

**Rounding of Internal Performance Targets:
Determinants and Implications***

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Rounding of Internal Performance Targets: Determinants and Implications

Abstract

We examine the pattern of rounding (placing a zero or five at the penny digit) for earnings-per-share (EPS) performance targets that are used in CEO bonus plans. We find that over 42% of the EPS targets end with a zero or five at the penny location, more than double the unconditional expected percentage of 20%. Analyses indicate that EPS targets are more likely to be rounded when the penny digit is less important, when there is more information uncertainty, and when the compensation committee is more co-opted. As a consequence of the information uncertainty, we predict and find that firms with rounded performance targets are more likely to issue rounded management forecasts and issue management forecasts later in time, and that the issued forecasts exhibit lower accuracy, have a wider range, and convey less information. In addition, management forecasts issued by firms with rounded performance targets are also more conservative, consistent with managers faced with greater information uncertainty giving themselves more leeway to avoid missing their own guidance. The higher information uncertainty for rounding firms is also reflected in their real operational decisions: they make less capital investment, engage in less acquisition activities, issue less debt, and hold more cash. Last, when EPS targets are rounded, CEOs receive higher compensation after controlling for performance and other firm characteristics. Rounded EPS targets, compared to non-rounded targets, are easier targets relative to realized EPS, thus likely to play a role in facilitating higher compensation payout to the CEO. Overall, we provide new evidence on the attributes of earnings performance targets used for incentivizing and coordination firm-wide activities.

Keywords: Rounding; Internal Performance Target; Board Co-option; CEO Compensation

1. Introduction

As a ubiquitous component of executive compensation, accounting-based bonuses play an important role in providing CEO incentives (e.g., Murphy 2013; Bennett et al., 2017; Guay, Kepler, and Tsui 2019). Murphy (2013) argues that bonus plans can be as important as equity in directing the activities of CEOs and other executives because cash bonus payouts are tangible, immediate, and well understood. Bonus plans also serve the essential function of organizing and coordinating firm-wide efforts and decisions as well as encouraging mutual monitoring across the top management team (Murphy and Jensen 2011; Indjejikian et al. 2014; Guay et al. 2019). Focusing on performance targets used in CEO bonus plans, this study examines the pattern of rounding, an unexplored attribute of earnings-per-share performance targets for CEO bonuses.

Murphy (2001) characterizes executive bonus plans by three basic components: performance measures, the relation between pay and performance, and performance standards. While there is a long line of research focusing on the first two components (e.g., Healy 1985; Lambert and Larcker, 1987; Sloan 1993; Holthausen et al. 1995; Baber et al. 1998; Core et al. 2003; Shalev et al. 2013; Guay et al. 2019; Na et al. 2022), large-sample evidence on performance standards, that is, performance targets for which target bonuses are paid, has been scarce until the SEC expanded its mandatory disclosure requirement for compensation-related information in 2006. Murphy (2013) suggests that performance targets are routinely determined by firms' annual internal budgeting process, which is an essential part of corporate operations. Recent studies find that performance targets in CEO compensation contracts affect financial reporting (Bennett et al. 2017), firm performance (Kim et al. 2022), and corporate risk taking (Chen et al. 2022). We further the understanding of performance targets in bonus plans by providing new evidence that earnings per share (EPS) targets in CEO bonus plans tend to be

rounded: the penny digit ends disproportionately more with zero or five. We also shed light on the motives and implications of rounding EPS performance targets.

Several lines of research in accounting and finance have examined whether investors, managers, or analysts focus on or herd to specific numbers. For example, Herrmann and Thomas (2005) and Dechow and You (2012) show that the penny digit of analysts' forecasts of EPS tends to end with zero or five. Bamber, Hui, and Yeung (2010) identify rounding patterns in managers' EPS forecasts. Such patterns can be driven by behavioral biases, economic factors, and opportunism. Research in various fields such as psychology and demography suggests that humans making quantitative estimates under uncertainty tend to give estimates ending in digits that are the largest divisors of the base of the number system, a phenomenon referred to as "heaping" (e.g., Turner 1958; Rowland 1990). In the base ten number system, ten and five are the largest divisors. Human estimates therefore commonly end in multiples of ten and five. Furthermore, Herrmann and Thomas (2005) attribute analysts' tendency to round their forecasts to their being less informed, while Dechow and You (2012) argue that analysts rationally choose to round their forecasts as the importance of the penny location declines. Bamber et al. (2010) point out that managers' nickel forecasts appear to reflect managers' efforts to protect proprietary information and are due to self-serving opportunism to bias the forecasts in their preferred direction.

It is not ex ante obvious to what extent performance targets may exhibit a rounding pattern. Neither can the determinants and implications of rounding performance targets be readily inferred from prior research. Different from analyst forecasts, which are outsiders' estimates of future performance, performance targets in bonus plans are internally determined by the budgeting process, likely based on more precise information, and affected by different

incentives. While both performance targets and management forecasts are based on insider information, performance targets differ from management forecasts along several dimensions that may affect the incidence of rounding. First, while concerns about proprietary information influence managers' earnings guidance (Bamber et al. 2010), they are unlikely to affect the decision to round the performance goal. At the time when the performance target is set, typically in the first quarter of the fiscal year, it is not revealed to the public. Instead, it is disclosed ex post in the proxy statement after the fiscal year has ended, the operating results have been finalized, and earnings have been announced. Murphy (2013) suggests that the performance target is routinely determined by a firm's annual internal budgeting process. Therefore, the performance target is mainly intended to serve the purpose of internally coordinating firm-wide activities and providing team incentives (e.g., Indjejikian, Matějka, Merchant, and Van der Stede, 2014; Guay, Kepler, and Tsui, 2019; Bloomfield, 2021; Bloomfield, Gipper, Kepler, and Tsui, 2021; Bushman, 2021). Second, although managers may prefer a low performance target that is easy to meet, the performance target is set by the board. It is unclear whether managerial opportunism significantly influences how the target is set.

We extract performance target data from the ISS Incentive Lab Database. We focus on CEO bonus plans that use EPS as a performance measure. As shown by past studies (e.g., Shalev et al., 2013; Huang et al., 2014; Armstrong et al. 2022), EPS is one of the most common performance measures in CEO cash bonus plans. After requiring nonmissing performance target data and imposing other necessary data requirements, our final sample includes 2,291 firm-year observations over the period from 2006 to 2020. We find strong evidence that EPS targets in bonus plans are rounded at nickel intervals. Over 42% of EPS targets end with zero or five, while only around 20% of the actual reported EPS end in nickel intervals.

We propose and test economic explanations for the tendency to round EPS performance targets at nickel intervals. Dechow and You (2012) expect that the economic importance of the penny digit declines as the level of EPS increases. They find that analysts are more likely to round their forecasts as the magnitude of EPS increases. In a similar vein, we expect EPS performance targets to be more likely rounded as the level of EPS increases. Further, research in psychology suggests that rounding is a heuristic response to uncertainty (e.g., Huttenlocher, Hedges, and Bradburn 1990). We thus expect that EPS targets are more likely rounded when there is more uncertainty about the firm's performance. In addition, prior research suggests that, when quantitative estimates are rounded, the rounded estimates are often biased toward respondents' preferred outcomes (e.g., Rowland 1990; Hales 2007). Consistent with this argument, Bamber et al. (2010) report that rounded management forecasts are more optimistically biased and that managers are more likely to issue rounded forecasts when they are motivated to upward bias the forecasts. In case of performance targets, CEOs prefer lower targets that are easier to achieve and could influence target setting by, for example, providing input for estimating future performance and pressuring compensation committee members. The greater is CEOs' influence over the compensation committee, the more likely performance targets reflect their self-serving preferences, that is, the more likely targets are rounded and easier to achieve. Prior research suggests that CEOs have a greater influence over the compensation committee when the compensation committee is more co-opted. We thus predict that the likelihood of rounding EPS targets increases with the extent of compensation committee co-option.

Our results are consistent with these predictions. We find that the likelihood of rounding increases with the magnitude of lagged earnings per share, consistent with the tendency to round increasing as the importance of the penny digit declines. The likelihood of a firm having rounded

EPS targets is significantly positively correlated with information uncertainty as captured by lagged analyst forecast dispersion. Also, the likelihood of rounding is positively associated with compensation committee co-option. These findings suggest that rounded performance targets can be a natural response to economic factors such as information uncertainty but can also be a result of CEO self-serving and lax governance.

If the rounding of internal performance targets are associated with greater uncertainty, we expect the uncertainty to also manifest in management guidance, which builds on internal performance projections (Call, Hribar, Skinner, and Volant 2023). In particular, we expect that firms with rounded EPS targets are also more likely to provide rounded management guidance. Further, their guidance is likely to be less precise, timely, or informative. Indeed, we find that the likelihood of issuing rounded management forecasts is higher for firms with rounded EPS targets. Firms with rounded EPS targets tend to issue the forecasts closer to the fiscal year end, consistent with management waiting longer for the information uncertainty to resolve before providing their forecasts. Forecasts issued by firms with rounded EPS targets tend to have wider ranges and their forecast errors are larger in magnitude. We also examine the market's reaction to management forecasts and find that management forecasts issued by firms with rounded EPS targets are associated with significantly lower market reactions, suggesting that rounded forecasts are less informative. Last, we examine the relation between performance target rounding and firms' tendency to issue conservative earnings guidance. Survey evidence provided by Call, Hribar, Skinner, and Volant (2023) suggests that firms issue conservative guidance in order to have leeway to meet their own guidance in case of an unexpected downturn. We find that firms with rounded performance targets are more likely to issue more conservative

management guidance, presumably because they face greater information uncertainty and therefore need more leeway to improve the chance of meeting their own guidance.

Next, we examine whether the higher information uncertainty for rounding firms is also reflected in their real operational decisions. We find that firms with rounded EPS targets hold more cash, make less capital investment, engage in less acquisition activities, and issue less debt, after controlling for firms' investment opportunities and stock return volatility. The results suggest that rounding as an internal measure of uncertainty has incremental explanatory power above and beyond uncertainty captured by common external measures such as stock return volatility.

Finally, we examine the relation between rounded EPS targets and CEO compensation. If CEOs influence the setting of performance targets and rounding EPS targets reflects their preference to lower the performance target, CEOs are more likely to meet rounded performance targets and receive higher compensation. We find that CEO cash and total compensation are higher in firms with rounded EPS targets than in other firms, after controlling for performance and various firm characteristics. The results are consistent with the rounding of EPS targets being partly driven by CEO self-dealing. Further supporting this interpretation, evidence indicates that rounded EPS targets, relative to non-rounded targets, are more likely to be lower in comparison to realized EPS, suggesting that rounded EPS targets are on average easier targets, thus likely to play a role in facilitating higher compensation payout to the CEO.

We contribute to the growing literature on performance targets in several ways. First, we report the first evidence of heaping in internal performance targets. Our findings indicate that the board is subject to psychological heuristics when determining performance targets. Second, we provide evidence suggesting that the rounding of internal performance targets is associated with

internal information uncertainty as well as CEOs' self-dealing incentives. Our findings that co-opted compensation committees are more likely to round EPS targets and that rounded EPS targets are easier to achieve are consistent with CEOs influencing the compensation committee to obtain higher compensation.

Our findings also suggest that rounding of performance targets conveys information beyond CEO compensation. The performance target is an important part of the corporate capital budgeting process and serves the essential function of internally coordinating firm-wide activities and providing team incentives (e.g., Murphy 2013; Indjejikian, Matějka, Merchant, and Van der Stede, 2014; Guay, Kepler, and Tsui, 2019; Bloomfield, 2021; Bloomfield, Gipper, Kepler, and Tsui, 2021; Bushman, 2021). Rounding of performance targets reveals information about insiders' assessment of uncertainty, which is incrementally important in explaining real corporate decisions beyond common external measures of uncertainty.

The rest of the paper is organized as follows. Section 2 discusses the literature and hypothesis development. Section 3 describes our sample and examines the rounding pattern of EPS performance targets. Section 4 examines the determinants of rounding. Section 5 explores the relation between rounded EPS targets and management guidance. Section 6 reports the analyses of rounded EPS targets, CEO compensation, and target difficulty. Section 7 concludes.

2. Literature review and hypothesis development

2.1. CEO bonus plans and performance targets

Almost all publicly traded U.S. corporations include accounting-based bonus as a part of the compensation packages of their executives including the CEOs (e.g., Murphy 1999; Armstrong et al. 2010; Murphy 2013; Guay et al. 2019). Murphy (2013) argues that “bonus plans

based on accounting measures may be as important as equity in actually directing the activities of CEOs and other executives.” He suggests two reasons for why this is the case from a behavioral perspective. First, CEOs understand the influence of their actions on accounting numbers better than that on stock prices. Second, cash bonus payouts are tangible and immediate compared to the distant and uncertain paper gains in unvested equity plans. Using data on bonus payouts at different levels of performance goals, Guay et al. (2019) show that previous studies underestimate the importance of bonus plans in terms of performance sensitivities by at least an order of magnitude. Relatedly, Na et al. (2022) find that, when the correct non-GAAP earnings performance measure (as opposed to GAAP earnings performance) is used, the sensitivity of bonus payout to earnings performance, estimated with the simple regression approach, is more than five times larger. Furthermore, bonus plans and related performance evaluation serve the essential function of organizing and coordinating firm-wide efforts and decisions as well as encouraging mutual monitoring across the top management team (Murphy and Jensen 2011; Indjejikian et al. 2014; Guay et al. 2019). Thus, bonus plans are an important incentive device for top management.

Murphy (2001) describes executive bonus plans as having three basic components: performance measures, the (non-linear) relation between pay and performance, and performance standards. There is a long line of research focusing on the choice and implications of performance measures and the relation between pay and performance (e.g., Healy 1985; Lambert and Larcker 1987; Sloan 1993; Holthausen et al. 1995; Baber et al. 1998; Core et al. 2003; Shalev et al. 2013; Guay et al. 2019; Na et al. 2022). Research on performance targets was limited and largely relied on proprietary data sources until the SEC expanded mandatory disclosures about the structure of bonus contracts in 2006 (Indjejikian et al. 2014). For example,

Leone and Rock (2002) investigate whether budgets ratchet using proprietary business-unit data from a large multinational corporation.

Several recent studies using the mandated disclosures highlight the importance of performance target choices in executive compensation. Bennett et al. (2017) find that missing internal targets increases the likelihood of a forced CEO turnover. They also find that a disproportionately large number of firms exceeds their targets by a small margin (relative to the number of firms that falls short of their target by a small margin), and that exceeding earnings targets by a small margin is associated with higher discretionary accruals and lower discretionary expenses. Kim and Shin (2017) provide the first large-sample evidence on bonus target ratcheting. Kim et al. (2022) find that greater target difficulty is associated with lower compensation and higher concurrent abnormal earnings but at the same time lower earnings and stock returns in the subsequent year. Armstrong et al. (2022) argue that internal earnings targets are often similar to analyst forecasts and, if they are different, CEOs have stronger incentives to achieve market expectations than internal targets. Chen et al. (2022) find evidence suggesting that performance goals affect CEO risk-taking.

2.2. Research on rounding

Research in psychology, demography, and other fields indicates that, when people give estimate, they tend to do so in convenient units provided by the number system. Specifically, they tend to overreport digits which are multiples of the divisors of the base of the number system and underreport digits which are not multiples of the divisors of the base of the number system (e.g., Turner 1958). In the base ten number system, ten and five are the largest divisors.

Thus, human estimates commonly end in multiples of ten and five (Turner 1958; Stockwell and Wicks 1974; Huttenlocher, Hedges, and Bradburn 1990; Rowland 1990).

Several lines of research in accounting and finance provide evidence suggesting that investors, managers, or analysts focus on or herd to specific numbers. The finance literature finds evidence on investors' rounding by examining the distribution of stock prices on the U.S. equity markets (e.g., Niederhoffer 1966; Harris 1991; Christie and Schultz 1994; Godek 1996; Grossman et al. 1997). Harris (1991) shows that price clustering increases with price level and volatility and decreases with capitalization and transaction frequency. These results are subsequently confirmed and other implications are investigated regarding the desirability of certain numbers in international stock markets.

In accounting, Carslaw (1988) finds that there are more zeros and fewer nines than would be expected by chance in the second-from-leftmost digit in reported earnings for New Zealand firms. Thomas (1989) shows similar unusual patterns for reported earnings for U.S. firms covered in the Compustat database. Furthermore, he documents a greater propensity of zeros and fives in the third digit of EPS numbers for the sample. Das and Zhang (2003) confirm Thomas's (1989) findings and extend the research by showing that the unusual frequency of rounded EPS reflects managers' incentive to round up EPS to meet analysts' forecasts, report positive profits, and sustain recent performance. Herrmann and Thomas (2005) show that the penny digit of analysts' forecasts of EPS tends to end with zero or five and attribute the pattern to those analysts with fewer resources or lower ability and therefore less informed. Dechow and You (2012) find evidence indicating that analysts engage in rounding in circumstances where the penny digit of the forecast is of less economic significance. Bamber et al. (2010) identify rounding patterns in managers' EPS forecasts. Their findings suggest that nearly half of managers' annual EPS

forecasts end in nickel intervals. They argue that managers' nickel forecasts appear to reflect their efforts to protect proprietary information and are also due to self-serving opportunistic motivations.

2.3. Hypothesis development

The internal performance target is set by the board for the purpose of coordinating and incentivizing firm-wide activities; inputs that are used in setting the performance target include, among other information, estimates of the firm's future performance. It is unclear to what extent performance targets are rounded, as they differ in several ways from analyst forecasts and management forecasts that have been studied in prior research. First, different from analyst forecasts, performance targets are based on insiders' estimates of firm performance. Internally generated performance targets can incorporate a richer, more accurate set of information than analyst forecasts, reducing the likelihood of rounding. Second, different from management forecasts that are publicly released before the realization of performance, performance targets are not revealed to the public when they are set. Instead, they are disclosed in the proxy statement after earnings announcements. Thus, concerns about proprietary costs, which Bamber et al. (2010) find to affect the likelihood of management forecast rounding, are unlikely to affect the likelihood of performance target rounding. Third, Bamber et al. (2010) find managerial opportunism to increase the likelihood of providing rounded management forecasts. Different from management forecasts, performance targets are not directly determined by CEOs and the board does not have obvious incentives to bias the performance target, especially considering the essential function of performance target, as a central part of bonus plans, in internally coordinating firm-wide activities and providing team incentives (e.g., Indjejikian, Matějka,

Merchant, and Van der Stede, 2014; Guay, Kepler, and Tsui, 2019; Bloomfield, 2021; Bloomfield, Gipper, Kepler, and Tsui, 2021; Bushman, 2021). However, given prior psychology research that finds evidence of rounding in more general cases that involve estimation, we may also find performance target to exhibit a pattern of rounding. Our first hypothesis is the following:

H1: Performance targets in CEO bonus plans end disproportionately more with zero or five.

Next, we explore determinants of the rounding pattern. Dechow and You (2012) argue that rounding is more likely when the economic importance of the penny digit declines. They find that analysts are more likely to round their forecasts when the magnitude of EPS increases, making the penny digit less important. Following the same logic, we expect the penny digit of EPS performance targets to be less important when the magnitude of EPS is larger. Thus, we predict that EPS performance targets are more likely rounded as the level of EPS increases. Our second hypothesis thus predicts that:

H2: Performance targets in CEO bonus plans are more likely to be rounded when the magnitude of EPS is larger.

Furthermore, prior psychology research suggests that uncertainty is likely a driver that leads to rounded estimates (e.g., Turner 1958; Huttenlocher, Hedges, and Bradburn 1990). Studies on management and analyst forecasts find evidence consistent with uncertainty increasing the likelihood of rounding. Bamber et al. (2010) show that management guidance is more likely rounded when there is more uncertainty about future earnings. Dechow and You (2012) also present evidence suggesting that analysts facing greater uncertainty are more likely to round their forecasts. We therefore predict that the board is more likely to round performance targets in CEO bonus plans when there is more uncertainty about corporate performance.

H3: Performance targets in CEO bonus plans are more likely to be rounded when there is more uncertainty about a firm's performance.

In addition, prior research suggests that, when quantitative estimates are rounded, the rounded estimates are often more biased and the direction of the bias is consistent with respondents' preferred outcomes (e.g., Kunda 1990; Hales 2007). For example, Rowland (1990) shows that respondents' estimates of their weight tend to end in zero and five, and that the rounded responses are more biased in favor of respondents' preferred outcomes—the rounded responses underreport weight to a greater extent than do non-rounded responses. Consistent with this pattern, Bamber et al. (2010) report that rounded management forecasts are more optimistically biased and that managers are more likely to issue rounded forecasts when they are motivated to upward bias the forecasts.

When boards set performance targets for CEO compensation, it is not obvious whether the directors prefer a high or low target. However, CEOs likely prefer lower targets that are easier to achieve so they will receive higher bonuses. The reasoning in prior research suggests that CEOs would like to round the targets in their preferred direction if they can influence the target setting process. CEOs can influence the compensation committee by, for example, providing their estimates of firm performance and other inputs for setting the performance targets. They may lowball and round the estimates they provide to the compensation committee. The more influence CEOs have over the compensation committee, the more likely targets are set in their preferred way. We expect that CEOs have a greater influence over the compensation committee if the compensation committee is more co-opted, that is, if more members of the compensation committee are appointed after the CEO assumes office. Coles et al. (2014) find that board monitoring decreases with co-option: turnover-performance sensitivity diminishes and

pay increases as more directors are co-opted. Thus, we hypothesize that when the compensation committee is more co-opted, the EPS targets are more likely to be rounded to reflect CEOs' preferences.

H4: Performance targets in CEO bonus plans are more likely to be rounded when the compensation committee is co-opted.

In summary, rounded performance targets can be a natural response to economic significance of the penny digit and uncertainty but can also be a result of CEO self-serving and lax governance. We explore the implications of these explanations of rounding by examining attributes of management guidance and CEO compensation in subsequent analyses.

3. Sample and the pattern of rounding

3.1. Sample selection

We obtain data on accounting performance goals from the Incentive Lab database. Our sample period starts in 2006 when the SEC's mandate to expand compensation disclosures becomes effective and ends in 2020. To test our hypotheses, we restrict our sample to firms that use absolute accounting performance goals in bonus contracts with EPS being a performance metric. Our initial sample consists of 19,492 unique firm-grant observations with nonmissing target value information. We then limit our sample to CEO compensation contracts, reducing the sample to 3,794 unique firm-grant observations. Next, we merge the data with Compustat and CRSP database and exclude firm-years with more than one CEO, resulting in a sample of 3,540 firm-grant observations. We then remove observations with duplicate firm-year-EPS and quarterly, semi-annual, or segment targets. We further restrict our sample to observations with

available data for control variables and the absolute value of EPS targets less than 10.¹ Our final sample includes 2,291 observations. Table 1 Panel A summarizes our sample filters. Panel B reports the distribution of the sample by year. The sample is fairly evenly distributed over time.

3.2. Rounding pattern of EPS performance targets

Figure 1 Panel A provides the relative frequency of the last two digits of EPS performance targets in CEO bonus plans. Similar to Bamber et al. (2010), we measure the relative frequency as the number of EPS targets in each last-two-digit EPS interval, divided by the total number of EPS targets. The figure shows a higher frequency of performance targets ending with zero or five than with other numbers. The frequencies of dollar and half-dollar EPS targets are particularly high. Overall, the penny digit ends with zero or five for 42.3% of the EPS targets. Dechow and You (2012) report that 46.3% of their sample of analyst forecasts are rounded, while Bamber et al. (2010) find that 49.6% of management forecasts are rounded. Although the proportion of rounded EPS targets is lower than that of analyst forecasts or management forecasts, it is substantially higher than the unconditional expected percentage of 20%.

Panel B shows the relative frequency of the last two digits of reported GAAP EPS for these same firm-years. In contrast to the figure in Panel A, Panel B shows almost no tendency for actual GAAP EPS to end in nickel intervals. In every one of the 20 nickel intervals (i.e., dollar, half-dollar, dime, and nickel intervals), the percentage of EPS targets exceeds the percentage of actual EPS. The overall percentage of EPS targets with the penny digit ending with zero or five is 20.2%, exhibiting no significant difference from the unconditional expected percentage. This

¹ We exclude 71 observations that have absolute EPS greater than 10 as the penny digit is clearly unimportant for these firms.

is consistent with Bamber et al. (2010), who report that, for their sample from 1996 to 2004, actual EPS heaps at nickel intervals only 20.26% of the time.

Table 2 reports the distribution of EPS targets by the penny digit. The digits are ranked from the highest to the lowest percentage of the distribution. The results show that zeros have the highest frequency (24.03%), followed by five (18.26%). We test H1 by comparing the observed frequencies to the unconditional expected frequency, that is, 10% for each number. The differences between these frequencies and their unconditional expected value (10%) are significant both economically and statistically (p -values = 0.000). The results are consistent with H1, suggesting a tendency to round when the board sets EPS targets in bonus plans. For other digits, consistent with Dechow and You's (2012) argument that the board applies the "round half to even rule," there are a greater frequency of EPS targets that end with an even number (31.31%) than EPS targets that end with an odd number (26.41%).²

4. Determinants of rounding EPS targets

Next, we examine the determinants of rounding EPS targets in bonus plans. We propose that EPS targets are more likely to be rounded when the penny digit is less important, when there is greater information uncertainty, and when the CEO has a greater influence on the compensation committee.

4.1. Research design

We examine the likelihood of rounding EPS targets in bonus plans using the following probit regression (firm subscripts are subsumed for simplicity):

² Dechow and You (2012) point out that the "round half to even" rule is a commonly used tie-breaking rule in bookkeeping when the digit to be rounded off is 5. If the digit is odd, then the number is rounded up to an even number; if the digit is even, then the number is rounded down to the even number.

$$\begin{aligned}
\text{Prob} (ROUND_t = 1) = & \alpha + \beta_1 ABS_EPS_{t-1} + \beta_2 DISPERSION_{t-1} + \beta_3 CO_OPTION_{t-1} + \text{Controls} \\
& + \sum \gamma_i Industry_i + \sum \lambda_j Year_j + \varepsilon_t
\end{aligned}
\tag{1}$$

The variable $ROUND_t$ is set equal to one if a firm's EPS target in CEO bonus plans of year t ends with zero or five, and zero otherwise. The variable ABS_EPS_{t-1} measures the magnitude of EPS and is computed as the absolute value of EPS of year $t-1$. We expect the importance of having a precise penny digit decreases with the magnitude of EPS. H2 predicts $\beta_1 > 0$. We capture information uncertainty using analyst forecast dispersion. The variable $DISPERSION_{t-1}$ is equal to the standard deviation of analyst annual forecasts of year $t-1$ scaled by the absolute value of the mean of the forecasts. H3 states that the likelihood of rounding increases with uncertainty, predicting $\beta_2 > 0$. We also expect CEOs' influence over the compensation committee to increase with the extent of co-option. The variable CO_OPTION_{t-1} is equal to the fraction of co-opted members of the compensation committee as of the annual meeting that is conducted after year $t-1$ has ended and the corresponding results have been finalized. H4 predicts $\beta_3 > 0$, if the CEO influences the target setting process when the compensation committee is more co-opted.

We include in the regression an array of firm characteristics that may affect the likelihood of rounding. We control for firm size measured by the logarithm of market value of equity at the end of year $t-1$ and growth opportunities captured by the market-to-book ratio and earnings-to-price ratio. The impact of firm size on the likelihood of rounding is not ex ante clear. Larger firms are more complex than small firms, making it more difficult to forecast earnings and increasing the likelihood of rounding in setting performance targets. However, larger firms are also likely to have better internal reporting and control systems that may increase the precision of internal information. Growth opportunities can also affect the likelihood of rounding in different ways. There can be more uncertainty for firms with more growth opportunities than assets-in-

place. Meanwhile, providing a precise target to motivate CEOs can be more important in these firms. In addition, we control for analyst coverage measured by the logarithm of the number of analysts covering the firm, monthly stock return volatility, and stock returns of year $t-1$.

4.2. Empirical results

Table 3 reports the descriptive statistics of control variables in our regressions. All continuous variables are winsorized at the top and bottom 1%. Panel A shows that, on average, about 44% of the compensation committee members are appointed by the incumbent CEO. The average magnitude of lagged EPS is \$2.813, with the first and the third quartile being \$1.51 and \$3.67, respectively. An average firm in our sample is covered by more than two analysts. Panel B reports the correlation matrix. The indicator for rounding is significantly correlated with the magnitude of lagged EPS and analyst forecast dispersion, consistent with rounding being more likely when the penny digit is of low importance and when information uncertainty is high.

Table 4 reports the results of estimating equation (1). The coefficient on *ABS_EPS* is significantly positive at better than 1% level, indicating that the board is more likely to round the EPS targets when the magnitude of EPS is larger and the penny digit is less important. The coefficient on *DISPERSION* is also significantly positive, suggesting that EPS performance targets are more likely rounded when there is more uncertainty. This result is in line with prior findings. Both Dechow and You (2012) on analyst forecasts and Bamber et al. (2010) on management guidance find evidence suggesting that uncertainty increases the likelihood of rounding. The variable *CO_OPT* loads significantly positive, indicating that rounding is more likely when more compensation committee members are appointed by the incumbent CEO. These results provide support for H2, H3 and H4. Control variables are largely insignificant

except for firm size. Larger firms are more likely to round the EPS targets, consistent with the argument that forecasting for large, complex firms is more difficult, thus increasing the likelihood of rounding. Dechow and You (2012) also find the analyst forecasts are more likely rounded when firms are larger.

Overall, the results suggest that both economic factors and CEO opportunism contribute to the rounding pattern of EPS performance targets in CEO bonus plans.

5. Rounded EPS targets and management guidance

5.1. Information uncertainty, rounded performance targets, and management forecasts

Call, Hribar, Skinner, and Volant (2023) suggest that internal performance projections form the basis for external guidance. If, as the results in Table suggest, greater information uncertainty leads to rounded EPS targets, the uncertainty, in turn, is likely to manifest in management guidance. We thus conjecture that firms with rounded EPS targets are more likely to issue rounded guidance. Their guidance is likely to be less precise, accurate, or informative. We also expect that firms with rounded EPS targets issue guidance closer to the fiscal year end so more uncertainty is resolved. Finally, we examine whether firms with rounded EPS targets tend to issue conservative earnings guidance. In a survey of corporate managers in their behavior in providing management guidance conducted by Call, Hirbar, Skinner, and Volant (2023), the majority of the managers report that they set guidance conservatively. When asked about the reasons for issuing conservative guidance, 46% of these managers indicate that it is to give the company leeway to meet their own guidance in case of an unexpected downturn. We expect that firms with rounded performance targets are more likely to issue more conservative management

guidance as they face greater information uncertainty and therefore need more leeway to improve the chance of meeting their own guidance.

We test these conjectures using the following regression:

$$\text{Management Guidance Attribute}_t = \alpha + \beta_1 \text{ROUND}_t + \text{Controls} + \sum \gamma_i \text{Industry}_i + \sum \lambda_j \text{Year}_j + \varepsilon_t \quad (2)$$

The variable of interest is ROUND_t , the indicator variable for rounded targets as defined in equation (1). Industry and year fixed effects are included in all regressions. Standard errors are clustered by firm.

The dependent variables are the following management guidance attributes that we examine. First, we study whether rounded EPS targets are associated with a higher likelihood of firms providing rounded management guidance. For the sample of firms providing point forecasts, we create an indicator, ROUND_MF , which is equal to one when management point EPS forecasts during year t end with zero or five, and zero otherwise. We expect ROUND_MF and ROUND to be positively correlated since information uncertainty is likely to increase the likelihood of rounding in both cases. In addition, to the extent internal performance projections form the basis for external guidance, management guidance is more likely rounded if the budgeting process produces a rounded EPS target.

Second, we test whether firms with rounded EPS targets issue guidance that is less precise or accurate. We measure the precision of management forecasts using RANGE , computed as the difference between the upper and lower bound of the guidance and zero for point forecasts, and accuracy using ACCURACY , computed as minus the absolute value of the difference between management EPS forecast and the actual EPS, both scaled by the stock price per share

two days before the issuance of management forecast.³ If firms with rounded EPS targets face greater uncertainty, their forecasts are likely to have a wider range and lower accuracy.

Third, we examine whether firms with rounded EPS targets issue guidance closer to the fiscal year end. We measure the forecast horizon using *HORIZON*, computed as the number of days between the release of management guidance and the fiscal year end. We expect that firms with rounded EPS targets are likely to wait longer for uncertainty to resolve before they issue guidance. A positive association between *HORIZON* and *ROUND* will be consistent with this conjecture.

Fourth, we study the relation between performance target rounding and the conservatism of management forecast guidance. Call, Hirbar, Skinner, and Volant (2023) suggest that managers tend to set the midpoint of their guidance conservatively below their true expected earnings. Also, they are concerned about falling out of the lower bound of the guidance. We thus construct two measures to capture the extent of conservatism in management guidance, one computed as IBES actual EPS minus the mid-point of management forecast and the other computed as IBES actual EPS minus the lower bound of management forecast, both scaled by price per share two days before the management forecast date. Higher values of management guidance conservatism correspond to more conservatism. If firms with rounded performance targets are more likely to issue more conservative management guidance as they need more leeway due to uncertainty, we expect *ROUND* to be positively correlated with the extent of conservatism in management forecasts.

Last, we assess the informativeness of management forecasts using the following regression:

³ Management EPS forecast is set equal to the point forecast or the midpoint of the range forecast.

$$CAR_t = \alpha + \beta_1 SURPRISE_t + \beta_2 SURPRISE_t \times ROUND_t + \beta_3 ROUND_t + Controls + \sum \gamma_i Industry_i + \sum \lambda_j Year_j + \varepsilon_t \quad (3)$$

The dependent variable is the market-adjusted three-day cumulative stock returns around the announcements of management forecasts. Management forecast surprise, *SURPRISE*, is computed as management EPS forecast minus the median analyst forecast within 30 days before the management forecast is issued, scaled by the stock price per share two days before the management forecast. More informative management forecasts trigger greater market reaction. Guidance issued by managers with less accurate internal information is likely to be less informative. Thus, we expect the coefficient on the interaction of *SURPRISE* and *ROUND* to be negative. Control variables in equations (2) and (3) include all explanatory variables in equation (1) and additional variables drawn from the literature.

5.2. Empirical results

Table 5 Panel A reports the results of this analysis. In column (1), we examine the relation between rounded EPS performance targets and rounded management forecasts. The regression is estimated for the sample of firms providing point forecasts. The coefficient on *ROUND* is significantly positive at 1%, indicating that firms with rounded EPS performance are more likely to provide rounded management forecasts. Column (2) examines the association between rounded EPS targets and the precision of management forecast as captured by the forecast range. The coefficient on *ROUND* is again significantly positive, consistent with our expectation that firms with rounded EPS targets, facing greater uncertainty, provide forecasts that are less precise. In column (3), the dependent variable is management forecast accuracy, *ACCURACY*. The coefficient on *ROUND* is significantly negative, indicating that firms with

rounded EPS targets provide less accurate forecasts. Column (4) reports the results when forecast horizon, *HORIZON*, is the dependent variable. The coefficient on *ROUND* is significantly negative, indicating that firms with rounded EPS targets tend to issue guidance late. Finally, in columns (5) and (6), we present the results on rounded EPS targets and management forecast conservatism. Both columns, where management forecast is measured at either the midpoint value or the lower bound value, show a significantly positive coefficient on *ROUND*, suggesting that management forecasts issued by firms with rounded EPS targets are more conservative.

In Table 5 Panel B, we estimate equation (3) to examine the informativeness of management forecasts provided by firms with rounded EPS targets. While the coefficient on *SURPRISE* is significantly positive, the coefficient on the interaction of *SURPRISE* and *ROUND* is significantly negative, suggesting that management forecasts of firms with rounded EPS targets are significantly less informative than management forecasts issued by other firms.

In summary, the analyses of multiple attributes of management forecasts confirm our earlier inference that firms with rounded performance targets are likely to face greater information uncertainty.

6. Round EPS targets and real corporate decisions

Our analyses suggest that rounded EPS targets is an internal indicator of information uncertainty. We expect firms with rounded EPS targets to be affected by the information uncertainty in making corporate decisions. We examine whether this internal indicator of information uncertainty is incrementally important in explaining firms' decisions regarding cash holdings, investing, and financing after controlling for other factors that affect these decisions, including external measures of uncertainty.

6.1. Rounded EPS targets and cash holdings

Firms facing greater information uncertainty are likely to have trouble forecasting their future cash flows. As a result, they are likely to maintain a higher level of cash to prepare for situations where there is unexpected cash outlay, i.e., a higher precautionary demand for cash holding (Bates, Kahle, and Stulz, 2009). We estimate the following regression to examine the association between the level of cash holdings and firms' having rounded EPS targets:

$$CASH_t = \alpha + \beta_1 ROUND_t + Controls + \sum \gamma_i Industry_i + \sum \lambda_j Year_j + \varepsilon_t \quad (4)$$

The dependent variable is cash holdings scaled by total assets at the beginning of the year. The variable of interest, *ROUND*, is defined as in the previous analyses. Control variables are the same as in model (1), including forecast dispersion, co-option, the magnitude of EPS, the market-to-book ratio, firm size, earnings-to-price ratio, stock return volatility, analyst coverage, and stock returns.

The results are reported in Panel A of Table 6. Consistent with our expectation, the coefficient on *ROUND* is significantly positive, indicating that firms with rounded EPS targets hold more cash than other firms. This effect is incremental to controlling for external measures of uncertainty, such as stock return volatility, which is also significantly positively correlated with the level of cash holdings.

6.2. Rounded EPS targets and investment decisions

Prior research suggests that uncertainty depresses short-term investment but may encourage R&D spending (Stein and Stone 2013; Bloom 2014; Mock, Yeung, and Zhang 2022).

We examine the association between having rounded EPS targets and firms' investment activities using the following regression model:

$$CAPEX/RD/ACQ_t = \alpha + \beta_1 ROUND_t + Controls + \sum \gamma_i Industry_i + \sum \lambda_j Year_j + \varepsilon_t \quad (5)$$

The dependent variable is capital expenditures, R&D expenses, or acquisition expenditures scaled by beginning total assets. We also consider total investment, which is computed as the sum of capital expenditures, R&D expenses, and acquisition expenditures. Control variables are the same as in model (1).

The results are reported in Panel B of Table 6. Consistent with uncertainty depressing investment, when *CAPEX* or *ACQ* is the dependent variable in columns (1) and (3), the coefficient on *ROUND* is significantly negative. In column (2) when *RD* is the dependent variable, the coefficient on *ROUND* is positive but insignificant. Column (4) shows that total investment is negatively associated with *ROUND*.

6.3. Rounded EPS targets and financing decisions

Firms facing greater uncertainty are likely to have less predictable cash flows, which increases the likelihood of financial distress associated with debt financing. We therefore expect firms with rounded EPS targets to be likely to issue debt. Furthermore, the negative association between *ROUND* and overall investment suggests that firms with round EPS targets are likely to have less investment and therefore lower demand for external financing. We examine the association between *ROUND* and the likelihood of external financing using the following regression:

$$EQUITY_ISSUANCE/DEBT_ISSUANCE_t = \alpha + \beta_1 ROUND_t + Controls + \sum \gamma_i Industry_i + \sum \lambda_j Year_j + \varepsilon_t \quad (6)$$

The dependent variable is equity or debt issuance scaled by beginning total assets, where equity issuance is measured by sale of common and preferred shares minus share repurchase and debt issuance is measured by long-term debt issuance minus reduction, both scaled by beginning total assets. We also consider total external financing, computed as the sum of equity and debt issuance. Control variables are the same as in model (1).

The results are reported in Panel C of Table 6. When *DEBT_ISSUANCE* is the dependent variable in column (1), the coefficient on *ROUND* is significantly negative, suggesting that firms with rounded EPS targets are less likely to issue long-term debt. The coefficient on *ROUND* is insignificant when *EQUITY_ISSURANCE* is the dependent variable, the coefficient on *ROUND* is negative but insignificant.

7. Rounded EPS targets and compensation

7.1. Managerial opportunism, rounded EPS targets, and compensation

The positive correlation between board co-option and the likelihood of rounding EPS targets in Table 4 is consistent with the argument that managers prefer rounded EPS targets, which are more susceptible to decision-makers' bias and preferences than non-rounded ones, and influence the rounding decision through their connections with the compensation committee members. If rounded EPS targets indeed reflect managerial self-serving incentives, we expect that CEOs of firms with rounded targets to obtain higher compensation.

We examine the relation between rounded EPS targets and CEO compensation using the following regression:

$$Cash\ or\ Total\ Compensation_t = \alpha + \beta_1 ROUND_t + Controls + \sum \gamma_i Industry_i + \sum \lambda_j Year_j + \varepsilon_t \quad (4)$$

The dependent variable is the logarithm of CEO non-equity compensation or total compensation. A positive β_1 will indicate that CEO cash or total compensation is higher in firms with rounded target. Control variables in equation (4) include all explanatory variables in equation (1) and additional variables drawn from the literature.

We examine the relation between rounded EPS targets and CEO compensation in Table 7. Column (1) reports the results when the logarithm of CEO total compensation is the dependent variable. The coefficient on *ROUND* is equal to 0.051, suggesting that CEO total compensation is higher by 5.1% when EPS targets are rounded than when they are not rounded. Column (2) reports the results when the logarithm of CEO non-equity compensation is the dependent variable. The coefficient on *ROUND* amounts to 0.069, suggesting that CEO non-equity compensation is higher by 6.9% when EPS targets are rounded. Thus, CEO cash and total compensation are higher in firms with rounded EPS targets than in other firms, after controlling for various firm characteristics and financial performance. These results suggest that rounded EPS targets tend to be easier targets that allow higher CEO compensation payout, consistent with rounded EPS targets being partly driven by CEO self-dealing. It is also plausible that other terms of CEO compensation packages in firms with rounded EPS targets are influenced by CEOs in ways that help increase their compensation.

7.2. Rounded EPS targets and target difficulty

To provide further empirical evidence on rounded EPS targets and managerial self-dealing, we directly examine the association between rounding and target difficulty. If rounded EPS targets are more likely influenced by managers, we expect that rounded targets are easier targets. We estimate the following regression model to test this conjecture:

$$TARGET\ DIFFICULTY_t = \alpha + \beta_1 ROUND_t + Controls + \sum \gamma_i Industry_i + \sum \lambda_j Year_j + \varepsilon_t \quad (5)$$

The dependent variable, *TARGET DIFFICULTY*, is measured as EPS performance target minus actual EPS as reported by Compustat, where EPS is computed either including or excluding extraordinary items.⁴ Control variables are drawn from prior research (Kim, Matějka, and Park, 2022). We control for firm size, growth opportunities, stock volatility, firm ROA and stock return, as well as industry peer firm ROA and stock return.

The results of estimating equation (5) are reported in Table 8. Column (1) presents the results when target difficulty is measured using GAAP EPS including extraordinary items, while column (2) reports the results when target difficulty is measured based on GAAP EPS excluding extraordinary items. The coefficients on *ROUND* are significantly negative in both columns, indicating that rounded performance targets, relative to non-rounded performance targets, are lower and thus easier to achieve. The evidence is consistent with the conjecture that rounded targets are more likely to reflect managerial preference for easier targets, which, in turn, facilitates higher compensation payouts to the CEO.

8. Conclusion

Prior research suggests that bonus plans play an important role in organizing and coordinating firm-wide efforts and decisions as well as encouraging mutual monitoring across the top management team. Performance targets are an essential component of bonus plans that is relatively less researched. We examine the rounding pattern of EPS performance targets used in

⁴ Prior research suggests that performance measures in bonus plans are typically adjusted non-GAAP measures (e.g., Na et al. 2022). Ideally, one should measure target difficulty by comparing the targets with realized performance, both of which are measured based on the same exclusion/inclusion rules. However, data on realized performance are not available in the Incentive Lab database. We therefore follow Bennett et al. (2017) and use reported GAAP EPS as a proxy for realized performance.

CEO bonus plans and find that over 42% of the EPS targets end with a zero or five in the penny location, significantly more than the unconditional expected percentage of 20%.

Exploring the determinants of rounded EPS targets, we find that EPS targets are more likely to be rounded when the penny digit is less important as the magnitude of EPS increases, when there is more information uncertainty that leads to less precise estimates, and when the compensation committee is more co-opted and therefore more likely to be influenced by the CEO. The results suggest that both economic factors and management opportunism affect boards' decision to round EPS performance targets.

Evidence from further analyses is also consistent with firms with rounded EPS targets facing greater information uncertainty. We find that firms with rounded EPS targets are also more likely to issue rounded forecasts when they provide point forecasts. Management forecasts of firms with rounded EPS targets tend to have a wider range and lower accuracy, and tend to be issued closer to the fiscal year end. In addition, their forecasts are also more conservative, consistent with the argument that managers need more leeway in the presence of information uncertainty. These forecasts also trigger smaller stock price reactions.

Last, we find that firms with rounded EPS targets hold more cash, make less capital investment, engage in less acquisition activities, and issue less debt, after controlling for firms' investment opportunities and stock return volatility. The results suggest that rounding as an internal measure of uncertainty has incremental explanatory power above and beyond uncertainty captured by common external measures such as stock return volatility.

Consistent with the rounding pattern of ESP targets being partially driven by management opportunism, we find that CEOs receive higher compensation when EPS targets are rounded after controlling for performance and other firm characteristics. Further analyses

indicate that rounded EPS targets, relative to non-rounded targets, are significantly more likely to be lower in comparison to realized EPS, suggesting that rounded EPS targets are on average easier targets, thus likely to play a role in facilitating higher compensation payout to the CEO.

Overall, we contribute to the literature by reporting the first evidence of heaping in CEO performance targets, suggesting that the board is subject to psychological heuristics when determining internal performance targets for incentivizing and coordinating firm-wide activities. Further, we provide new evidence suggesting that CEOs can influence the compensation process for self-serving purposes. Our findings that co-opted compensation committees are more likely to round EPS targets and that rounded EPS targets are more likely to be lower than realized EPS are consistent with CEOs influencing the compensation committee and the setting of EPS targets to obtain higher compensation.

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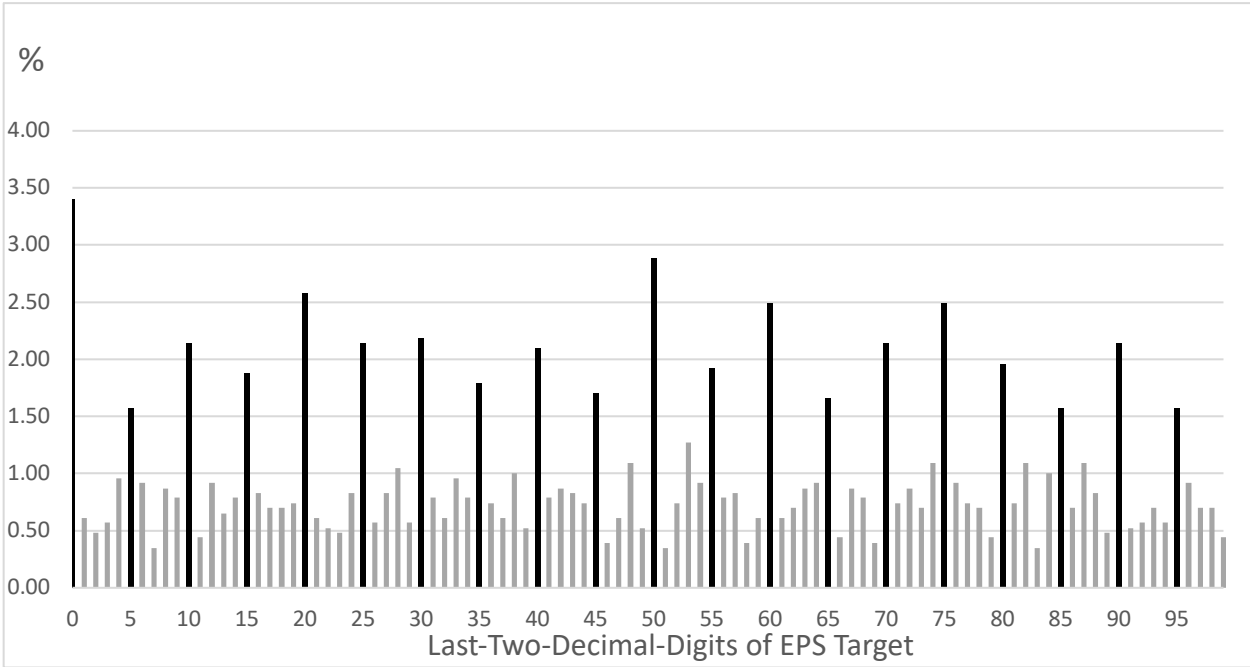
Appendix A: Variable definitions

Variables	Definition
<i>Variables used in the analysis of determinants of rounding</i>	
<i>ROUND</i>	A dummy variable equal to one if the penny digit of the EPS target of year t bonus plan is zero or five.
<i>DISPERSION</i>	Dispersion of analyst forecasts of year $t-1$ annual earnings issued in the last month of year $t-1$. Dispersion equals the standard deviation of individual forecasts scaled by the absolute value of the mean of the forecasts.
<i>CO_OPTION</i>	Fraction of directors on the compensation committee that are co-opted in year t . Co-option is measured using directors on the compensation committee as of the annual meeting in year t (usually in Q1 of year t).
<i>ABS_EPS</i>	Absolute value of GAAP earnings per share in year $t-1$.
<i>MTB</i>	Market value of equity over book value of equity at the end of year $t-1$.
<i>EP</i>	Net income divided by beginning market value of equity in year $t-1$.
<i>MV</i>	Natural logarithm of market value of equity at the end of year $t-1$.
<i>COVERAGE</i>	Natural logarithm of the number of analysts covering the firm in year $t-1$.
<i>VOLATILITY</i>	Monthly stock return volatility in year $t-1$.
<i>RET</i>	Annual stock return of year $t-1$.
<i>Additional variables used in the analysis of management forecasts</i>	
<i>ROUND_MF</i>	A dummy variable equal to one if the penny digit of management's point EPS forecasts in year t is zero or five.
<i>ACCURACY</i>	Minus one times the absolute value of the difference between management EPS forecast and IBES actual EPS, scaled by price per share two days before the management forecast and multiplied by 1,000. Management forecast is measured at the midpoint value for range forecasts and the point value for point forecasts.
<i>RANGE</i>	Difference between the upper and lower bound of management's range forecasts (set to zero for point forecasts), scaled by price per share two days before the management forecast and multiplied by 1,000.
<i>HORIZON</i>	Number of days between the date when management forecast is issued and the fiscal year end.
<i>CAR</i>	Market-adjusted return over the (-2, 2) window around the management forecast date.
<i>CONSV_MID</i>	IBES actual EPS minus management EPS forecast, scaled by price per share two days before the management forecast date and multiplied by 1,000. Management forecast is measured at the midpoint value for range forecasts and the point value for point forecasts.
<i>CONSV_LOW</i>	IBES actual EPS minus management EPS forecast, scaled by price per

	share two days before the management forecast date and multiplied by 1,000. Management forecast is measured at the lower bound for range forecasts and the point value for point forecasts.
<i>SURPRISE</i>	Management EPS forecast minus the median of analyst forecasts issued within 30 days before the management forecast, scaled by price per share two days before the management forecast and multiplied by 1,000.
<i>INSTITUTION</i>	Institutional ownership measured at the beginning of the year <i>t</i> .
<i>LEVERAGE</i>	Total liabilities over total assets measured at the beginning of the fiscal year <i>t</i> .
<i>Additional variables used in the analysis of rounding and corporate decisions</i>	
<i>CASH</i>	Cash and short-term investments scaled by total assets at the beginning of the year
<i>CAPEX</i>	Capital expenditures scaled by total assets at the beginning of the year
<i>RD</i>	R&D expenses scaled by total assets at the beginning of the year
<i>ACQ</i>	Acquisitions expenditures scaled by total assets at the beginning of the year
<i>DEBT_ISSUANCE</i>	Long-term debt issuance minus long-term debt reduction scaled by total assets at the beginning of the year
<i>EQUITY_ISSUANCE</i>	Sale of common and preferred shares minus repurchase of common and preferred shares scaled by total assets at the beginning of the year
<i>Additional variables used in the analysis of rounding and CEO compensation</i>	
<i>TOTAL COMPENSATION</i>	Natural logarithm of CEO total compensation of year <i>t</i> .
<i>NONEQUITY INCENTIVE</i>	Natural logarithm of nonequity incentive compensation of year <i>t</i> .
<i>TENURE</i>	Natural logarithm of one plus CEO tenure in years as of the end of year <i>t</i> .
<i>SP500</i>	Dummy variable equal to one if the firm is in the S&P500 at the end of year <i>t</i> , and zero otherwise.
<i>ROA</i>	Net income divided by beginning total assets in year <i>t</i> .
<i>Additional variables used in the analysis of rounding and target difficulty</i>	
<i>TARGET DIFFICULTY</i>	Difference between target EPS and Compustat EPS scaled by assets per share.
<i>ROA_PEER</i>	Median of industry-size peer ROA in year <i>t</i> -1.
<i>RET_PEER</i>	Median of industry-size peer return in year <i>t</i> -1.

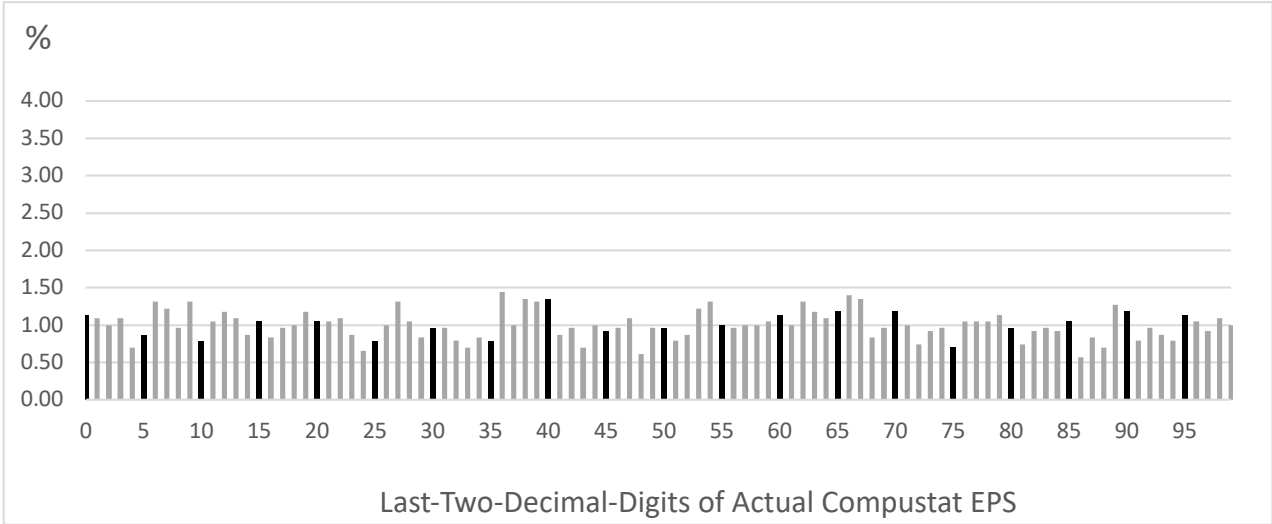
Figure 1: Frequency of EPS targets and actual reported GAAP EPS

Panel A: Relative frequency of last two digits of EPS targets



Panel A reports the relative frequency of the last two digits of EPS targets in CEO bonus plans. Relative frequency is the number of EPS targets ending in each last-two-digit interval, divided by the total number of EPS targets in the sample.

Panel B: Relative frequency of last two digits of GAAP EPS



Panel B reports the relative frequency of the last two digits of GAAP EPS of the sample in Panel A. Relative frequency is the number of GAAP EPS ending in each last-two-digit interval, divided by the total number of observations in our sample.

Table 1: Sample selection and distribution**Panel A: Sample selection procedures**

CEO bonus plans with nonmissing EPS targets	3,794
Merge with Compustat, CRSP, & IBES	3,667
Drop observations with more than one CEO during a firm-year	3,540
Drop duplicate firm-year-EPS	3,481
Delete quarterly, semi-annual, and segment targets	2,920
Delete observations with missing control variables	2,393
Require absolute value of EPS target ≤ 10	2,322
Require CRSP share code in (10, 11)	2,291

Panel B: Distribution by year

Year	n	Percent
2006	91	3.97%
2007	149	6.50%
2008	162	7.07%
2009	165	7.20%
2010	171	7.46%
2011	167	7.29%
2012	163	7.11%
2013	170	7.42%
2014	178	7.77%
2015	167	7.29%
2016	158	6.90%
2017	161	7.03%
2018	143	6.24%
2019	130	5.67%
2020	116	5.06%
Total	2,291	100.00%

Table 2: Frequency of EPS targets by cent digit

Cent Digit	n	Percentage of Distribution	P-value for test of H1
0	550	24.01%	0.000
5	419	18.29%	0.000
Combined	969	42.30%	0.000
Other even digits			
4	197	8.60%	
8	186	8.12%	
2	169	7.38%	
6	165	7.20%	
Combined	717	31.30%	
Other odd digits			
3	169	7.38%	
7	168	7.33%	
1	142	6.20%	
9	126	5.50%	
Combined	605	26.41%	

This table reports the frequency of EPS performance targets by the cent digit. The p-values are for tests of the frequency against the unconditional expected percentage, which is 10%, 10%, and 20% for cent digit 0, 5, and the combined frequency, respectively.

Table 3: Descriptive statistics**Panel A: Descriptive statistics**

Variable	Mean	SD	p25	p50	p75
<i>ROUND</i>	0.423	0.494	0.000	0.000	1.000
<i>DISPERSION</i>	0.017	0.025	0.006	0.010	0.018
<i>CO-OPTION</i>	0.441	0.378	0.000	0.333	0.750
<i>ABS_EPS</i>	2.813	1.833	1.510	2.440	3.670
<i>MTB</i>	3.337	5.750	1.586	2.423	3.999
<i>EP</i>	0.057	0.043	0.042	0.058	0.076
<i>MV</i>	8.999	1.219	8.117	8.868	9.811
<i>COVERAGE</i>	2.828	0.489	2.485	2.890	3.178
<i>VOLATILITY</i>	0.073	0.036	0.048	0.064	0.089
<i>RET</i>	0.138	0.292	-0.028	0.131	0.292

This table reports the average, median, the first and the third quartile, and the standard deviation of variables used in the main analysis. All continuous variables are winsorized at the top and bottom 1%.

Table 3: Descriptive statistics**Panel B: Pearson correlations**

	<i>ROUND</i>	<i>DISPERSION</i>	<i>CO-OPTION</i>	<i>ABS_EPS</i>	<i>MTB</i>	<i>EP</i>	<i>MV</i>	<i>COVERAGE</i>	<i>VOLATILITY</i>
<i>DISPERSION</i>	0.04**								
<i>CO-OPTION</i>	0.03	-0.00							
<i>ABS_EPS</i>	0.11***	-0.15***	-0.03						
<i>MTB</i>	-0.01	-0.08***	-0.03	0.01					
<i>EP</i>	0.01	-0.25***	0.02	0.28***	-0.04**				
<i>MV</i>	0.03*	-0.21***	-0.09***	0.23***	0.10***	0.08***			
<i>COVERAGE</i>	-0.01	-0.01	0.04**	0.13***	0.04*	-0.01	0.61***		
<i>VOLATILITY</i>	-0.01	0.30***	0.06***	-0.09***	-0.04*	-0.16***	-0.37***	-0.05**	
<i>RET</i>	-0.02	-0.13***	0.03	0.04**	0.11***	0.26***	0.12***	-0.02	-0.15***

This table reports the correlation matrix of variables used in the main analysis. ***, ** and * indicate significance at the 1%, 5% or 10% level, respectively.

Table 4: Determinants of performance target rounding

VARIABLES		<i>ROUND</i>
<i>ABS_EPS</i>	H2 (+)	0.061*** (2.87)
<i>DISPERSION</i>	H3 (+)	3.998** (2.57)
<i>CO-OPTION</i>	H4 (+)	0.195** (2.08)
<i>MTB</i>		0.000 (0.02)
<i>EP</i>		0.248 (0.28)
<i>MV</i>		0.126*** (2.64)
<i>COVERAGE</i>		-0.111 (-0.96)
<i>VOLATILITY</i>		0.409 (0.34)
<i>RET</i>		-0.134 (-1.18)
Observations		2,287
Pseudo R-squared		0.0517

This table reports the results of estimating equation (1) to model the likelihood of rounding. The dependent variable is *ROUND*, which is equal to one for EPS targets ending in zero or five and zero otherwise. Other variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 5: Performance target rounding and attributes of management guidance**Panel A: Management guidance characteristics**

VARIABLES	(1) <i>ROUND MF</i>	(2) <i>RANGE</i>	(3) <i>ACCURACY</i>	(4) <i>HORIZON</i>	(5) <i>CONSV_ MID</i>	(6) <i>CONSV_ LOW</i>
<i>ROUND</i>	0.578*** (2.83)	0.523*** (3.54)	-0.502* (-1.85)	-3.113** (-2.20)	0.673* (1.79)	0.945** (2.45)
<i>ABS_EPS</i>	0.056 (0.98)	0.026 (0.36)	-0.004 (-0.02)	-0.063 (-0.13)	-0.081 (-0.61)	-0.077 (-0.54)
<i>MTB</i>	-0.002 (-0.18)	-0.007 (-0.82)	0.003 (0.16)	0.045 (0.47)	0.034 (1.25)	0.031 (1.07)
<i>EP</i>	2.460 (0.94)	-3.603 (-0.98)	2.428 (0.29)	-17.409 (-0.81)	-2.491 (-0.36)	-3.596 (-0.48)
<i>MV</i>	0.041 (0.31)	-0.156 (-1.05)	0.599* (1.87)	-0.211 (-0.15)	0.155 (0.53)	0.069 (0.23)
<i>COVERAGE</i>	0.473* (1.75)	-0.911*** (-2.80)	0.242 (0.40)	1.176 (0.36)	-0.976 (-1.54)	-1.379** (-2.06)
<i>VOLATILITY</i>	6.181** (1.99)	14.837*** (3.98)	-40.205*** (-4.11)	-72.930*** (-2.62)	23.436** (2.35)	30.508*** (3.05)
<i>RET</i>	-0.263 (-0.99)	-1.919*** (-7.81)	2.412*** (3.21)	-1.003 (-0.35)	3.518*** (4.05)	2.537*** (2.90)
<i>INSTITUTION</i>	1.835*** (3.69)	-0.421 (-0.48)	1.082 (0.71)	3.743 (0.55)	2.653* (1.90)	2.367 (1.59)
<i>LEVERAGE</i>	0.825 (1.15)	0.381 (0.44)	-0.562 (-0.31)	-3.161 (-0.52)	-2.795 (-1.49)	-2.618 (-1.38)
<i>HORIZON</i>	0.001 (1.15)	0.007*** (16.23)	-0.017*** (-14.95)		0.003*** (2.89)	0.007*** (5.82)
Observations	865	8,526	8,521	8,659	8,521	8,521
R-squared	0.280	0.375	0.246	0.006	0.121	0.139

This table reports the results of estimating equations (2) to examine the relation between rounding EPS targets and attributes of management forecasts. Variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 5: Performance target rounding and attributes of management guidance**Panel B: Informativeness of management guidance**

VARIABLES	(1) <i>CAR</i>
<i>ROUND</i> * <i>SURPRISE</i>	-0.001* (-1.95)
<i>ROUND</i>	0.001 (0.79)
<i>SURPRISE</i>	0.005*** (13.00)
<i>ABS_EPS</i>	-0.001 (-1.33)
<i>MTB</i>	0.000 (0.83)
<i>EP</i>	0.007 (0.32)
<i>MV</i>	-0.001 (-1.26)
<i>COVERAGE</i>	-0.000 (-0.02)
<i>VOLATILITY</i>	0.004 (0.14)
<i>RET</i>	0.002 (0.52)
<i>INSTITUTION</i>	0.010** (2.17)
<i>LEVERAGE</i>	-0.010* (-1.83)
<i>HORIZON</i>	0.000*** (3.63)
Observations	7,293
R-squared	0.106

This table reports the results of estimating equations (3) to examine the relation between rounding EPS targets and management forecasts informativeness. Variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 6: Rounded EPS targets and real corporate decisions**Panel A: Rounded EPS targets and cash holdings**

VARIABLES	CASH/TA
<i>ROUND</i>	0.013** (2.19)
<i>DISPERSION</i>	0.128 (1.09)
<i>CO-OPTION</i>	0.008 (0.77)
<i>ABS_EPS</i>	0.000 (0.18)
<i>MTB</i>	0.001* (1.74)
<i>EP</i>	-0.004 (-0.06)
<i>MV</i>	-0.005 (-0.94)
<i>COVERAGE</i>	0.029** (2.08)
<i>VOLATILITY</i>	0.354*** (3.45)
<i>RET</i>	0.034*** (3.69)
Observations	2,287
R-squared	0.330

This table reports the results of estimating equations (4) to examine the relation between rounding EPS targets and cash holdings. Variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Panel B: Rounded EPS targets and investment

VARIABLES	(1) CAPEX/TA	(2) R&D/TA	(3) ACQ/TA	(4) Total investment (1)+(2)+(3)
<i>ROUND t</i>	-0.003** (-2.03)	0.001 (0.92)	-0.007** (-2.15)	-0.009** (-2.44)
<i>DISPERSION t-1</i>	-0.065** (-2.08)	0.031 (0.79)	-0.154*** (-2.92)	-0.186** (-2.47)
<i>CO-OPTION t</i>	0.004* (1.79)	0.003 (0.90)	-0.001 (-0.16)	0.007 (1.28)
<i>ABS_EPS t-1</i>	0.001* (1.86)	-0.001** (-2.22)	-0.001 (-0.88)	-0.001 (-0.56)
<i>MTB t-1</i>	0.000** (2.11)	0.000** (2.50)	0.000 (0.27)	0.001** (2.21)
<i>EP t-1</i>	0.048** (2.42)	-0.005 (-0.26)	0.039 (1.20)	0.087* (1.93)
<i>MV t-1</i>	-0.004** (-2.21)	-0.001 (-0.93)	-0.003 (-1.45)	-0.009*** (-2.94)
<i>COVERAGE t-1</i>	0.005 (1.24)	0.010** (2.54)	0.008 (1.50)	0.025*** (3.32)
<i>VOLATILITY t-1</i>	0.108*** (2.87)	0.075** (2.30)	0.024 (0.32)	0.232** (2.35)
<i>RET t-1</i>	0.008*** (3.10)	0.005** (2.43)	0.021*** (2.82)	0.033*** (3.97)
Observations	2,279	2,287	2,287	2,279
R-squared	0.516	0.580	0.115	0.265

This table reports the results of estimating equations (5) to examine the relation between rounding EPS targets and investment. Variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Panel C: Rounded EPS targets and financing decisions

VARIABLES	(4) EQUITY/TA	(5) DEBT/TA	(6) (EQUITY+DEBT)/TA
<i>ROUND t</i>	-0.001 (-0.51)	-0.006* (-1.81)	-0.008** (-2.09)
<i>DISPERSION t-1</i>	0.124*** (3.16)	-0.072 (-1.12)	0.056 (0.72)
<i>CO-OPTION t</i>	-0.001 (-0.32)	-0.001 (-0.12)	-0.002 (-0.34)
<i>ABS_EPS t-1</i>	-0.001 (-1.06)	0.000 (0.45)	-0.001 (-0.81)
<i>MTB t-1</i>	-0.001** (-2.48)	0.001 (1.26)	-0.001 (-1.34)
<i>EP t-1</i>	-0.006 (-0.21)	0.083** (2.07)	0.073 (1.42)
<i>MV t-1</i>	0.002 (0.73)	-0.002 (-0.61)	0.002 (0.67)
<i>COVERAGE t-1</i>	-0.008 (-1.41)	0.010* (1.75)	0.002 (0.28)
<i>VOLATILITY t-1</i>	0.129** (2.52)	-0.094 (-1.47)	0.075 (0.83)
<i>RET t-1</i>	-0.003 (-0.47)	0.025*** (3.57)	0.025** (2.57)
Constant	-0.028 (-1.30)	0.008 (0.51)	-0.035 (-1.53)
Observations	2,165	2,207	2,094
R-squared	0.232	0.065	0.104

This table reports the results of estimating equations (6) to examine the relation between rounding EPS targets and financing decisions. Variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 7: Performance target rounding and CEO compensation

VARIABLES	(1) <i>TOTAL COMPENSATION</i>	(2) <i>NON-EQUITY INCENTIVE</i>
<i>ROUND</i>	0.051** (2.15)	0.069** (2.17)
<i>TENURE</i>	0.088*** (3.85)	0.103*** (3.95)
<i>MV</i>	0.338*** (13.84)	0.373*** (10.70)
<i>SP500</i>	0.044 (0.94)	0.046 (0.67)
<i>MTB</i>	-0.004* (-1.86)	-0.003 (-1.24)
<i>RET</i>	0.341*** (7.71)	0.637*** (9.15)
<i>LAG_RET</i>	0.152*** (3.62)	0.264*** (4.37)
<i>ROA</i>	-0.378 (-1.43)	1.117*** (3.24)
<i>LAG_ROA</i>	-1.395*** (-4.07)	-2.765*** (-6.48)
<i>ABS_EPS</i>	0.014 (1.61)	0.025** (2.25)
<i>COVERAGE</i>	0.098* (1.87)	-0.105 (-1.45)
Observations	2,109	1,944
R-squared	0.578	0.445

This table reports the results of estimating equation (4) to examine the relation between rounding EPS targets and CEO compensation. Variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 8: Performance target rounding and performance target difficulty

VARIABLES	(1)	(2)
	<i>TARGET DIFFICULTY</i>	
	Relative to realized earnings per share including extraordinary items	Relative to realized earnings per share excluding extraordinary items
<i>ROUND</i>	-0.003* (-1.80)	-0.002* (-1.67)
<i>ABS_EPS</i>	-0.000 (-0.45)	-0.000 (-0.31)
<i>MTB</i>	0.000 (0.67)	0.000 (0.57)
<i>MV</i>	-0.003** (-2.48)	-0.003** (-2.52)
<i>COVERAGE</i>	0.011*** (3.60)	0.012*** (3.98)
<i>VOLATILITY</i>	0.059 (1.58)	0.061 (1.61)
<i>ROA</i>	-0.074*** (-3.32)	-0.075*** (-3.41)
<i>ROA_PEER</i>	0.025 (0.67)	0.020 (0.61)
<i>RET</i>	-0.013*** (-3.20)	-0.014*** (-3.39)
<i>RET_PEER</i>	-0.024*** (-3.03)	-0.024*** (-3.03)
Observations	2,287	2,287
R-squared	0.147	0.168

Variables are defined in Appendix A. All regressions include industry (Fama-French 48 industries) and year fixed effects. Regression intercepts are omitted for brevity. T-statistics, based on standard errors clustered at firm-level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.