information asymmetry: an examination of bid-ask spreads. Journal of Accounting Research 35: 181-191.

Feng, M., C. Li, and S. McVay. 2009. Internal control and management guidance. Journal of Accounting and Economics 48: 190-209.

Healy, P. M., and K. G. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: a review of empirical disclosure literature. Journal of Accounting Economics 31: 405-440.

Heckman, J. J. 1979. Sample selection bias as a specification error. Econometrica 47: 153-161.

Hirst, D. E., L. Koonce, and S. Venkataraman. 2008. Management earnings forecasts: a review and framework. Accounting Horizons 22: 315-338.

Hughes, J., and S. Pae. 2004. Voluntary disclosure of precision information. Journal of Accounting and Economics 37: 261-289.

Karamanou, R., and N. Vafeas. 2005. The association between corporate boards, audit committees, and management earnings forecasts: an empirical analysis. Journal of Accounting Research 43: 453-473.

Kim, O., and R. Verrecchia. 1991. Trading volume and price reactions to public announcements. Journal of Accounting Research 29: 302-321.

Lang, M., and R. Lundholm. 2000. Voluntary disclosure and equity offerings: reducing information asymmetry or hyping the stock? Contemporary Accounting Research 17: 623-662.

Lennox, C. S., and C. W. Park. 2006. The informativeness of earnings and management's issuance of earnings forecasts. Journal of Accounting and Economics 42: 439-458.

Noe, C. 1999. Voluntary disclosures and insider transactions. Journal of Accounting and Economics 27: 305-326.

Penman, S. H. 1982. Insider trading and the dissemination of firms' forecast information. Journal of Business 55: 479-503.

Peterson, M. A. 2009. Estimating standard errors in finance panel data sets: comparing approaches. Review of Financial Studies 22: 435-480.

Pownall, G., C. Wasley, and G. Waymire. 1993. The stock price effects of alternative types of management earnings forecasts. The Accounting Review 68: 896-912.

Rogers, J. L. 2008. Disclosure quality and management trading incentives. Journal of Accounting Research 46: 1265-1296.

Rogers, J. L. and A. Van Buskirk. 2011. Bundled forecasts in empirical accounting research. Working paper, the University of Chicago.

Rogers, J. L., D. J. Skinner, and A. Van Buskirk. 2009. Earnings guidance and market uncertainty. Journal of Accounting and Economics 48: 90-109.

Rogers, J. L., and P. C. Stocken. 2005. Credibility of management forecasts. The Accounting Review 80: 1233-1260.

Skinner, D. 1994. Why firms voluntarily disclose bad news. Journal of Accounting Research 32: 38-60.

Skinner, D. 1997. Earnings disclosures and stockholder lawsuits. Journal of Accounting and Economics 23: 249-262.

Subramanyam, K. R. 1996. Uncertain precision and price reactions to information. The Accounting Review 71: 207-220.

Yang, H. 2012. Capital market consequences of managers' voluntary disclosure styles. Journal of Accounting and Economics 53: 167 - 184.

Waymire, G. 1984. Additional evidence on the information content of management earnings forecasts. Journal of Accounting Research 22 (2): 703-718.

Appendix A: Variable Measurement

Panel A: Variables used to test management forecast precision hypotheses

Dependent variables

Width = Forecast width for a range or point forecast, calculated as the difference between the high-end estimate and the low-end estimate, divided by the absolute value of the mid-point of the estimate; *Width* is 0 for a point forecast;

Precision= Management forecast precision, defined as forecast width (*Width*) times negative 1;

Independent variables of interest

FN = Forecast news, calculated as the difference between management forecast of EPS (the point or the mid-point of the range forecast) and the consensus analyst forecast of EPS issued in the 90 days before management forecast, scaled by the pre-release share price;

InsiderSell= Insider sale indicator, defined as 1 when the net insider trading (total purchases – total sales) in the 30 days after the management forecast is negative, and 0 otherwise;

InsiderBuy= Insider purchase indicator, defined as 1 when the net insider trading (total purchases – total sales) in the 30 days after the management forecast is positive, and 0 otherwise;

Control variables

Forecast Error= Management forecast error, calculated as the absolute value of the difference between actual EPS and the management forecast of EPS, divided by the pre-release share price;

Loss = Loss indicator of actual EPS, defined as 1 if actual EPS is negative, and 0 otherwise;

Forecast Horizon = Management forecast horizon, calculated as the number of calendar days between the forecast release date and the corresponding earnings announcement date; we use the log transformation in the correlation matrix and regression analysis;

Return Volatility= Return volatility, defined as the standard deviation of daily stock returns over the 250 trading days prior to the management forecast release date;

R&D= Research and development expenditures divided by sales;

Analyst Coverage = Analyst coverage, defined as the number of unique analysts who provide earnings forecasts in the 90 days before management forecasts; we use the log transformation in the correlation matrix and regression analysis;

INST= Institutional ownership, defined as the percentage of outstanding shares owned by institutional investors per 13F in the quarter when management forecast is released;

Size = Firm size, calculated as the firm's market capitalization (in $million) at the end of the quarter before the forecast; we use the log transformation in the correlation matrix and regression analysis;

M/B= Market to book ratio, calculated as the ratio of the market capitalization of equity divided by the book value of equity at the end of the quarter before the forecast;

FD = Indicator variable for post-FD (Regulation Fair Disclosure) period, equal to 1 when a management forecast is issued after October 2000, and 0 otherwise;

Litigation = Indicator variable for litigation risk, equal to 1 if firms are within industries with high litigation risk (i.e., 4-digit SIC code between 2833 and 2836, 3570 and 3577, 3600 and 3674, 5200 and 5961, and 7370 and 7374), and 0 otherwise;

Optimism = Indicator variable for forecast optimism, 1 if the management forecast (the point or the mid-point estimate) is higher than the actual EPS, and 0 otherwise;

PPrecision = Past management forecast precision, defined as the average precision for all management forecasts issued before the current forecast; we use a dummy variable to indicate the precision of past management forecasts, equal to 1 for the point forecasts, and 0 for the range forecasts;

Equity Issuance = Indicator variable for the occurrence of equity issuance, equal to 1 if the forecast is followed by equity issuance in the next 30 days and 0 otherwise;

Annual = Indicator variable for forecast of annual earnings, equal to 1 if a forecast is for annual earnings and 0 otherwise;

<u>*Conditioning variables*</u>

IH = Decile rank of institutional ownership standardized to [0,1]; *IH*=0 for firms with the lowest decile of institutional ownership and *IH*=1 for firms with the highest decile of institutional ownership;

DRISK= Indicator for high disclosure risk, 1 if a disclosure of bad news precedes insider purchases or a disclosure of good news precedes insider sales, and 0 otherwise;

DIFF= Decile rank of the difficulty level of assessing the precision of managers' information standardized to [0,1]; *DIFF*=0 for firms with the lowest decile of difficulty level and *DIFF*=1 for firms with the highest decile of difficulty level; the difficulty level is a common factor based on the following six variables: the standard deviation of analyst forecasts outstanding when management forecast is released, the standard deviation of analyst forecast errors for five years prior to the forecast release, whether the firm has a loss preceding the forecast, the standard deviation of daily stock returns in the year before the forecast date, the average bid-ask spread for the 10 days before the forecast date, and the standard deviation of forecast ranges before the current forecast.

Panel B: Additional variables used to test the market reaction to management forecasts

<u>*Dependent variables*</u>

Ret= Event period abnormal return for the management forecast, measured as the cumulative daily return minus the size-decile-matched market return from the day of the forecast to one day after;

<u>*Additional control variables*</u>

UE= Earnings surprise, calculated as the difference between actual EPS and the consensus analyst forecast of EPS before earnings announcement, scaled by pre-earnings-announcement share price; it is set as 0 for management forecasts not issued with earnings announcement;

Multiple= Indicator variable for multiple events, equal to 1 if there is more than one announcement (e.g., earnings announcements or other management forecasts), and 0 otherwise.

PAccuracy= Previous management forecast accuracy, defined as the forecast accuracy of management forecasts relative to the accuracy of analyst forecasts, averaged over all management forecasts issued before the current one. Management forecast accuracy is calculated as the absolute value of the difference between actual EPS and management forecast, divided by the pre-release share price and then multiplied by minus 1; and analyst forecast accuracy is calculated similarly.

Appendix B: Description of Control variables

This Appendix discusses the control variables included in the analyses. The detailed variable measurement is presented in Appendix A.

First, forecast precision is affected by the uncertainty that managers face when providing forecasts. We use several variables to capture managers' uncertainty including an ex post measure, forecast error (*FE*) (Rogers and Stocken 2005). It is usually more difficult for managers to forecast a firm's earnings precisely when the firm is unprofitable, when the forecast date is further away from the earnings announcement date, and when the firm operates in an uncertain environment. Thus we include an indicator variable of negative earnings (*Loss*), forecast horizon (*Horizon*), and two proxies for operating environment uncertainty: return volatility (*RetVol*) and research and development expenditure (*R&D*). We expect negative coefficients on these five variables.

Second, prior research indicates that managers are more likely to provide precise forecasts when the demand for information is higher (Baginski and Hassel 1997; Ajinkya et al. 2005; Lennox and Park 2006). We use analyst coverage (*Analyst*), institutional ownership (*INST*), firm size (*Size*), and growth opportunities (proxied for by the market-to-book ratio, *M*/*B*) to capture the capital markets' demand for information. We expect positive coefficients on these variables.

Third, we include several other variables that might affect forecast precision. Regulation Fair Disclosure (FD), enacted on October 23, 2000, prohibits selective disclosure and grants all investors equal access to a firm's material information. We expect that managers are more likely to release vague forecasts in the post-FD period than in the pre-FD period because the risk of voluntary disclosure is higher in the post-FD period due to tighter regulation. We use a dummy variable, *FD*, to indicate management forecasts issued after the year 2000. Litigation risk reduces managers' incentive to issue precise forecasts because precise forecasts are easier to be verified subsequently and are thus more likely to be used against companies in lawsuits. We include an indicator variable based on industry classification, *Litigation*, to capture the variation in litigation risk. As discussed previously, managers can provide biased forecasts to increase their personal gains (e.g., Rogers and Stocken 2005). Thus, we include an indicator for optimistic management forecasts (*Optimism*) to capture any potential impact that forecast bias has on precision, although we do not have a signed prediction for this variable. Because our sample includes both quarterly and annual forecasts, we include an indicator variable for annual forecasts (*Annual*) to control for the potential difference in forecast precision between annual and quarterly forecasts.

Fourth, we include several interaction terms in the regression. As shown in Choi et al. (2010), the relation between forecast precision and news may be nonlinear, and we thus include the square of forecast news to control for the potential non-linearity. In addition, some of the control variables might affect not only the level of forecast precision, but also the relation between forecast news and forecast precision. For example, litigation risk may lead to more bad news forecasts and imprecise forecasts (Baginski et al. 2002). Thus, high litigation concern can lead to a more positive relation between forecast news and forecast precision. Forecasts with longer horizons are more likely to be good news and at the same time less precise, leading to a

less positive relation between forecast news and precision. However, if managers have bad news with a long horizon, they might issue vague forecasts to dampen the effect of bad news, leading to a more positive relation between forecast news and precision. Similarly, firms with losses are more likely to issue bad news forecasts, which might be less precise due to the greater uncertainty associated with poor performance, leading to a more positive association between forecast news and precision. However, one might argue that the good news of loss firms, if any, will be even less precise, leading to a less positive association between forecast news and precision. Despite the ambiguous predictions for these interaction terms, we include them to ensure that our results on insider trading are not driven by omitted correlated variables.

Fifth, managers might strategically choose forecast precision before equity issuance. When firms are about to issue additional shares, they have incentives to increase stock prices and proceeds. Managers can affect stock prices through voluntary disclosures (e.g., Lang and Lundholm 2000). If such incentives also affect managers' forecast precision decisions, we expect managers to issue more precise positive news forecasts and less precise negative news forecasts to increase proceeds, as in the case of insider sales. Hence, we include an interaction variable of $FN \times EquIssue$, where *EquIssue* is 1 for management forecasts followed by equity issuance in the next 30 days and 0 otherwise. We also include the main effect of equity issuance for the sake of completeness.

Finally, despite our efforts, we might still miss important determinants of forecast precision. As long as these omitted determinants are not correlated with managerial incentives, our inferences are not affected. Nevertheless, we include past management forecast precision (*PPrecision*) to control for the impact of time-invariant omitted factors.

Table 1
Descriptive Statistics of Management Forecasts

This table describes the characteristics of 10,799 management forecasts of current period's earnings issued in the period 1999-2006.

Panel A: Yearly and quarterly distribution of management forecasts

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total	(%)
1999	45	59	79	84	267	(2.47%)
2000	58	96	89	171	414	(3.83%)
2001	181	296	330	357	1,164	(10.78%)
2002	287	383	380	389	1,439	(13.33%)
2003	276	360	393	488	1,517	(14.05%)
2004	340	457	533	530	1,860	(17.22%)
2005	376	478	505	610	1,969	(18.23%)
2006	440	573	602	554	2,169	(20.09%)
Total	2,003	2,702	2,911	3,183	10,799	(100%)
	(18.55%)	(25.02%)	(26.96%)	(29.47%)	(100%)	

Table 1 (cont'd)

Panel B: Management forecast news

Good (bad, neutral) news forecasts refer to management forecasts for which the point estimate, or the mid-point of a range forecast, is above (below, similar to) the average of the analyst forecasts issued in the 90 days before the management forecast release date. Management forecasts are classified as neutral news if the absolute value of forecast news (*FN*, defined as management forecast minus average analyst forecast scaled by pre-release price) is in the bottom quintile of the sample distribution.

	All management forecasts		Management forecasts before insider sales		Management forecasts before insider purchases		Management forecasts not followed by insider trading	
	N	%	N	%	N	%	N	%
Good news forecasts	3,555	32.92%	1,163	41.08%	401	28.30%	1,991	30.39%
Bad news forecasts	5,067	46.92%	877	30.98%	743	52.43%	3,447	52.62%
Neutral forecasts	2,177	20.16%	791	27.94%	273	19.27%	1,113	16.99%
Total	10,799	100%	2,831	100%	1,417	100%	6,551	100%

Table 2
Descriptive Statistics

This table provides descriptive statistics on key variables for the sample of 10,799 management earnings forecasts issued in the period 1999-2006. Please see Appendix A for variable definitions.

		Percentile					
	Mean	5%	25%	50%	75%	95%	Std. Dev.
Forecast Width (*Width*)	0.117	0	0.018	0.053	0.121	0.462	0.211
Forecast Precision (*Precision*)	-0.117	-0.462	-0.121	-0.053	-0.018	0	0.211
Management Forecast News (*FN*)	-0.001	-0.011	-0.003	-0.001	0.002	0.006	0.005
Insider Sell (*InsiderSell*)	0.262	0	0	0	1	1	0.440
Insider Buy (*InsiderBuy*)	0.131	0	0	0	0	1	0.337
Management Forecast Error (*FE*)	0.003	0	0.0004	0.001	0.003	0.010	0.005
Firm Profitability (*Loss*)	0.073	0	0	0	0	1	0.260
Management Forecast Horizon (*Horizon*)	124	33	84	92	122	354	88
Return Volatility (*RetVol*)	0.027	0.011	0.018	0.024	0.033	0.056	0.014
Research and Development Expenditures (*R&D*)	0.051	0	0	0	0.069	0.243	0.093
Analyst Following (*Analyst*)	8.210	3	4	6	11	20	7.630
Institutional Holding (*INST*)	0.651	0	0.537	0.705	0.832	0.945	0.245
Firm Growth (*M/B*)	3.642	1.075	1.787	2.662	4.146	10.019	3.274
Firm Size (*Size*)	9,235	205	693	1,938	6,316	39,083	28,610
Fair Disclosure (*FD*)	0.937	0	1	1	1	1	0.243
Litigation (*Litig*)	0.298	0	0	0	1	1	0.458
Management Optimism (*Optimism*)	0.305	0	0	0	1	1	0.460
Past Management Forecast Precision (*PPrecision*)	0.300	0	0.045	0.2	0.484	1	0.305
Equity Issuance (*EquIssue*)	0.010	0	0	0	0	0	0.084
Annual Forecast (*Annual*)	0.351	0	0	0	1	1	0.477

Table 3
Correlation Matrix

This table reports the correlations among independent variables for the sample of 10,799 management earnings forecasts issued in the period 1999-2006. All variables are defined in Appendix A. *, ** indicate significance at the 0.05 and 0.01 levels, respectively, based on two-tailed tests.

	FN (1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*	*(16)*	*(17)*
InsiderSell (2)	0.15**																
InsiderBuy (3)	-0.02*	-0.23**															
FE (4)	-0.09**	-0.06**	0.01														
Loss (5)	-0.30**	-0.06**	-0.01	0.30**													
Horizon (6)	0.15**	0.05**	0.05**	0.09**	-0.08**												
RetVol (7)	-0.21**	-0.03**	-0.03**	0.11**	0.36**	-0.18**											
R&D (8)	-0.13**	0.05**	-0.04**	0.04**	0.35**	-0.10**	0.31**										
Analyst (9)	-0.02	0.01	-0.01	-0.01	0.01	-0.06**	-0.01	0.12**									
INST (10)	0.06**	0.09**	-0.01	-0.04**	-0.09**	-0.03**	-0.07**	-0.03**	0.07**								
M/B (11)	0.07**	0.10**	-0.01	-0.13*	-0.05**	-0.01	0.05**	0.14**	0.06**	-0.03**							
Size (12)	0.17**	0.03**	0.03**	-0.18**	-0.21**	0.06**	-0.36**	-0.05**	0.34**	0.03**	0.27**						
FD (13)	0.08**	0.06**	-0.04**	0.02*	0.01	0.06**	-0.16**	0.01	0.01	0.10**	-0.11**	-0.04**					
Litigation (14)	-0.05**	0.07**	-0.03**	0.02*	0.14**	-0.09**	0.35**	0.51**	0.12**	-0.01	0.13**	-0.01	-0.01				
Optimism (15)	0.01	-0.09**	0.05**	0.20**	0.10**	0.17**	0.03**	-0.05**	0.01	-0.06**	-0.05**	-0.04**	-0.04**	-0.04**			
PPrecision (16)	-0.01	-0.02*	0.01	-0.04**	0.03**	-0.07**	0.20**	0.10**	0.08**	0.01	0.15**	0.17**	-0.35**	0.08**	-0.01		
EquIssue (17)	0.03**	0.01	-0.01	-0.01	-0.01	-0.01	0.01	-0.01	-0.01*	-0.01	0.01	-0.02**	0.01	-0.02*	-0.02**	-0.01	
Annual (18)	0.17**	0.00	0.04**	-0.03**	-0.12**	0.42**	-0.27**	-0.17**	-0.08**	-0.22**	-0.01	0.10**	0.04**	-0.15**	0.16**	-0.09**	-0.02*

Table 4
Managerial Incentives and Management Forecast Precision: Tests of H1

This table reports regression analysis of the impact of insider trading on the relation between forecast news and forecast precision. Panel A is based on the continuous variable of forecast news and Panel B is based on the sign of forecast news. The regressions are estimated based on 10,799 management forecasts issued in the period 1999-2006. Please see Appendix A for variable measurements. P-values are based on one-sided tests for coefficients with predicted signs and are based on two-sided tests for other coefficients. We use firm-clustering adjusted standard errors to calculate p-values.

Panel A: Regressions based on continuous variable of forecast news

This table reports regression results from the following model:

$$Precision = \beta_0 + \beta_1 FN + \beta_2 InsiderSell + \beta_3 FN \times InsiderSell + \beta_4 InsiderBuy + \beta_5 FN \times InsiderBuy + \boldsymbol{\delta}\,\textbf{Control Variables} + \varepsilon \quad (1)$$

		Model (1)		Model (2)	
Variable	Pred. sign	Coeff.	P-Value	Coeff.	P-Value
Intercept	?	-0.261	0.001	-0.264	0.001
FN	+	4.748	0.001	4.003	0.001
InsiderSell	+	0.008	0.059	0.009	0.027
FN × InsiderSell	**+**			**7.866**	**0.001**
InsiderBuy	-	-0.002	0.371	-0.011	0.037
FN × InsiderBuy	**-**			**-5.316**	**0.001**
Forecast Error	-	-1.508	0.071	-1.512	0.067
Loss	-	-0.117	0.001	-0.117	0.001
Forecast Horizon	-	-0.001	0.001	-0.001	0.001
Return Volatility	-	-1.198	0.001	-1.217	0.001
R&D	-	-0.188	0.001	-0.184	0.001
Analyst Coverage	+	-0.006	0.954	-0.006	0.975
INST	+	0.060	0.001	0.059	0.001
M/B	+	0.002	0.008	0.002	0.007
Size	+	0.017	0.001	0.018	0.001
FD	-	-0.010	0.102	-0.008	0.141
Litigation	-	-0.008	0.159	-0.008	0.132
Optimism	?	-0.012	0.011	-0.012	0.011
Previous Precision	+	0.102	0.001	0.102	0.001
Equity Issuance	?	-0.094	0.053	-0.095	0.049
Annual	?	0.086	0.001	0.085	0.001
FN × FN	-	-33.417	0.236	-77.166	0.056
FN × Litigation	+	3.442	0.014	3.474	0.011
FN × Forecast Horizon	?	0.991	0.280	1.141	0.211
FN × Loss	?	-8.551	0.001	-8.894	0.001
FN × Equity Issuance	+	17.864	0.047	18.643	0.038
Adjusted R^2		21.07%		21.87%	

Table 4 (cont'd)

Panel B: Regressions based on the sign of forecast news

This table reports regression results from the following model:

$$\begin{aligned} Precision = {} & \beta_{00} + \beta_{01} Good + \beta_{02} Bad \\ & + \beta_{11} InsiderSell + \beta_{12} InsiderSell \times Good + \beta_{13} InsiderSell \times Bad \\ & + \beta_{21} InsiderBuy + \beta_{22} InsiderBuy \times Good + \beta_{23} InsiderBuy \times Bad + \boldsymbol{\delta}\,\mathbf{Control\ Variables} + \varepsilon \end{aligned} \quad (1')$$

Good is an indicator variable that is 1 for management forecasts that are classified as good news and *Bad* is an indicator variable that is 1 for management forecasts that are classified as bad news. Other management forecasts are neutral forecasts. Good (bad, neutral) news forecasts refer to management forecasts for which the point estimate, or the mid-point of a range forecast, is above (below, similar to) the average of the analyst forecasts issued in the 90 days before the management forecast release date. Management forecasts are classified as neutral news if the absolute value of forecast news (*FN*, defined as management forecast minus average analyst forecast scaled by pre-release price) is in the bottom quintile of the sample distribution.

Variable	Pred. sign	Coeff.	P-Value
Intercept	?	-0.217	0.001
Good	+	-0.008	0.878
Bad	-	-0.058	0.001
InsiderSell	+	0.005	0.107
InsiderSell × Good	+	**0.015**	**0.005**
InsiderSell × Bad	-	**-0.023**	**0.035**
InsiderBuy	-	-0.003	0.270
InsiderBuy × Good	-	**-0.034**	**0.005**
InsiderBuy × Bad	+	**0.021**	**0.011**
Forecast Error	-	-1.360	0.079
Loss	-	0.009	0.568
Forecast Horizon	-	-0.001	0.001
Return Volatility	-	-1.223	0.001
R&D	-	-0.179	0.001
Analyst Coverage	+	-0.003	0.841
INST	+	0.057	0.001
M/B	+	0.001	0.071
Size	+	0.015	0.001
FD	-	-0.005	0.246
Litigation	-	0.018	0.995
Optimism	?	-0.004	0.327
Previous Precision	+	0.094	0.001
Equity Issuance	?	-0.092	0.344
Annual	?	0.087	0.001
Good × Litigation	+	-0.012	0.930
Bad × Litigation	-	-0.064	0.001
Good × Forecast Horizon	?	-0.015	0.008
Bad × Forecast Horizon	?	-0.010	0.166
Good × Loss	?	-0.132	0.047
Bad × Loss	?	-0.079	0.141
Good × Equity Issuance	+	0.095	0.175
Bad × Equity Issuance	-	-0.170	0.146
Adjusted R^2		22.72%	

Table 5
Managerial Incentives and Management Forecast Precision, Conditioning Analyses: Test of H2-H4

This table reports regression results from the following model:

$$\begin{aligned} Precision = {} & \beta_0 + \beta_1 FN \\ & + \beta_{20} InsiderSell + \beta_{21} FN \times InsiderSell + \beta_{22} FN \times InsiderSell \times Conditioning\_Variable \\ & + \beta_{30} InsideBuy + \beta_{31} FN \times InsiderBuy + \beta_{32} FN \times InsiderBuy \times Conditioning\_Variable + \boldsymbol{\delta}\,\textbf{Control Variables} + \varepsilon \end{aligned} \quad (2)$$

Conditioning_Variable is one of the three conditioning variables: *IH, DRISK,* and *DIFF*. *IH* is the decile rank of institutional ownership standardized to [0,1] (with *IH*=0 for firms with the lowest decile of institutional ownership and *IH*=1 for firms with the highest decile of institutional ownership). *DRISK* is an indicator variable for high disclosure risk and it equals 1 if the forecast before insider purchases is bad news or if the forecast before insider sales is good news, and 0 otherwise. *DIFF* is the decile rank of the difficulty level of assessing the precision of managers' information standardized to [0,1] (with *DIFF*=0 for firms with the lowest decile of difficulty level and *DIFF*=1 for firms with the highest decile of difficulty level). Please see Appendix A for variable measurements. The regression is estimated based on 10,799 management forecasts issued in the period 1999-2006. P-values are based on one-sided tests for coefficients with predicted signs and are based on two-sided tests for other coefficients. We use firm-clustering adjusted standard errors to calculate p-values.

	Pred.	Model (1)		Model (2)		Model (3)		Model (4)	
	sign	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value
Intercept	?	-0.264	0.001	-0.260	0.001	-0.245	0.001	-0.244	0.001
FN	+	4.058	0.001	5.277	0.001	3.868	0.001	5.003	0.001
InsiderSell	+	0.010	0.014	0.042	0.001	0.009	0.027	0.038	0.001
FN × InsiderSell	+	12.855	0.001	18.158	0.001	2.046	0.144	18.991	0.001
FN × InsiderSell×IH	**-**	**-9.992**	**0.004**					**-7.986**	**0.011**
FN × InsiderSell×DRISK	**-**			**-23.944**	**0.001**			**-22.315**	**0.001**
FN × InsiderSell×DIFF	**+**					**9.064**	**0.003**	**3.225**	**0.124**
InsiderBuy	-	-0.012	0.032	0.018	0.990	-0.012	0.024	0.017	0.981
FN × InsiderBuy	-	-6.951	0.001	-17.977	0.001	-2.204	0.070	-16.698	0.001
FN × InsiderBuy×IH	**+**	**4.039**	**0.043**					**4.315**	**0.048**
FN × InsiderBuy×DRISK	**+**			**16.774**	**0.001**			**18.459**	**0.001**
FN × InsiderBuy×DIFF	**-**					**-3.997**	**0.029**	**-5.021**	**0.033**

Table 5 (Cont'd)

	Pred. sign	Model (1) Coeff.	Model (1) P-Value	Model (2) Coeff.	Model (2) P-Value	Model (3) Coeff.	Model (3) P-Value	Model (4) Coeff.	Model (4) P-Value
DRISK	?			-0.011	0.056			-0.006	0.327
DIFF	?					-0.042	0.001	-0.039	0.001
Forecast Error	-	-1.524	0.063	-1.275	0.099	-1.366	0.086	-1.153	0.120
Loss	-	-0.119	0.001	-0.114	0.001	-0.118	0.001	-0.115	0.001
Forecast Horizon	-	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001
Return Volatility	-	-1.225	0.001	-1.133	0.001	-0.358	0.165	-0.341	0.174
R&D	-	-0.185	0.001	-0.191	0.001	-0.190	0.001	-0.198	0.001
Analyst Coverage	+	-0.006	0.971	-0.005	0.923	-0.006	0.965	-0.004	0.913
INST	+	0.060	0.001	0.058	0.001	0.059	0.001	0.060	0.001
M/B	+	0.002	0.007	0.002	0.026	0.002	0.012	0.001	0.033
Size	+	0.017	0.001	0.017	0.001	0.016	0.001	0.015	0.001
FD	-	-0.008	0.144	-0.009	0.106	-0.018	0.009	-0.018	0.009
Litigation	-	-0.009	0.125	-0.010	0.094	-0.008	0.131	-0.010	0.096
Optimism	?	-0.011	0.014	-0.010	0.028	-0.011	0.014	-0.010	0.032
Previous Precision	+	0.102	0.001	0.099	0.001	0.104	0.001	0.102	0.001
Equity Issuance	?	-0.096	0.024	-0.095	0.049	-0.095	0.048	-0.095	0.048
Annual	?	0.085	0.001	0.086	0.001	0.092	0.001	0.094	0.001
FN × FN	-	-83.759	0.039	70.508	0.927	-67.709	0.072	66.859	0.921
FN × Litigation	+	3.227	0.016	3.275	0.015	3.730	0.007	3.394	0.011
FN × Forecast Horizon	?	1.194	0.189	1.275	0.163	1.114	0.218	1.309	0.147
FN × Loss	?	-9.201	0.001	-8.400	0.001	-9.034	0.001	-8.480	0.001
FN × Equity Issuance	+	18.486	0.041	19.206	0.031	17.815	0.043	18.546	0.035
Adjusted R^2		22.13%		22.81%		22.59%		23.57%	

Table 6
Forecast Precision and Market Response to Management Forecasts

This table reports regression results from the following model:

$$Ret = \beta_0 + \beta_1 FN + \beta_2 Precision + \beta_3 FN \times Precision + \boldsymbol{\delta}\textbf{Control Variables} + \varepsilon \quad (3)$$

Ret is the event period abnormal return for the management earnings forecast, measured as the cumulative daily return minus the size-decile-matched market return from the day of management forecast to one day after. The regression is estimated based on 10,799 management forecasts issued in the period 1999-2006. Please see Appendix A for variable measurements. We use the decile ranks of *Precision* and control variables (except *UE* and *Multiple*) and standardize the ranks to the range of [0,1]. P-values are based on one-sided tests for coefficients with predicted signs and are based on two-sided tests for other coefficients. We use firm-clustering adjusted standard errors to calculate p-values.

Variable	Pred. sign	Coeff.	P-Value
Intercept	?	-0.004	0.286
FN	**+**	**5.126**	**0.001**
Precision	?	0.011	0.001
FN × Precision	**+**	**0.412**	**0.046**
Size	?	-0.007	0.023
FN × Size	-	-1.254	0.001
M/B	?	-0.010	0.001
FN × M/B	+	0.537	0.002
RetVol	?	-0.003	0.292
FN × RetVol	+	0.008	0.484
Multiple	?	0.008	0.001
FN × Multiple	-	-0.323	0.002
PAccuracy	?	-0.002	0.433
FN ×PAccuracy	+	-0.125	0.767
Annual	?	0.009	0.001
FN × Annual	-	-4.455	0.001
UE	+	0.225	0.100
UE × Size	-	-0.563	0.028
UE × M/B	+	0.557	0.041
Adjusted R^2		11.41%	

Table 7
Using Actual Magnitude of Insider Trading

This table reports regression analysis of the impact of insider trading on the relation between forecast news and forecast precision, using actual magnitude of insider trading (instead of indicators). In model (1) we measure *InsiderSell* (*InsiderBuy*) using log transformation of actual net insider sales (or purchases) in dollars and it is zero for observations with net insider purchases (sales); we measure insider trading in the period of 30 days after the management forecast date. In model (2) we further adjust *InsiderSell* (*InsiderBuy*) by deducting the average of net insider sales (purchases) in the previous 12-month period. The regressions are estimated based on 10,799 management forecasts issued in the period 1999-2006. Please see Appendix A for variable measurements. P-values are based on one-sided tests for coefficients with predicted signs and are based on two-sided tests for other coefficients. We use firm-clustering adjusted standard errors to calculate p-values.

		Model (1)		Model (2)	
Variable	Pred. sign	Coeff.	P-Value	Coeff.	P-Value
Intercept	?	-0.264	0.001	-0.264	0.001
FN	+	4.143	0.001	4.566	0.001
InsiderSell	+	0.001	0.005	0.001	0.031
FN × InsiderSell	**+**	**0.516**	**0.001**	**0.391**	**0.003**
InsiderBuy	-	-0.001	0.060	-0.001	0.051
FN × InsiderBuy	**-**	**-0.460**	**0.001**	**-0.453**	**0.001**
Forecast Error	-	-1.484	0.071	-1.494	0.071
Loss	-	-0.117	0.001	-0.118	0.001
Forecast Horizon	-	-0.001	0.001	-0.001	0.001
Return Volatility	-	-1.215	0.001	-1.206	0.001
R&D	-	-0.184	0.001	-0.184	0.001
Analyst Coverage	+	-0.006	0.974	-0.006	0.969
INST	+	0.059	0.001	0.060	0.001
M/B	+	0.002	0.008	0.002	0.007
Size	+	0.017	0.001	0.017	0.001
FD	-	-0.008	0.135	-0.009	0.131
Litigation	-	-0.009	0.124	-0.008	0.140
Optimism	?	-0.011	0.013	-0.012	0.012
Previous Precision	+	0.102	0.001	0.102	0.001
Equity Issuance	?	-0.096	0.048	-0.095	0.049
Annual	?	0.085	0.001	0.085	0.001
FN ×FN	-	-73.479	0.058	-61.846	0.095
FN × Litigation	+	3.413	0.012	3.577	0.011
FN × Forecast Horizon	?	1.171	0.201	1.219	0.188
FN × Loss	?	-8.811	0.001	-8.912	0.001
FN × Equity Issuance	+	18.630	0.075	18.596	0.077
Adjusted R^2		21.77%		21.51%	