Reexamining and Refining Bonus-Induced Earnings Management: Evidence from a Tax-Based Identification Strategy

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Abstract

This paper revisits and refines Healy's (1985) classic investigation of bonus-induced earnings management using tax-related last-chance earnings management (LCEM)—the manipulation of fourth-quarter tax expense. LCEM allows for firm-level identification of earnings management while controlling for economic fundamentals. This innovation addresses two limitations in prior research: (1) it disentangles firm-specific manipulation from industry-wide economic shocks embedded in accruals; and (2) it avoids benchmark contamination, where both test and comparison groups may be managing earnings, obscuring theoretical inference. Relative to prior research, our evidence shows that managers respond not to the overall structure of bonus plans but to the local incentive gradients around thresholds. Specifically, we confirm income-decreasing behavior below thresholds, show that upward manipulation occurs primarily in discrete bonus plans with steep payout discontinuities, and demonstrate that such manipulation declines sharply once thresholds are crossed. We find no evidence of cookie-jar behavior above bonus maximums; instead, earnings management in this region appears to be driven primarily by equity incentives. We further show that bonus incentives and market pressure jointly shape reporting choices. Collectively, these findings clarify how bonus-induced earnings management operates in contemporary contracting environments and help reconcile inconsistencies in prior studies.

Keywords: Bonus Contract, Performance Goals, Last Chance Earnings Management

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Data availability: All data are available from public sources identified in the paper.

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1. Introduction

Academic and policy discussions regarding aligning managerial and shareholder interests have long been dominated by equity-based compensation. However, recent evidence suggests that cash-based bonus plans may exert equally powerful influences on executive behavior (Guay, Kepler, and Tsui, 2019).[1] These plans often tie bonuses to short-term financial metrics, providing managers with clear incentives to meet specific benchmarks. While such arrangements can align interests, they also risk encouraging earnings manipulation aimed at securing payouts (Healy, 1985; Bennett, Bettis, Gopalan, and Milbourn, 2017). Possible misalignments or manipulations are often raised as a concern in cases when shareholders lose money while CEO's bonuses grow (Krantz, 2023; Blake, 2025).

With four decades since Healy's (1985) seminal contribution, the executive compensation landscape has evolved in ways that fundamentally reshape managerial incentives, suggesting the need for a reexamination. Major regulatory developments, including SFAS 123R and the 2006 executive compensation disclosure rules, have altered both the design and transparency of compensation contracts (Gipper, 2021). Contemporary bonus plans are considerably more complex, often featuring nonlinear payout schedules and sharp threshold discontinuities (Matejka and Ray, 2017; Hu, Li, and Ray, 2021). At the same time, recent research shows that CEOs respond to multiple, overlapping incentive forces, such as analyst expectations and equity-based pay, rather than reacting to bonus contracts in isolation (Core and Guay, 2002; Davidson, 2022; Armstrong et al., 2024).

Yet empirical research on bonus-induced earnings management continues to rely heavily on Healy's stylized predictions. Much of the existing evidence is concentrated at performance extremes, where managerial and shareholder incentives are already closely aligned, limiting the ability to detect agency-driven behavior (Healy, 1985; Gaver, Gaver, and Austin, 1995; Holthausen, Larcker, and Sloan, 1995; Guidry, Leone, and Rock, 1999). Moreover, many of these studies predate the regulatory reforms that reshaped bonus plan design and disclosure. More recent findings, such as Armstrong, Chau, Ittner, and Xiao (2024), who show that CEOs are less likely to meet bonus EPS targets when targets exceed analysts' forecasts, have further

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[1] The average CEO bonus-to-equity delta ratio—measuring the relative power of bonus incentives versus equity portfolio incentives—in Guay et al. (2019) is 0.27. Bonus incentives are even comparable in scale to equity incentives for many CEOs early in their tenures.

reinforced the perception that cash-based bonus agency problems are limited. Taken together, the evolution of compensation design and regulatory oversight underscores the need to reevaluate bonus-induced earnings management in modern contracting environments.

Most CEO bonus plans consist of an "incentive zone" which includes (1) a threshold that must be met for any payout, (2) a target for the expected payout, and (3) a maximum (Chen, Kim, Li, and Zhu, 2022; Armstrong et al., 2024). CEOs achieve these goals set by boards not only to receive cash payment but also to reduce the likelihood of termination (Matejka and Ray, 2017). Previous studies find mixed results regarding the earnings management activities in different areas of the "incentive zone". For example, Healy (1985) argues and finds that CEOs make income-decreasing accruals when earnings are below the incentive threshold or above the bonus maximum.[2] However, Holthausen et al. (1995) was unable to replicate all of Healy's (1985) findings. Further, Gaver et al. (1995) found the opposite results to those found in Healy (1985), supporting income smoothing rather than big bath behavior. These mixed results raise questions about whether and how managers' bonus plans influence their accounting choices.

In addition to mixed results, these prior studies have two weaknesses in their identification that could have led to incomplete conclusions. First, these studies utilize total accruals or discretionary accruals as measures of earnings management (Healy, 1985; Gaver et al., 1995; Holthausen et al., 1995; Guidry et al., 1999). Accruals are inadequate summaries of earnings manipulation because they capture both economic fundamentals and earnings management (Dechow, Ge, and Schrand, 2010). This creates noise in the analysis and could bias results if the underlying economic fundamentals hidden in the accruals are correlated with variables of interest.[3]

The second weakness of these prior studies is that they often compare accrual levels across different groups to infer earnings management. However, such comparisons are

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[2] Healy (1985) proposes that the extent of earnings manipulation varies depending on whether the manager anticipates the final income to be (1) below the bonus threshold required to earn any bonus (Low portfolio), (2) above the bonus maximum beyond which no additional bonuses are awarded (Upp portfolio), or (3) within the "incentive zone" between the bonus thresholds and maximums (Mid portfolio).

[3] Discretionary accruals compare a firm's accruals to those in the same industry-year considering firm fundamentals. However, the same economic forces that affect a single firm will also affect the other firms in their industry. And those same economic forces will affect where most CEOs in that industry fall along the incentive zone. For instance, if a strong economic shock hurts the performance of the manufacturing industry, then most CEOs in that industry will have earnings below the earnings threshold and all manage earnings downward to take a big bath. Therefore, the economic shock, industry accruals, and firm performance would all be related.

susceptible to "benchmark contamination" (Loughran and Ritter, 2000), particularly when both groups have distinct yet active incentives to manage earnings, as suggested by Healy (1985). When each group is engaging in earnings management (but in potentially different ways) it becomes difficult to determine which group is driving the observed effects and whether the behavior aligns with theoretical predictions. This ambiguity undermines the reliability of empirical inference.

To overcome these limitations in prior research, we employ last-chance earnings management (LCEM), defined as earnings manipulation through tax expense adjustments (Dhaliwal, Gleason, and Mills, 2004). This setting provides an estimate of "pre-managed earnings" that is not mechanically linked to contemporaneous economic performance and is orthogonal to industry peers (Beardsley, Robinson, and Wong, 2021). Specifically, prior studies use the third-quarter effective tax rate (ETR)—required to reflect management's best estimate of the annual ETR—to project expected year-end earnings absent manipulation (Dhaliwal et al., 2004; Christensen, Olson, and Omer, 2015; Beardsley et al., 2021). Because this estimate is firm-specific rather than industry-based, it avoids the peer contamination inherent in discretionary accruals. Consequently, changes in earnings arising from adjustments to the ETR between the third and fourth quarters capture earnings management distinct from pre-managed performance. This identification is further strengthened because the tax account is among the last accounts closed before earnings announcements and offers managers substantial discretion (Schrand and Wong, 2003; Dhaliwal et al., 2004; Krull, 2004; Frank and Rego, 2006; Beardsley et al., 2021; Mayberry and Rane, 2025). By incorporating an independent measure of pre-managed earnings, the LCEM framework substantially improves identification of earnings management incentives associated with bonus contracts.[4]

We use hand-collected CEO bonus contract data from DEF 14A to explore the relationship between CEO bonus contracts and LCEM. We focus on after-tax incentives which are widely used in CEO compensation contracts (Gaertner, 2014). Therefore, our bonus goals

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[4] While we argue that changes from third to fourth quarter ETR is a cleaner setting to measure earnings manipulation regarding our research question, we do acknowledge that it too has weaknesses. Large economic or legal changes between the reporting of third and fourth quarter results could also impact the change in ETR from 3rd to 4th quarter. However, those changes would be unexpected by management and should be orthogonal to management earnings management behavior, leading to noise but not bias. Therefore, we still argue that this is a cleaner setting to answer our research question regarding earnings management and cash bonus incentives.

come directly from CEO contracts and are tied to LCEM by being based on after-tax earnings. We focus only on firms that use GAAP after-tax income metrics in their CEO cash incentive plans because (1) managers cannot manipulate tax expenses to affect pre-tax income, so the difference between pre-tax bonus goals and pre-managed after-tax income has no economic implication under the LCEM setting; and (2) previous studies document a systematic difference between firms using pre-tax and after-tax metrics (Newman, 1989; Wallace, 1997). Therefore, focusing exclusively on after-tax metrics helps alleviate potential selection bias in the empirical analyses. We also exclude non-GAAP metrics due to the highly idiosyncratic nature of bonus goal adjustments, which involve a diverse range of transaction types (Curtis, Li, and Patrick, 2021). While using hand-collected CEO bonus contracts and LCEM leads to a small sample and might restrict the generalizability of our findings, we contend that it provides a much cleaner setting to investigate our research question.

We consider the amount of bonus goals (thresholds, targets, and maximums) a CEO would have missed using pre-managed earnings (earnings based on the ETR reported in the third quarter). We can then examine whether CEOs reduce the ETR from the third to the fourth quarter, inflating after-tax income to increase their payoffs. We adopt the methodologies outlined in prior research (Healy, 1985; Holthausen et al., 1995) to classify firm-years into three portfolios, as theorized in Healy (1985). We then separately investigate observations of each portfolio because the earnings management behaviors are likely to be different among the three portfolios (Healy, 1985; Gaver et al., 1995; Holthausen et al., 1995; Guidry et al., 1999). Although firms may reduce the 4th quarter tax expense to increase their net income, they may also increase the 4th quarter tax expense to manipulate earnings downward to increase the probability of earning a bonus in the future.

Using the novel methodology to re-examine Healy's (1985) model, our results differ meaningfully from prior studies in several ways (Healy, 1985; Gaver et al., 1995; Holthausen et al., 1995; Guidry et al., 1999). First, we document robust evidence that firms increase their 4th quarter ETR to manipulate earnings downward ("big bath") when their actual earnings are below bonus thresholds, an earnings management behavior that draws significant debate in prior literature (Gaver et al., 1995; Holthausen, et al., 1995). Second, we do not find evidence that firms increase ETRs in the 4th quarter to create a cookie jar (Healy, 1985) when pre-

managed earnings would have beaten the bonus maximums. Meanwhile, our results also indicate that when CEOs are in the bonus range and have incentives to make income-increasing earnings management, firms decrease ETRs in the 4th quarter on average, consistent with previous findings that managers manipulate earnings upward to increase their cash bonus compensation (Healy, 1985; Guidry et al., 1999; Bennett et al., 2017). We conduct several robustness checks including industry fixed effects, subgroup analysis, and alternative classification and our results hold under all specifications. To ensure our construct reflects earnings management, we use two widely used tax-related earnings management proxies, tax misstatements and tax accrual quality, to validate our LCEM measure. We document that LCEM is more pronounced among firms with lower tax accounting quality, consistent with our previous argument that the change of the last quarter ETR captures earnings manipulation (Dhaliwal et al., 2004; Beardsley et al., 2021).

More importantly, we synthesize insights from the evolving executive compensation literature to interpret empirical findings and to reconcile mixed evidence in the bonus-induced earnings management literature within modern contracting environments. In doing so, we emphasize two features that are central to contemporary bonus design but largely overlooked in earlier work: nonlinear payout structures and overlapping managerial incentives.

First, we focus on nonlinear payout structures. In contrast to Healy's (1985) stylized model, contemporary bonus plans frequently feature sharp threshold discontinuities in payouts (Matejka and Ray, 2017; Hu, Li, and Ray, 2021). Under such designs, managers receive a substantial discrete payout once performance exceeds an explicit threshold. Executives whose pre-managed performance falls just below the lower threshold—but who believe the threshold remains attainable—face particularly strong incentives to engage in earnings management to secure the bonus (Murphy and Jensen, 2024). By contrast, bonus plans with smooth pay–performance relationships offer weaker marginal rewards around performance thresholds, thereby attenuating incentives to manipulate reported earnings.

To examine the effects of nonlinear threshold payouts, we hand-collect initial payout ratios and classify bonus plans as discrete or continuous based on whether the initial payout ratio is strictly greater than zero. Comparing these two plan types, we find that the income-increasing earnings management observed in the Mid portfolio is concentrated almost entirely

among firms with discrete bonus plans.[5] This evidence suggests that sharp increases in initial payout ratios create substantially stronger incentives for earnings management. Focusing further on firms in the incentive range where income-increasing manipulation is most likely, we show that upward earnings management is primarily driven by firms whose pre-managed earnings fall below the bonus threshold. Moreover, CEOs' incentives to engage in LCEM decline sharply once the threshold is reached, indicating that bonus thresholds constitute a stronger incentive lever than bonus targets.

Second, we examine overlapping incentive environments. Managers simultaneously face multiple incentives, including capital market pressures and equity-based compensation. We first explore how market pressure interacts with bonus incentives. Prior studies suggest that CEOs are less likely to meet bonus EPS targets when those targets exceed analysts' forecasts (Armstrong et al., 2024). Building on this insight, we jointly examine analysts' forecasts and bonus goals in shaping LCEM across performance portfolios. In contrast to the view that cash-based bonus incentives generate limited agency concerns, we find that managers strategically manipulate earnings to both meet analysts' expectations and maximize expected bonus payouts. These results highlight the joint importance of internal bonus incentives and external market expectations in shaping managerial reporting behavior.

We further analyze the interaction between equity incentives and bonus incentives. In contrast to prior research emphasizing equity incentives as the dominant driver of earnings management, we find that equity incentives primarily explain earnings management in the Upper portfolio, where pre-managed earnings already exceed the bonus maximum. Below the bonus maximum, bonus incentives, rather than equity incentives, play the central role in shaping earnings management behavior. These findings enrich our understanding of managerial incentives by demonstrating that equity compensation is not the sole driver of incentive-induced earnings management and that the relative importance of incentives varies across performance regions (Healy, 1985; Armstrong, Larcker, Ormazabal, and Taylor, 2013).

Our study makes several important contributions to the literature. First, we provide

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[5] While bonus plans establish a minimum payout threshold, the payout ratio varies across plans. We classify bonus plans with a zero initial payout ratio as continuous bonus plans and those with a non-zero initial payout ratio discrete bonus plans.

cleaner identification of bonus-induced earnings management by exploiting tax-related LCEM. This design allows us to revisit classic predictions in Healy (1985) with substantially improved measurement, helping to reconcile mixed evidence in the prior literature.

Second, we refine the bonus-induced earnings management framework by highlighting the role of local incentive gradients created by nonlinear payout structures. Contemporary bonus contracts frequently feature sharp payout discontinuities at performance thresholds. We show that earnings management behavior is concentrated around these discontinuities rather than driven by the overall shape of the bonus plan. These findings demonstrate that threshold-based nonlinearity is a central mechanism through which bonus contracts shape reporting behavior, a feature largely overlooked in earlier studies.

Third, we contribute to the literature on managerial incentives by documenting how the relative importance of incentive mechanisms varies across performance regions. Contrary to the view that equity incentives uniformly dominate incentive-induced earnings management, we find that bonus incentives play a primary role when earnings fall below the bonus maximum, while equity incentives are more salient when earnings already exceed bonus caps. We also show that bonus incentives and external market pressures jointly influence reporting decisions: when bonus thresholds and analysts' expectations are misaligned, managers engage in earnings management to optimize both benchmarks. These results underscore the importance of analyzing incentive interactions rather than examining compensation components in isolation.

Collectively, our findings provide a more nuanced understanding of how modern bonus contracts influence managerial reporting behavior. By combining improved identification with contract-level detail, this study clarifies the conditions under which cash-based bonus incentives generate agency conflicts and offers new evidence on their governance implications in contemporary compensation settings.

Although evolving regulations (e.g., SFAS 123R in 2004 and the Compensation Disclosure Regulation in 2006) have reshaped the regulatory environment regarding corporate governance (Cohen, Dey, and Lys, 2008; Laksmana, 2008) as well as compensation contracting (Gipper, 2021), bonus incentives continue to play a significant role in influencing financial reporting decisions of top executives. Our research adds to the stream of literature about the use of accounting information in compensation contracts. As the design of performance metrics can

produce strong behavioral responses that may not always align with shareholder interests. This has important implications for boards and regulators responsible for designing compensation contracts that promote long-term firm value.

The remainder sections of this paper are structured as follows: Section 2 encompasses the literature review and outlines our research question. Section 3 explains our setting, data and empirical methodology. Sections 4 present the primary analyses. Section 5 shows the results of sensitivity analyses. Finally, section 6 concludes the paper.

2. Literature Review and Hypothesis Development

2.1 CEO Bonus Contract and Earnings Management

Accounting earnings are frequently observed in executive compensation contracts because it is less sensitive to market-wide "noise" in equity values, thus "*shielding executives from fluctuations in firm value that are beyond their control*" (Sloan, 1993, p.55). However, CEOs have discretion in shaping firms' financial outcomes, and they constantly make choices that could maximize the value of their compensation (Wallace, 1997). Therefore, managers have an economic incentive to manipulate earnings to increase their cash compensation (Holthausen et al., 1995).

In recent years, research about compensation incentive largely concentrates on the relationship between CEO equity incentives and earnings management (Feng, Ge, Luo, and Shevlin, 2011; Armstrong, Larcker, Ormazabal and Taylor, 2013) and discovers a positive relationship between equity incentive and financial manipulation (Davidson, 2022). With the looming regulation about pay transparency, firms turn to more formulaic incentive plans under market pressure (Gipper, 2021). Though traditionally considered less important, cash-based bonus plans actually have a greater magnitude than previously anticipated and may exert incentive power comparable to equity incentives early in CEO careers (Guay et al., 2019). Also, bonus plans play a vital role in corporate governance practices through communicating a firm's strategic objectives to executives and tying these objectives to sophisticated performance metrics (Bushman, 2021). Nonetheless, to achieve certain performance targets, managers will strategically manipulate accounting earnings (Healy, 1985; Gaver et al., 1995; Holthausen et al., 1995; Guidry et al., 1999). This strategic earnings manipulation maximizes managers'

personal payoff but could be detrimental to shareholder value.

One of the most widely cited papers that theorizes and explores the effect of executive bonus incentives on earnings management and accounting choice is Healy (1985). Healy (1985) proposes that the extent of earnings manipulation varies depending on whether the manager anticipates earnings to be (1) below the bonus threshold required to earn any bonus, (2) above the bonus maximum beyond which no additional bonuses are awarded, or (3) within the "incentive zone" between the bonus thresholds and maximums. Healy (1985) assumes that each manager observes pre-managed income and manipulates earnings either upward or downward based on their incentives. The implications are as follows: (1) when pre-managed income is significantly below the bonus thresholds (Low Portfolio) or above the bonus maximums (Upp Portfolio), managers are likely to make income-decreasing earnings management to increase the likelihood of earning a bonus in the future; and (2) when pre-managed income falls between the bonus threshold and maximum or is near the threshold (Mid Portfolio), managers will tend to make income-increasing earnings management. While theoretical predictions are intuitive, prior studies fail to document consistent results about the impact of bonus contracts on earnings management activities.

Table 1 provides a comparison of these studies. All studies use total accruals or discretionary accruals to capture earnings management activities but provide mixed evidence regarding the level of accruals in different situations. Supporting the theoretical prediction, Healy (1985) presents evidence that accruals are more negative for managers motivated to manage earnings downward due to bonus-related incentives (Low and Upp Portfolios), compared to managers with incentives to increase earnings (Mid Portfolio). However, Holthausen et al. (1995) does not find a significant difference between discretionary accruals in the Low and Mid Portfolios. This contradicts Healy's (1985) prediction that managers in the Low Portfolio manipulate earnings downward to increase their probability of receiving future bonuses. Gaver et al. (1995) finds that firm-years in Low Portfolio report more income-increasing earnings management. This result is opposite to the predictions of Healy (1985) and instead supports the income-smoothing hypothesis that managers smooth earnings to reduce volatility. To increase the test power, Guidry et al. (1999) take advantage of business-unit level data from a large conglomerate to examine the level of discretionary accruals in different

business-units. This setting reduces the aggregation problem using firm-level data and the confounding effects from other compensation components of senior executives. However, as Healy (1999) indicated in his discussion, senior executives have significant influence over firms' strategic choices which are likely to be distinct from business-unit managers. Therefore, the empirical results from business-unit managers also constrain the generalizability of this research.

Besides the mixed evidence discussed above, previous studies relying on accruals as measures of earnings management also have two weaknesses in their empirical specifications that might result in incorrect conclusions. First, total accruals or Modified Jones discretionary accruals contain both economic fundamentals and earnings management. Therefore, these measures include substantial noise from economic fundamentals which could impair empirical identification (Dechow et al., 2010). Discretionary accrual measures try to control for economic shocks by measuring earnings management relative to other firms in an industry. However, economic shocks that affect one firm will also affect the other firms in their industry. And those same economic forces will affect where the majority of CEOs in that industry fall along the incentive zone. For instance, if a strong economic shock hurts the performance of the manufacturing industry, then most CEOs in that industry will have earnings below the earnings threshold and all manage earnings downward to take a big bath. Therefore, the economic shock, industry accruals, and firm performance would all be related.

Second, inter-group comparisons of accrual levels are vulnerable to benchmark contamination (Loughran and Ritter, 2000). If both the test and control groups face different but non-random incentives to manage earnings (Healy, 1985), observed differences may not identify actual effects. Therefore, when both groups engage in earnings management in distinct ways, it becomes unclear whose behavior drives the empirical results and whether it aligns with theoretical predictions. In this regard, previous research does not offer evidence on whether firm-year observations within each portfolio manipulate earnings as predicted by Healy's (1985) theory.

2.2 Last Chance Earnings Management

To enhance the understanding of CEO bonus contract and earnings management. We employ a novel setting – last change earnings management (Dhaliwal et al., 2004) – which

offers a valuable framework for this study for several reasons.

First, prior research examines difference in effective tax rates (ETRs) from the 3rd quarter to the 4th quarter as evidence of earnings management through tax expense (Dhaliwal et al., 2004; Christensen et al., 2015; Beardsley et al., 2021) These studies take advantage of the interim reporting requirement under Accounting Principles Board (APB) 28 that firms make their best estimate of annual ETR at interim reporting periods, providing a point estimate of expected annual ETR. Scholars hence use the cumulative ETR for the first three quarters of the fiscal year to represent the "pre-managed" annual ETR together with the actual pre-tax income to estimate pre-managed after-tax earnings. Therefore, the ETR3 contains managers' expectation about future effective tax rate, reducing the measurement error in estimating "pre-managed earnings"

Second, by comparing pre-managed earnings with earnings cut-offs, scholars could identify whether firms would beat or miss the cut-off without changing the 3rd quarter ETR estimates. Accordingly, prior studies (Dhaliwal et al., 2004; Christensen et al., 2015; Beardsley et al., 2021; Beardsley, Kara, and Weaver, 2024) interpret the decrease (increase) in ETR from 3rd to 4th quarter as evidence of earnings-increasing (earnings-decreasing) tax expense manipulation. Therefore, this last chance earnings management (LCEM) setting allows us to associate different objectives in bonus contracts with the estimated pre-managed earnings, providing a firm-level proxy for managers' incentive to engage in earnings management. This methodology improves empirical identification by investigating whether the earnings management activities vary contingent upon the distance between an independent measure of pre-managed earnings and performance goals in bonus contracts.

Third, previous studies (Gaver et al., 1995; Holthausen et al., 1995; Guidry et al., 1999) generally employ discretionary accruals as a proxy of earnings management. The discretionary accruals are estimated using the residual of regression models by each industry. This measure then represents "*the amount of accruals that differs from the average accrual in that industry, conditional on the change in revenues and level of property, plant, and equipment*" (McNichols and Stubben, 2018, p.229). Therefore, the sign of discretionary accruals measure does not capture the firm-level direction of earnings management. Even if a firm engages in income-increasing earnings management, the regression may give a negative discretionary accrual

measure if the magnitude of the firm's accruals is smaller relative to its industry peers. However, Healy's (1985) theory includes clear predictions regarding the direction of earnings management. The LCEM setting hence outperforms previous measures by offering a cleaner direction of firm-level earnings management.

Because tax expense is one of the last accounts closed prior to an earnings announcement, it provides managers with substantial discretion to engage in LCEM (Dhaliwal et al., 2004; Christensen et al., 2015; Beardsley et al., 2021). LCEM refers to the intentional manipulation of tax expense as a distinct tool for influencing reported earnings.[6] Consistent with the view that changes in fourth-quarter ETRs signal earnings management, Cook, Huston, and Omer (2008) show that higher tax-related fees paid to auditors are associated with greater reductions in ETRs, Christensen et al. (2015) document that industry-expert auditors constrain the use of tax accounts for earnings management, and Gleason, Pincus, and Rego (2017) find that material weaknesses in internal controls over tax functions increase the likelihood of such manipulation.

Prior work also identifies the mechanisms available to managers for exercising discretion through tax accounts. Schrand and Wong (2003) show that banks strategically increase valuation allowances in profitable years and subsequently adjust them to smooth earnings over time. Similarly, Krull (2004) finds that firms classify foreign subsidiary income as "permanently reinvested earnings" to help meet analysts' earnings forecasts. Together, these studies illustrate the multiple channels through which managers can exploit tax expense to influence reported earnings.

2.3 Bonus Incentives and Last Chance Earnings Management: Conceptual Background

Many firms base CEO cash-based bonuses on after-tax earnings (Gaertner, 2014). Contracting on after-tax performance may lead executives to focus on tax-related decisions that affect firm value, as tax expenses directly determine after-tax income. When compensation contracts rely on after-tax metrics, managers face salient performance benchmarks and may

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[6] Although both practices reduce ETRs, LCEM is distinct from tax avoidance. Tax avoidance is typically planned and executed continuously as part of long-term tax planning and cash flow management, whereas shifts in ETRs between the third and fourth quarters are more likely to reflect transitory adjustments in tax expense aimed at boosting reported earnings at year-end. Consistent with this view, Kim, Pierce, and Yeung (2021) document that firms reporting favorable news and engaging in last-chance earnings management are more likely to delay their earnings announcements.

exploit discretion in tax-related accounts to improve expected compensation.

Healy (1985) provides the foundational framework for analyzing bonus-induced earnings management. In his model, bonus contracts include three key cutoffs—a threshold below which no bonus is paid, a target associated with expected payout, and a maximum beyond which additional performance yields no incremental compensation. These cutoffs partition firm-years into three incentive regions, commonly referred to as the Low, Mid, and Upp portfolios. Because bonus payouts are directly tied to reported earnings, Healy predicts that managers optimally adjust reporting behavior in response to their position within this incentive zone. Importantly, bonus goals differ from other earnings benchmarks, such as analysts' forecasts, because they are contractually specified and directly determine executives' annual cash compensation, making them especially salient incentives.

Within this framework, Healy (1985) predicts income-decreasing earnings management when pre-managed earnings fall below the bonus threshold, income-increasing earnings management when earnings fall within the incentive zone, and income-decreasing earnings management when earnings exceed the bonus maximum in order to shift income to future periods through "cookie jar" reserves. These predictions imply that the direction and magnitude of earnings management vary systematically across incentive regions.

2.4 The Need for Refinement: Mixed Evidence and Modern Incentives

Empirical evidence testing Healy's (1985) predictions is mixed. For the Low portfolio, Healy (1985) and Guidry et al. (1999) document lower accruals relative to the Mid portfolio, consistent with income-decreasing earnings management. In contrast, Holthausen et al. (1995) fail to find significant differences in discretionary accruals between the Low and Mid portfolios, while Gaver et al. (1995) argue that managers smooth earnings by manipulating upward in the Low portfolio to reduce volatility. Moreover, differences in accruals across portfolios may be difficult to interpret because aggressive income-increasing earnings management in the Mid portfolio can mechanically lower relative accrual levels in the Low portfolio.

Evidence for the Mid portfolio is more consistent with Healy's predictions. Healy (1985) and Guidry et al. (1999) find higher accruals in the Mid portfolio relative to the Low and Upp portfolios. More recently, Bennett et al. (2017) document sharp discontinuities around bonus thresholds and targets, showing that firms are disproportionately more likely to narrowly beat

bonus benchmarks than narrowly miss them.

Predictions for the Upp portfolio remain particularly ambiguous. Healy (1985) finds evidence consistent with income-decreasing earnings management when bonus maximums are binding and income-increasing accruals when maximums are non-binding. However, Holthausen et al. (1995) replicate these tests and find weaker evidence, detecting manipulation only when using modified Jones discretionary accruals and failing to document higher accruals for non-binding maximum observations. These mixed findings raise questions about whether managers systematically engage in "cookie jar" behavior once bonus caps are reached.

Several features of modern compensation environments further complicate predictions in the Upp portfolio. Boards retain discretion to adjust CEO compensation ex post, potentially weakening incentives to shift earnings once bonus maximums are achieved (Albuquerque et al., 2019; Drake et al., 2023). When bonuses are based on after-tax earnings, income-decreasing manipulation through higher tax expense may increase effective tax rates and expose managers to scrutiny or penalties (Chyz and Gaertner, 2018). Managers with strong performance may also strategically reduce effort rather than manipulate earnings in response to target ratcheting concerns (Bouwens and Kroos, 2011). Although prior research finds that firms increase fourth-quarter tax expense when earnings exceed analysts' forecasts (Beardsley et al., 2021), it remains unclear whether similar behavior arises in bonus-based incentive settings.

Taken together, the mixed empirical evidence and the evolution of compensation design suggest that Healy's (1985) framework, while foundational, may require refinement to account for modern bonus structures, overlapping incentives, and cleaner measures of firm-specific earnings management. By synthesizing recent literature, we identify two important compensation design features that are largely overlooked in prior studies:

2.4.1 Non-linearity in Pay Structure

A key simplifying assumption in Healy's (1985) seminal framework is that managers' incentives to manipulate earnings around the bonus threshold are homogeneous once a minimum performance requirement is specified. In practice, however, modern bonus contracts exhibit substantial heterogeneity in how payouts are structured at the threshold. An important but largely overlooked dimension is the initial payout ratio—the fraction of the target bonus awarded immediately upon meeting the threshold. Variation in this ratio implies that the

strength of managers' incentives to reach the threshold can differ markedly across firms, even when thresholds are set at similar performance levels.

Recent work by Murphy and Jensen (2024) emphasizes that "cliff-like" bonus structures, in which a substantial payout is triggered once a performance hurdle is crossed, generate particularly strong short-term incentives and may encourage opportunistic behavior. This insight highlights a limitation of Healy's (1985) linear treatment of bonus incentives: it abstracts from the convex payoff features that characterize many contemporary compensation contracts. When bonus plans feature discrete payout jumps at the threshold, the marginal benefit of crossing the threshold can be large, sharply increasing managers' incentives to engage in last-chance earnings management. In contrast, bonus plans with smoother, more continuous payout schedules create weaker local incentives near the threshold and may attenuate manipulation.

Incorporating nonlinear threshold incentives therefore refines Healy's (1985) framework by recognizing that earnings management incentives depend not only on the existence of a bonus threshold, but also on how steeply compensation increases once that threshold is met. This perspective aligns with recent compensation research (Matějka and Ray 2017; Hu, Li, and Ray 2021; Murphy and Jensen 2024) and motivates a more nuanced analysis of how bonus contract design shapes managerial reporting behavior in modern settings. Accordingly, we pose the following research question:

RQ1: How does nonlinearity in bonus payout structures affect bonus-induced earnings management around performance thresholds?

2.4.2 Overlapping Incentives

Another limitation of Healy's (1985) framework is that it largely treats bonus incentives in isolation, abstracting from the overlapping incentives that modern executives face. In practice, managers are simultaneously influenced by cash bonuses, capital market pressures, and equity-based compensation. External market expectations, in particular, can shape managerial reporting incentives in ways that interact with bonus contracts. Armstrong et al. (2024) show that CEOs are less likely to meet bonus EPS targets when those targets exceed analysts' forecasts, suggesting that market pressure can attenuate the effectiveness of bonus incentives. When bonus goals and analysts' benchmarks coexist, however, it remains an open question how managers strategically adjust reporting behavior in response to both objectives.

Equity-based incentives further complicate this incentive environment. Prior research often emphasizes equity incentives as the dominant driver of earnings management (e.g., Armstrong, Larcker, Ormazabal, and Taylor, 2013; Davidson, 2022), but this view overlooks the possibility that the salience of different incentives may vary across performance regions. Understanding how equity incentives interact with bonus incentives is therefore important for developing a more comprehensive view of incentive-induced earnings management. Taken together, these considerations highlight the need to refine Healy's (1985) framework to account for overlapping incentive structures, in which cash bonuses, equity incentives, and market expectations jointly shape earnings management behavior rather than operating independently. This motivates the following research question:

RQ2: How do overlapping incentives from equity-based compensation and capital market expectations influence bonus-induced earnings management?

3. Data and Research Design

3.1 Multivariate models

Following previous research (Dhaliwal et al., 2004; Beardsley et al., 2021), we use the change in ETR from the third quarter to the fourth quarter to examine earnings management and estimate the following regression with standard errors clustered at firm level:

$$ETR4\_ETR3_{it} = \beta_0 + \beta_1 Diff\_Thrs\_PreE\_Low_{it} + \beta_2 Diff\_Max\_PreE\_Mid_{it} + \beta_3 Diff\_PreE\_Max\_Upp_{it} + \beta_4 Upp_{it} + \beta_5 Low_{it} + Control_{it} + Year\ Fixed + Firm\ Fixed + \varepsilon_t$$
(1)

where *ETR4_ETR3* is the difference between the 4th quarter ETR and the 3rd quarter ETR. A negative value indicates that the ETR decreased from the 3rd to 4th quarter, increasing after-tax income.

Following prior research (Healy, 1985; Holthausen et al., 1995) we assign firm-year observations to one of three portfolios based on the actual and pre-managed earnings. Observations are assigned to portfolios in the following manner:

Lower Bound Portfolio (Low Portfolio): firm-years are classified as the *Low Portfolio* when the actual earnings are below bonus thresholds.

Upper Bound Portfolio (Upp Portfolio): firm-years are classified as the *Upp Portfolio* when the pre-managed earnings are above bonus maximums.

Middle Bound Portfolio (Mid Portfolio): firm-years are classified as the *Mid Portfolio* when their pre-managed earnings are between bonus threshold and maximums or when pre-managed earnings are below bonus thresholds, but actual earnings surpass bonus thresholds.[7]

Our main variable of interest is *Diff_Thrs_PreE_Low (Diff_Max_PreE_Mid, Diff_PreE_Max_Upp)* for firm-years in the Low (Mid, Upp) Portfolio, which equals to the absolute value of difference between bonus threshold (maximum, maximum) and pre-managed earnings, and 0 if a firm-year is not included in the Low (Mid, Upp) Portfolio. We scale our main variables by total asset to ensure cross-sectional comparability (Kim, Matejka, and Park, 2023). Therefore, these variables represent the predicted amount of bonus goals the firm would have missed (beaten) without manipulating ETR. Managers have incentives to manage ETR upward (earnings-decreasing) or downward (earnings-increasing) to increase their payoffs. We hence test our hypotheses by examining the sign of coefficients β_1, β_2 and β_3 in Equation (1). If firms manage ETR upward (downward), we will observe a positive (negative) estimated coefficient.

Control variables follow Dhaliwal et al. (2004). We include *ETR3* to control for potential mean reversion and the amount by which the firm could decrease its ETR. We include *Tax_Owed* to control for the over- or under- payment of estimated tax changes and *Induced_ETR* to control for changes in ETR caused by unexpected earnings. We further control for CEO Delta and Vega following Core and Guay (2002) because equity incentives are associated with more earnings management (Davidson, 2022; Beardsley et al., 2024). We also include a series of firm characteristics and corporate governance properties: total accruals, *Accrual*, the number of directors, *Boardsize*, whether the CEO is the board chair, *CEOChair*, the CEO's tenure at the company, *CEOTenure*, the percent of board members who are independent, *Indp*, financial leverage, *Lev*, and firm size, *Size*. We further include two indicator

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[7] Holthausen et al. (1995, p.38) provides the rational for using actual earnings to differentiate between the Low and Mid Portfolios: *"The manager's lower bound threshold is a function of the lower bound of the funding formula, the manager's personal rate of time preference, degree of risk aversion, and expectations of corporate earnings. While the lower bound is observable, the lower bound threshold is not observable. However, tests do not depend on the manager's lower bound threshold (which is unobservable) because we know where the executive finishes relative to the plan. Thus, we know whether it was in the executive's interests to take income increasing or decreasing accruals, depending on whether the bonus exceeds the lower bound or not."*

variables (*Upp* and *Low*) to control for the fixed effect of different portfolios, allowing us to examine within-portfolio variations. Finally, we include year and firm fixed effects to control for unobservable characteristics. We winsorize all continuous variables at the 1% and 99% levels. Detailed definitions of all relevant variables are listed in the Appendix.

3.2 Sample Construction

To construct a database of CEO cash incentives, we manually collect earnings metrics from annual proxy statements (form DEF 14A) filed in the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system from the SEC website. Proxy statements officially provide detailed information on earnings metrics and their formulas. The section "Compensation Discussion and Analysis" (CD&A) is our primary source of data from proxy statements.

To economize hand-collection effort, we start from firm-years in Execucomp from 2010 to 2017, avoiding potential influences from the Financial Crisis and the Tax Cuts and Job Act (TCJA)[8]. The initial sample consists of 17,192 observations. Following Beardsley et al. (2021), we first exclude 3,608 observations with missing quarterly tax information or with abnormal ETRs (negative or exceeding one). We further require non-missing control variables in Compustat and IBES, reducing our sample to 7,854 observations. Including governance characteristics from ISS leaves our sample to 6,613 firm-years.

For each firm-year in our sample, we hand-collected bonus contract information in the CEO annual incentive plan. Following Chen et al. (2022), we exclude firm-years without bonus thresholds and maximums, reducing our sample to 4,401 firm-years. We then exclude firm-years where bonuses are based on pre-tax metrics because LCEM does not influence pre-tax income. To ensure comparability, we include the two most widely used metrics: earnings and earnings per share (EPS). Additionally, we further restrict our sample to observations using GAAP earnings because the non-GAAP adjustments in bonus targets are idiosyncratic and encompass numerous types of transactions (Curtis et al., 2021). It is hence infeasible to calculate the pre-managed earnings of firm-years not using GAAP earnings. This restriction substantially reduces our sample to 977 observations, consistent with findings that about 16%

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[8] Firms adjust for regulatory impacts when evaluating CEO performance (Curtis et al., 2021). For instance, in its 2017 DEF 14A, Procter & Gamble excluded the "transitional impact of the U.S. Tax Act" from CEO earnings metrics. To maintain consistency in policy application and avoid distortions from such transitory adjustments, we restrict our sample to the pre-TCJA period, which strengthens the validity of our empirical identification.

of firms in S&P 1500 use GAAP earnings in bonus compensation (Curtis et al., 2021).

To avoid the effect of TCJA, we exclude 5 observations with fiscal years ending after December 31, 2017. Finally, we exclude 24 firm-years with a studentized residual over 2 (Beardsley et al., 2021) to mitigate the impact of extreme outliers. Previous studies (Dhaliwal et al., 2004; Mayberry and Rane, 2025) set restrictions on ETR changes (five cents of the median consensus EPS forecast) to study firms that are close to the analyst forecast benchmark. We refrain from imposing such restrictions because Healy's (1985) theory does not predict earnings management to beat certain bonus cut-offs. Instead, our empirical test examines whether firms' earnings management behaviors vary along with the gap between pre-managed earnings and different bonus goals, a proxy for the intensity of earnings management incentives. Our final sample contains 948 observations. Table 2 outlines our sample selection procedure.

[Insert Table 2 Here]

3.3 Descriptive Analysis

Table 3 Panel A presents the descriptive statistics of the pooled sample. Consistent with prior research (Beardsley et al., 2021; Beardsley et al., 2024; Mayberry and Rane, 2025), the negative mean value (-0.006) of *ETR4_ETR3* indicates that firms, on average, reduce their last quarter ETR. The mean value of *ETR3* is about 0.299 with is also consistent with the magnitude in previous research (Beardsley et al., 2021). The average total assets in our sample are $15,435 million, which is larger than other studies because Execucomp data is restricted to firms in S&P 1500.

Panel B provides the univariate analysis of our earnings management proxy *ETR4_ETR3.* Consistent with Healy (1985), we document a significant difference in the level of *ETR4_ETR3* between the Low Portfolio and Mid Portfolios, indicating that compared with firm-years in the Mid Portfolio, firms-years in the Low Portfolio are more likely to have higher ETRs in the last quarter. Also, we document a significant difference in the level of *ETR4_ETR3* between the Upp Portfolio and the Mid Portfolio, suggesting that firms-years in the Mid Portfolio are more likely to have lower ETRs in the 4th quarter. This supports the argument that firms in different portfolios manipulate tax expenses in distinct ways.

[Insert Table 3 Here]

4. Reexamining and Refining Bonus-induced Earnings Management

4.1 Reexamining Bonus-induced Earnings Management

Table 4 shows the results of our model estimation for Equation (1). Column (1) to (3) present the results for the Low, Mid and Upp Portfolios separately. Column (4) provides a pooled regression of all our variables of interest. In Column (1), the coefficient estimate of *Diff_Thrs_PreE_Low* is significantly positive (coefficient = 2.602, p-value < 0.01). Therefore, when earnings are not able to reach the CEO bonus threshold, firms increase tax expenses in the last quarter to manage earnings downward. Our results thus support Healy's (1985) hypothesis that firms in the Low Portfolio tend to conduct earnings-decreasing earning management to take a "big bath". Column (2) shows the results for firm-years in the Mid Portfolio, the coefficient estimates of *Diff_Max_PreE_Mid* is significantly negative (coefficient = -1.511, p-value < 0.01). We hence find evidence that firms in the Mid portfolio make income-increasing earnings management to inflate the actual earnings. Column (3) shows the results for firm-years in the Upp Portfolio. Although our univariate analysis in Table 2 Panel B shows a significant difference in *ETR4_ETR3* between the Mid Portfolio and the Upp Portfolio, we fail to document a significant association between *Diff_PreE_Max_Upp* and *ETR4_ETR3* (coefficient = 0.025, p-value > 0.1). Our regression analysis indicates no evidence of downward earnings management when we examine the within-portfolio variation of firm-years in the Upp Portfolio. Finally, Column (4) includes all the variables of interest in our model, and the results remain consistent.

[Insert Table 4 Here]

4.2 Refining Bonus-induced Earnings Management—Nonlinear Threshold Payouts

4.2.1 Discrete and Continuous Bonus Plan

A key assumption in Healy's (1985) seminal model is that managers have incentives to manipulate earnings upward to meet the minimum performance threshold required for bonus eligibility. However, an important yet underexplored dimension of heterogeneity lies in the initial payout ratio, the proportion of the target bonus awarded once performance just meets the threshold. Variation in this ratio across firms implies that the strength of managers' incentives to reach the threshold may differ substantially.

To examine this heterogeneity, we hand-collect detailed payout policy information

from firms' DEF 14A proxy statements. Among 893 firm-year observations that explicitly disclose their ex-ante payout schedules, Table 5 Panel A summarizes the distribution of the initial payout ratio at the threshold.

[Insert Table 5 Here]

We classify bonus plans into discrete and continuous types. Specifically, we define discrete bonus plans (*Discrete* = 1) as those with a non-zero initial payout ratio—meaning managers receive a material bonus immediately upon crossing the performance threshold. In contrast, continuous bonus plans (*Discrete* = 0) have a zero initial payout ratio, implying that payouts begin to accrue gradually beyond the threshold. Among the 893 firm-years, 635 (71%) are discrete and 258 (29%) are continuous. The mean initial payout ratio across all plans is 0.287, indicating that, on average, meeting the bonus threshold yields 28.7% of the target bonus.

This design distinction has meaningful incentive implications. Discrete plans create a sharp discontinuity in rewards: managers receive a sizable payout once performance clears an explicit hurdle. Such "cliff-like" structures strengthen short-term performance incentives (Matějka and Ray 2017; Hu, Li, and Ray 2021) and may encourage greater earnings management around thresholds. In contrast, continuous plans generate smoother pay-performance relationships, offering weaker marginal rewards near the threshold and therefore attenuating managers' incentives to manipulate reported earnings.

Consistent with these predictions, Table 5 Panel B presents evidence that upward earnings management within the Mid portfolio is concentrated among discrete bonus plans. While both plan types exhibit some degree of downward earnings management in the Low portfolio, only discrete plans display statistically significant upward manipulation in Mid portfolio. This pattern reinforces the idea that nonlinearities in payout design, not merely the presence of a bonus plan, shape the intensity and direction of earnings management incentives.

Overall, these results refine Healy's (1985) framework by showing that the incentive to engage in "last-chance" upward earnings management depends not only on whether a bonus threshold exists but also on how steeply payouts increase once that threshold is crossed. The presence of a discrete payout schedule amplifies managerial motivation to ensure eligibility for bonus compensation, providing a novel micro-level mechanism linking compensation design to earnings management behavior.

4.2.2 Bonus Incentive and LCEM within the Mid Portfolio

While firms in the Mid portfolio generally have incentives to engage in income-increasing earnings management, the intensity of these incentives likely varies with the position of pre-managed earnings to the bonus threshold. Because crossing the threshold determines eligibility for any payout, even a small shortfall can result in a substantial loss of compensation. As shown in Section 4.2.1, discrete bonus plans amplify this pressure by creating steep increases once the threshold is met, thereby strengthening managers' incentives to boost reported performance. Accordingly, we predict that firm-years with pre-managed earnings just below the bonus threshold exhibit the strongest incentives to reduce tax expenses and increase after-tax income.

However, it is ex-ante unclear how the bonus targets could affect firms' incentive to manipulate earnings. On the one hand, the pay-for-performance function is largely continuous around the target, missing it would have minimal impact on compensation payouts (Chen et al., 2022). On the other hand, CEOs might experience reputation loss for missing the bonus target (Bennett et al., 2017), so they have incentives to beat the bonus target. Finally, if the pre-managed earnings have surpassed the bonus target, managers' incentive to manipulate earnings may substantially decrease because the reputational concern is eliminated. However, the slope of the pay-performance relationship may also increase between the target and the maximum value (Martin, Seo, Yang, Kim, and Martel, 2023), inducing more earnings management for monetary reasons.

Leveraging the within-portfolio variation in our setting, we provide the first exploratory investigation into the earnings management behavior within the Mid Portfolio. We first classify firm-years in the Mid Portfolio into three subgroups:

Mid1 Portfolio: firm-years are classified into the Mid1 Portfolio when the pre-managed earnings are below the bonus threshold.

Mid2 Portfolio: firm-years are classified into the Mid2 Portfolio when the pre-managed earnings are above bonus threshold but below the bonus target.

Mid3 Portfolio: firm-years are classified into the Mid3 Portfolio when the pre-managed earnings are larger than the bonus target.

Because there are 389 observations in the Mid Portfolio, we estimate the following

regression with industry fixed effect:

$$ETR4\_ETR3_{it} = \beta_0 + \beta_1 Diff\_Thrs\_PreE\_Mid1_{it} + \beta_2 Diff\_Tar\_PreE\_Mid2_{it} + \beta_3 Diff\_Max\_PreE\_Mid3_{it} + \beta_4 PortfolioMid1_{it} + \beta_5 PortfolioMid2_{it} + Control_{it} + Year\ Fixed_{it} + Firm\ Fixed_{it} + \varepsilon_{it} \qquad (3)$$

Our variables of interest are hence *Diff_Thrs_PreE_Mid1* (*Diff_Tar_PreE_Mid2, Diff_Max_PreE_Mid3*) for firm-years in the Mid1 (Mid2, Mid3) Portfolio, which equals to the absolute value of difference between bonus threshold (target, maximum) and pre-managed earnings, and 0 if a firm-year is not included in the Mid1 (Mid2, Mid3) Portfolio. Other variables are previously defined. Table 6 reports our results.

[Insert Table 6 Here]

Table 6 Panel A shows the regression results of Equation (3). We documented a significantly negative association between *Diff_Thrs_PreE_Mid1* and *ETR4_ETR3* (coefficient = -21.30, p-value < 0.05) in column (1). As expected, the firm-years in the Mid1 Portfolio exhibit the strongest incentive to manipulate tax expense downward. In column (2), the negative association between *Diff_Tar_PreE_Mid2* (coefficient = -1.96, p-value < 0.1) and *ETR4_ETR3* indicates weak evidence that firms in the Mid2 Portfolio make income-increasing earnings management. The F test shows a significant difference in the magnitude between *Diff_Thrs_PreE_Mid1* and *Diff_Tar_PreE_Mid2*. Our results hence suggest that firms' incentive to engage in earnings management considerably declined when the pre-managed earnings surpassed the bonus threshold. Finally, for firm-years in the Mid3 Portfolio, our variable of interest, *Diff_Max_PreE_Mid3*, becomes insignificant (coefficient = -0.630, p > 0.1). Therefore, firms may have little incentive to manage earnings when their pre-managed earnings are above bonus target. Column (4) includes all three variables of interest in our model, and the results remain consistent.

4.3 Refining Bonus-induced Earnings Management—Overlapping Incentives

4.3.1 Analyst Forecast, Bonus Incentive, and LCEM

We examine the impact of analyst forecasts on earnings management behaviors across different portfolios. Armstrong et al. (2024) emphasize the importance of considering both types of earnings benchmarks simultaneously. Their findings suggest that while most CEOs

meet analysts' final consensus EPS forecasts, they are less likely to achieve bonus EPS targets that exceed forecasted EPS. However, given the distinct earnings management behaviors observed across the three portfolios, the influence of analyst forecasts on these behaviors remains a critical question.

Table 7 compares pre-managed earnings and actual earnings against analyst consensus forecasts. In the Low Portfolio, 14.1% of firm-years have pre-managed earnings that exceed analyst forecasts, whereas only 12.2% of firm-years report actual earnings that meet these forecasts. This aligns with the above findings that firms in the Low Portfolio tend to manipulate earnings downward. In contrast, in the Mid Portfolio, 52.4% of firm-years surpass the analyst forecasts before LCEM, and the proportion of firm-years with actual earnings exceeding analyst forecasts rises to 59.1%. This corroborates the main findings that firm-years in the Mid Portfolio tend to make upward earnings management. Unsurprisingly, in the Upp Portfolio we observe only slight differences between the proportion of firms whose pre-managed earnings exceed analyst consensus forecasts and those whose actual earnings do. This finding is consistent with our main results, indicating no evidence of LCEM in the Upp Portfolio.

[Insert Table 7 Here]

Following Dhaliwal et al. (2004), we create an indicator variable, *PreMeetAF*, which equals to 1 if pre-managed earnings meet analyst consensus forecasts. We investigate whether the LCEM differs when pre-managed earnings have surpassed analyst consensus forecasts. Table 8 reports the results.

[Insert Table 8 Here]

Our results suggest that analyst forecasts and bonus goals jointly influence LCEM behaviors. In the Low Portfolio, firms engage in more income-decreasing LCEM when their pre-managed earnings fall below analyst forecasts (coefficient = 2.033, p-value < 0.05). However, if pre-managed earnings exceed analyst forecasts but remain close to them, firms are inclined to reduce earnings (coefficient = -2.395, p-value < 0.05). In the Mid Portfolio, firms tend to manipulate earnings upward when pre-managed earnings fall below analyst forecasts (coefficient = -0.987, p-value < 0.05). However, this incentive weakens once pre-managed earnings exceed analyst forecasts (coefficient = 0.372, p-value > 0.1). We find no evidence of earnings management in the Upp Portfolio. Overall, our results suggest that managers

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manipulate earnings to both maximize their bonus compensation and to beat analyst forecasts.

4.3.2 Equity Incentives , Bonus Incentive, and LCEM

While we find no evidence that bonus incentives drive earnings management among firms in the Upp portfolio, these firms may not be entirely free from earnings management incentives. Besides bonus incentives, equity incentives constitute a significant portion of executive compensation (Davidson 2022). Prior research indicates that higher equity incentives are associated with lower fourth-quarter tax expenses (Beardsley et al. 2024). This pattern suggests that executives with greater equity exposure engage in income-increasing tax management toward the fiscal year-end. To further examine how equity incentives interact with bonus incentives, we test whether the influence of equity incentives varies across incentive regions of bonus contracts. Table 9 reports the results.

[Insert Table 9 Here]

The interaction between bonus incentives and CEO delta is not statistically significant across all three columns. However, CEO delta in column (3) is significantly negatively associated with *ETR4_ETR3* (coefficient = –0.040, p < 0.10). These results indicate that equity incentives are more salient in regions where earnings exceed the bonus maximum. On the contrary, our evidence suggests that bonus incentives are the primary driver of earnings management when earnings fall below the bonus maximum.

Our finding aligns with Beardsley et al. (2024), which shows that equity-based compensation can motivate "last-chance" earnings management as managers seek to boost year-end stock performance or valuation metrics. In contrast to Healy's (1985) bonus model, which predicts little or no income-increasing manipulation once the maximum payout has been reached, our results suggest that the presence of substantial equity holdings introduces an alternative incentive channel that operates beyond the bonus contract. Managers with large equity stakes may continue to manage earnings upward to sustain market valuations, signal strong firm performance, or secure future equity grants.

Taken together, these findings suggest that the Upper (Upp) portfolio reflects a more complex incentive environment than envisioned in Healy's (1985) framework. Rather than indicating the absence of incentive-induced earnings management, performance above the bonus maximum appears to shift the dominant incentive channel from cash bonuses to equity-

based compensation. This pattern highlights the multifaceted nature of executive pay design and underscores the importance of accounting for overlapping incentive mechanisms when analyzing earnings management behavior.

5. Sensitivity Analysis

5.1 Industry Fixed Effect

We incorporate firm fixed effect in our main regression to account for unobservable, time-invariant characteristics specific to each firm. This approach isolates the impact of variables that vary within each firm over time, which can give a clearer picture of relationships for changes in a firm's behavior. Also, fixed effects help control for factors that are unobserved but stable over time, minimizing bias that could result from omitted variables. However, the firm fixed effect removes all between-firm variation, so it becomes impossible to study how firm-level differences influence the outcome. This limits the analysis to within-firm comparisons only. To examine whether our results remain held across different firms, we re-estimate Equation (1) using SIC 2 digits industry fixed effect. Table 10 reports our results.

[Insert Table 10 Here]

Consistent with our main analysis, both *Diff_Thrs_PreE_Low* (coefficient = 1.756, p-value < 0.01) and *Diff_Max_PreE_Mid* (coefficient = -1.014, p-value < 0.01) remain significant when we use industry fixed effect. Therefore, firm-years in the Low Portfolio increase their 4th quarter tax expense to a greater extent when the distance between pre-managed earnings and bonus thresholds are larger. Also, firm-years in the Mid Portfolio decrease the 4th quarter ETR more if the distance between pre-managed earnings and bonus maximums are larger. Nonetheless, we fail to document a significant association between *Diff_PreE_Max_Upp* and *ETR4_ETR3*. Our results hence do not support the argument that firm-years in the Upp Portfolio will manipulate earnings downward to create a cookie jar (coefficient = 0.042, p-value > 0.1).

5.2 Subgroup Analysis

The above pooled analyses take advantage of all available information in our sample. However, the LCEM setting allows us to examine the within-portfolio variations unlike prior research. To provide additional evidence regarding how the firms manipulate tax expenses according to the distance between pre-managed earnings and bonus goals, we re-estimate

Equation (1) in each portfolio and present the results in Table 11.

[Insert Table 11 Here]

In line with our main analysis, we document a significant positive association between *Diff_Thrs_PreE_Low* and *ETR4_ETR3* (coefficient = 1.360, p-value < 0.05). A one standard deviation increases in *Diff_Thrs_PreE_Low* for firm-years in the Low Portfolio is associated with about 2.6% increase in the last quarter ETR, which will lead to an on-average 0.15% reduction in the annual return on assets (ROA) within the Low Portfolio sample. This result is in line with the prediction that firms in the Low Portfolio have incentives to reduce earnings in the current period, increasing the probability of achieving future bonus thresholds. We also find a significant negative relationship between *Diff_Max_PreE_Mid* and *ETR4_ETR3* (coefficient = -1.044, p-value < 0.01). A one standard deviation increases in *Diff_Max_PreE_Mid* for firm-years in Mid portfolio is associated with about 1.4% decrease in the 4th quarter ETR, which translates to about 0.12% increase in the annual ROA for the average firm in the Mid Portfolio. In our subgroup analysis, the coefficient of *Diff_PreE_Max_Upp* remains insignificant (coefficient = -0.017, p-value > 0.1), Therefore, this additional analysis does not provide evidence for the hypothesis that managers engage in income-decreasing earnings management when the pre-managed earnings are above bonus maximums.

5.3 Use Pre-managed Earnings to Classify Low and Mid Portfolio

In our main regression, we classify the Low and Mid Portfolios using actual earnings. This allows us to include those below the threshold that have the ability to manage earnings upwards (Holthausen et al., 1995). However, we note that doing so puts firm-years we know are managing earnings upward in the Mid Portfolio possibly inflating results. To address this, we run the tests with no firms with pre-managed earnings below the threshold in the Mid Portfolio. If we still find results for the Mid Portfolio, then using actual earnings to determine those below threshold who can manage earnings up is not driving our results. We create two additional indicator variables. *Mid_R* equals to 1 if pre-managed earnings are above bonus threshold and below bonus maximum. Similarly, *Low_R* equals to 1 if pre-managed earnings are below bonus threshold. We re-estimate results in the Mid Portfolio using the alternative classification and our results remain consistent (Table 12). Therefore, using actual earnings to classify the Low and Mid Portfolios does not bias our results.

5.4 Construct Validity – Tax Misstatement and Tax Accrual Quality

One critical element of our research design is that the third quarter ETR serves as an estimate for the annual ETR, thereby reflecting the pre-managed ETR. Previous studies (Dhaliwal et al., 2004; Christensen et al., 2015; Beardsley et al., 2021) have employed this methodology and interpret the change in the last-quarter ETR as indications of earnings management. Nevertheless, quarterly ETRs do not necessarily represent estimates of the annual ETR if there are tax regulation changes or the company suddenly becomes more profitable (Bratten, Gleason, Larocque and Mills, 2017). To ensure that the systematic change in the last-quarter ETR indicates earnings management, we examine whether LCEM will be more pronounced when firms have lower tax accounting quality.

We use two proxies to capture tax accounting quality. First, we focus on tax-related misstatement because misstatements are broadly used indicators of poor accounting quality and controls. Firms misstating their financial reporting unambiguously reflect accounting measurement problems (Dechow et al., 2010). Using tax-related misstatements as an indicator of tax expense manipulation fits the LCEM setting, thus reducing the Type I error. Second, we follow Choudhary et al. (2016) to measure the tax accrual quality. Tax accrual quality captures variation in the extent to which the income tax accrual maps into income tax-related cash flows. Lower tax accrual quality suggests a mismatch between tax-related accrual and cash flows, which indicates more unjustified accruals. We therefore estimate the following regression model in each portfolio separately:

$$ETR4\_ETR3_{it} = \beta_0 + \beta_1 Diff\_BonusGoal\_PreE_{it} + \beta_2 TaxMiss(LTAQ)_{it} + \beta_3 Diff\_BonusGoal\_PreE_{it} * TaxMis(LTAQ)_{it} + Control_{it} + Year\ Fixed_{it} + Industry\ Fixed_{it} + \varepsilon_{it} \quad (2)$$

where *Diff_BonusGoal_PreE* is either *Diff_Thrs_PreE_Low, Diff_Max_PreE_Mid* or *Diff_PreE_Max_Upp* contingent on relevant portfolios. *TaxMiss* is an indicator variable which equals to 1 if a firm misstated the tax account in certain fiscal year. *LTAQ* equals to 1 if the tax accrual quality is below sample median. Table 13 presents the results of tax-related misstatement.

[Insert Table 13 Here]

As anticipated, we find that the interaction terms, *Diff_Thrs_PreE_Low*TaxMiss,* in column (1) is positively significant (coefficient = 3.181, p-value < 0.05), indicating that firm-years with tax-related misstatement in the Low Portfolio report more tax expenses in the last quarter. Also, *Diff_Max_PreE_Mid*TaxMiss* in column (2) is negative and significant (coefficient = -5.551, p-value < 0.05), consistent with the theory that firm-years in the Mid Portfolio have incentives to manipulate tax expenses downward and earnings upward. This suggests firms that report tax related misstatement are more likely to exhibit LCEM. Our results support the argument that the systematic change in the 4th quarter ETR is indicative of earnings management. Also, for firm-years in the Upp Portfolio, the interaction term *Diff_PreE_Max_Upp*TaxMiss* is not significant. We hence document no evidence that observations in the Upp Portfolio engage in earnings management regardless of tax misstatements.

Table 14 reports the results of tax accrual quality. We find that *Diff_Max_PreE_Mid*LTAQ* is significantly negative (coefficient = -1.348, p-value < 0.1), suggesting that firm-years in the Mid Portfolio have incentives to manipulate earnings upward. While the interaction term in Low Portfolio is not significant, the result is qualitatively consistent with the misstatement analysis. Notably, the joint effect for the Low (Mid) Portfolio is significant at the 10% (1%) level, indicating that firms engaged in LCEM exhibit lower tax accrual quality. In contrast, the joint effect for the Upp Portfolio remains insignificant, reinforcing the prior finding that there is no evidence of earnings management in the Upp Portfolio.

[Insert Table 14 Here]

6. Conclusion

In this study, we leverage the setting of last chance earnings management (Dhaliwal et al., 2004) to re-examine and refine how CEO bonus contracts can influence earnings management behavior. Although some previous studies find that the level of discretionary accruals is relatively higher when the manager anticipates earnings to be within the "incentive zone" (Healy 1985; Guidry et al. 1999), there is no convincing evidence regarding the earnings

management in different incentive portfolios because traditional settings eliminate the within-portfolio variations of earnings management incentives. Therefore, our novel approach improves the empirical test by offering an estimate of "pre-managed" earnings. This special setting allows us to observe the distance between pre-managed earnings and each of the performance goals in the bonus contracts.

Utilizing the difference between the 4th quarter and the 3rd quarter ETR as a proxy of earnings manipulation, we first re-examine how CEO bonus contracts can influence earnings management behavior based on Healy's (1985) model. We find evidence consistent with CEOs manipulating earnings upwards to increase after-tax income when their performances are within the incentive zone. More importantly, though previous research (Gaver et al. 1995; Holthausen et al. 1995) documented mix results on earnings management behavior when managers are below the lower bound of their contracts. Our research provides robust evidence that managers increase the 4th quarter tax expense to reduce after-tax income when they cannot meet bonus threshold, consistent with the "big bath" prediction in Healy (1985). However, we fail to document evidence that managers manipulate earnings downwards if they are at the upper bound of their bonus contracts. Our results remain robust under different specifications, including industry fixed effects, subgroup analysis, and alternative classification. To validate our construct, we find that the LCEM is more pronounced among firms with low tax accounting quality, mitigating the concern that the systematic change in the last-quarter ETR reflects unexpected economic change.

We then integrate insights from recent studies on executive compensation and apply them within Healy's (1985) incentive-zone framework. We refine the empirical implications of Healy's predictions to modern contracting environments by emphasizing two features of contemporary compensation design: nonlinear payout structures and overlapping managerial incentives.

First, recent research highlights the prevalence of nonlinear payout structures in modern bonus plans, characterized by sharp payout discontinuities at performance thresholds (Matejka and Ray, 2017; Hu, Li, and Ray, 2021). Incorporating this insight helps reconcile prior mixed evidence by showing that income-increasing earnings management within the incentive zone is concentrated among firms with discrete payout structures. In particular, managers whose

pre-managed earnings fall just below the bonus threshold face especially strong incentives to engage in last-chance earnings management, while these incentives attenuate sharply once the threshold is reached (Murphy and Jensen, 2024).

Second, recent work emphasizes that managers face multiple, overlapping incentives. Integrating this perspective clarifies why earnings management behavior varies across performance regions. We show that managers jointly consider bonus incentives and external market pressure when making reporting decisions, consistent with evidence that analysts' forecasts interact with compensation goals (Armstrong et al., 2024). Moreover, the relative importance of incentive mechanisms differs across regions: bonus incentives play a central role below the bonus maximum, whereas equity-based incentives become more salient once earnings exceed bonus caps (Healy, 1985; Armstrong, Larcker, Ormazabal, and Taylor, 2013). Taken together, incorporating these empirical insights extends Healy's (1985) predictions to contemporary compensation settings and helps reconcile inconsistencies in prior studies without altering the underlying theoretical framework.

Collectively, this study contributes to the executive compensation and earnings management literature by providing cleaner identification of bonus-induced earnings management through tax-related LCEM, helping to clarify ambiguities in prior accrual-based research and reconcile mixed evidence from Healy (1985) and subsequent studies. We show that earnings management responses are driven by local incentive gradients created by nonlinear payout structures, with behavior concentrated around bonus thresholds rather than the overall shape of bonus plans. We further document that incentive salience varies across performance regions: bonus incentives dominate earnings management below the bonus maximum, while equity incentives become more salient once earnings exceed bonus caps, and that bonus incentives and analyst forecasts jointly shape reporting behavior when benchmarks are misaligned. Together, these findings highlight how modern bonus design can generate agency conflicts when managerial focus shifts toward meeting short-term performance benchmarks rather than maximizing long-term firm value, offering important implications for boards and regulators seeking to design compensation contracts that promote accountability and align managerial incentives with shareholder interests.

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Table 1
Comparison between prior research with this study

Article	Measure of Earnings Management	Sample	Results
Healy (1985)	Total Accruals	Companies listed on the 1980 Fortune Directory of the 250 largest U.S. industrial corporations from 1930 to 1980	Upp accruals < Mid accruals Low accruals < Mid accruals
Holthausen, Larcker and Sloan (1995)	Discretionary Accruals	Data from consulting firms (443 firm-year observations between 1982 and 1990)	Upp accruals < Mid accruals Low and Mid accruals not significantly different
Gaver, Gaver, and Austin (1995)	Discretionary Accruals	Bonus plan observations for 102 firms and 837 firm-years between 1980 and 1990	Upp and Mid accruals not tested Low accruals > Mid accruals
Guidry, Leone and Rock (1999)	Discretionary Accruals	179 business unit-years from management and financial reporting database of a large conglomerate	Upp accruals < Mid accruals Low accruals < Mid accruals
Ma and Olson	Last Chance Earnings Management (LCEM): the change in earnings due to changes in ETR from the 3rd to the 4th quarter	948 firm-years from Execucomp with GAAP after-tax incentives	Low: income-decreasing LCEM Mid: income-increasing LCEM Upp: no LCEM detected

Table 2

Sample Selection

Sample observations	# Firm-Years
Execucomp CEO Compensation Data from 2010 - 2017	17,192
Exclude observations with missing quarterly tax data and negative ETR in Compustat	(3,608)
Exclude observations without shares used to calculate EPS (CSHPRI) in Compustat	(2,837)
Require non-missing control variables in Compustat and IBES	(2,893)
Require non-missing control variables in ISS Director	(1,241)
Exclude firms without bonus thresholds, targets or maximums	(2,212)
Require firms using GAAP EPS or GAAP Earnings	(3,424)
Exclude observations with period end dates after December 31, 2017	(5)
Exclude observations with a studentized residual larger than 2	(24)
Regression Sample	**948**

This table shows the sample selection process. The sample period spans from 2010 - 2017.

Table 3: Descriptive Analysis

Panel A: Summary Statistics

Variable	N	Mean	Median	SD	p25	p75
ETR4_ETR3	948	-0.006	-0.002	0.116	-0.015	0.006
Diff_Thrs_PreE_Low	948	0.006	0.000	0.014	0.000	0.005
Diff_Max_PreE_Mid	948	0.006	0.000	0.011	0.000	0.006
Diff_PreE_Max_Upp	948	0.008	0.000	0.024	0.000	0.000
ETR3	948	0.299	0.314	0.094	0.252	0.357
Total Assets	948	15435.00	6543.00	31378.00	3121.00	15451.00
Lev	948	0.596	0.601	0.159	0.491	0.693
Accrual	948	-0.633	-0.422	0.873	-0.860	-0.183
Tax_Owed	948	0.031	0.000	0.075	0.000	0.049
Induced_ΔETR	948	0.001	0.000	0.115	-0.008	0.005
CEODelta	948	759.500	385.900	1327.000	139.000	789.500
CEOVega	948	198.700	143.600	226.100	10.360	290.600
Boardsize	948	10.160	10.000	1.825	9.000	11.000
Indp	948	0.870	0.889	0.063	0.857	0.909
CEOTenure	948	6.749	5.000	6.182	2.000	9.000
CEOChair	948	0.450	0.000	0.498	0.000	1.000
TaxMiss	948	0.025	0.000	0.157	0.000	0.000
TAQ	948	-0.011	-0.008	0.010	-0.014	-0.004
PreMeetAF	948	0.467	0.000	0.499	0.000	1.000
Upp	948	0.245	0.000	0.430	0.000	0.000
Mid	948	0.410	0.000	0.492	0.000	1.000
Low	948	0.345	0.000	0.476	0.000	1.000
Diff_Thrs_PreE_Mid1	389	0.000	0.000	0.002	0.000	0.000
Diff_Tar_PreE_Mid2	389	0.002	0.000	0.005	0.000	0.003
Diff_Max_PreE_Mid3	389	0.005	0.000	0.012	0.000	0.004
Mid_R	948	0.409	0.000	0.492	0.000	1.000
Low_R	948	0.346	0.000	0.476	0.000	1.000

Panel B: Univariate Analysis of *ETR4_ETR3* in Different Portfolios

	Overall	Low = 1	Mid = 1	Upp = 1
#Obs	948	327	389	232
Mean	-0.006	0.012***	-0.024	-0.002***

Panel A reports the summary statistics on an annual basis of the variables used in our analysis. All variables are defined in the Appendix. Total assets are reported in raw number (in millions). Panel B reports that univariate analysis of *ETR4_ETR3* in different portfolios of firm-year observations formed by position relative to minimum and maximum bonus goals. ***, **, * indicate significance levels different from the Mid Portfolio at the 1%, 5%, and 10% levels (two-tailed), respectively using t-tests of differences in means.

Table 4: CEO Bonus Incentive Zone and Last Chance Earnings Management

VARIABLES	(1) ETR4_ETR3	(2) ETR4_ETR3	(3) ETR4_ETR3	(4) ETR4_ETR3
Diff_Thrs_PreE_Low	2.602***			2.534***
	(3.25)			(3.23)
Diff_Max_PreE_Mid		-1.511***		-1.293**
		(-2.75)		(-2.35)
Diff_PreE_Max_Upp			0.025	0.009
			(0.11)	(0.05)
Upp	0.026***	0.011	0.028***	0.010
	(3.02)	(1.16)	(3.07)	(1.07)
Low	0.003	0.018	0.038***	-0.014
	(0.19)	(1.54)	(3.38)	(-0.99)
Size	-0.025	-0.027	-0.030	-0.023
	(-0.74)	(-0.78)	(-0.86)	(-0.67)
Lev	-0.055	-0.011	-0.026	-0.042
	(-0.76)	(-0.14)	(-0.33)	(-0.57)
ETR3	-0.295**	-0.239*	-0.240*	-0.292**
	(-2.28)	(-1.84)	(-1.84)	(-2.28)
Accrual	-0.009	-0.020	-0.020	-0.010
	(-0.60)	(-1.24)	(-1.22)	(-0.63)
Tax_Owed	-0.078	-0.021	-0.008	-0.088
	(-0.58)	(-0.15)	(-0.05)	(-0.66)
Induced_ΔETR	-0.312**	-0.291*	-0.290*	-0.312**
	(-2.08)	(-1.91)	(-1.90)	(-2.09)
CEODelta	-0.094***	-0.104***	-0.109***	-0.091***
	(-2.77)	(-2.85)	(-2.89)	(-2.73)
CEOVega	0.013*	0.015*	0.015*	0.013
	(1.69)	(1.78)	(1.81)	(1.65)
CEOChair	-0.028*	-0.029*	-0.030*	-0.028*
	(-1.71)	(-1.69)	(-1.68)	(-1.71)
Boardsize	-0.001	-0.002	-0.001	-0.001
	(-0.26)	(-0.37)	(-0.25)	(-0.36)
Indp	-0.061	-0.027	-0.027	-0.061
	(-0.42)	(-0.17)	(-0.17)	(-0.42)
CEOTenure	0.002	0.003*	0.003*	0.002
	(1.61)	(1.90)	(1.88)	(1.63)
Constant	0.375	0.327	0.336	0.367
	(1.34)	(1.16)	(1.18)	(1.32)
Observations	948	948	948	948
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.365	0.330	0.321	0.370

This table reports the regression results from Equation (1). The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at firm level; t-statistics are reported below the coefficients. *,**,*** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 5: Discrete and Continuous Incentives

Panel A: Distribution of Initial Payout Ratio

	Discrete = 0	Discrete = 1			Mean Threshold Payout
Initial Payout Ratio	0	0 - 0.2	0.21 - 0.49	≥0.5	0.287
#obs	258	61	217	357	

Panel B: Subsample Regression

	(1)	(2)
	Discrete = 1	Discrete = 0
VARIABLES	ETR4_ETR3	ETR4_ETR3
Diff_Thrs_PreE_Low	1.903**	3.277***
	(2.00)	(3.07)
Diff_Max_PreE_Mid	-2.497***	0.646
	(-3.18)	(0.76)
Diff_PreE_Max_Upp	-0.133	0.388
	(-0.50)	(0.72)
Upp	-0.006	0.022
	(-0.52)	(1.40)
Low	-0.014	-0.034
	(-0.80)	(-1.17)
Observations	635	258
Constant	Included	Included
Control Variables	Included	Included
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R-Squared	0.368	0.241

This table reports the regression results from Equation (1). The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at firm level; t-statistics are reported below the coefficients. *, **, *** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 6: Bonus Incentive and LCEM within the Mid Portfolio

VARIABLES	(1) ETR4_ETR3	(2) ETR4_ETR3	(3) ETR4_ETR3	(4) ETR4_ETR3
Diff_Thrs_PreE_Mid1	-21.299**			-21.874**
	(-2.35)			(-2.39)
Diff_Tar_PreE_Mid2		-1.955*		-2.617**
		(-1.77)		(-2.00)
Diff_Max_PreE_Mid3			-0.630	-0.642
			(-1.26)	(-1.20)
Mid1	-0.035	-0.111**	-0.115**	-0.034
	(-1.04)	(-2.37)	(-2.46)	(-1.06)
Mid2	-0.001	0.007	-0.008	0.006
	(-0.11)	(0.56)	(-0.69)	(0.47)

F Test of Column (4)	*Diff_Thrs_PreE_Mid = Diff_Tar_PreE_Mid*		*Diff_Tar_PreE_Mid = Diff_Max_PreE_Mid*	
F-statistic	4.58**		2.01	
p-value	0.034		0.158	

Observations	389	389	389	389
Constant	Included	Included	Included	Included
Control Variables	Included	Included	Included	Included
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.642	0.604	0.603	0.649

This table reports the regression results from Equation (3). The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in the Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at the firm level; t-statistics are reported below the coefficients. *, **, *** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 7: Analyst Forecasts, Bonus Incentive and LCEM - Univariate Analysis

	Portfolio		
	Low (N=327)	Mid (N=389)	Upp (N=232)
Pre-managed Earnings >= Analyst Forecast	14.1%	52.4%	83.2%
	(46)	(204)	(193)
Actual Earnings >= Analyst Forecast	12.2%	59.1%	81.9%
	(40)	(230)	(191)
Diff.	-1.80%	6.70%***	-1.30%

This table compares the proportion of firms whose pre-managed earnings exceed the analyst consensus forecast to the proportion of firms whose actual earnings surpass these forecasts. The number of observations is provided below the ratios. *, **, *** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 8: Analyst Forecasts, Bonus Incentive and LCEM - Multivariate Analysis

VARIABLES	(1) Low = 1 ETR4_ETR3	(2) Mid = 1 ETR4_ETR3	(3) Upp = 1 ETR4_ETR3
Diff_Thrs_PreE_Low	2.033**		
	(2.51)		
Diff_Thrs_PreE_Low*PreMeetAF	-2.395**		
	(-2.07)		
Diff_Max_PreE_Mid		-0.987**	
		(-1.99)	
Diff_Max_PreE_Mid*PreMeetAF		0.372	
		(0.61)	
Diff_PreE_Max_Upp			-0.149
			(-0.92)
Diff_PreE_Max_Upp*PreMeetAF			0.144
			(0.81)
PreMeetAF	0.108***	0.023*	-0.013
	(3.26)	(1.83)	(-1.09)
F Test of	Diff_Thrs_PreE_Low*PreMeetAF + Diff_Thrs_PreE_Low = 0	Diff_Max_PreE_Mid*PreMeetAF + Diff_Max_PreE_Mid = 0	Diff_PreE_Max_Upp*PreMeetAF + Diff_PreE_Max_Upp=0
Coefficient	-0.362	-0.615	-0.005
F-statistic	0.21	2.49	0.00
Observations	327	389	232
Constant	Included	Included	Included
Control Variables	Included	Included	Included
SIC 2-Digit FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R-Squared	0.433	0.225	0.101

This table reports the impact of analyst forecasts on LCEM. The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in the Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at the firm level; t-statistics are reported below the coefficients. *, **, *** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 9: Bonus Incentive, Equity Incentive and LCEM - Multivariate Analysis

VARIABLES	(1) Low = 1 ETR4_ETR3	(2) Mid = 1 ETR4_ETR3	(3) Upp = 1 ETR4_ETR3
Diff_Thrs_PreE_Low	1.439**		
	(2.49)		
Diff_Thrs_PreE_Low*CEODelta	2.496		
	(1.13)		
Diff_Max_PreE_Mid		-1.200***	
		(-2.93)	
Diff_Max_PreE_Mid*CEODelta		-2.304	
		(-1.03)	
Diff_PreE_Max_Upp			-0.068
			(-0.53)
Diff_PreE_Max_Upp*CEODelta			-0.759
			(-0.84)
CEODelta	0.008	0.000	-0.040*
	(0.13)	(0.02)	(-1.80)
Observations	327	389	232
Constant	Included	Included	Included
Control Variables	Included	Included	Included
SIC 2-Digit FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R-Squared	0.410	0.210	0.110

This table reports the impact of CEO Delta on LCEM. The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at firm level; t-statistics are reported below the coefficients. *,**,*** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

	(1) Low = 1 ETR4_ETR3	(2) Mid = 1 ETR4_ETR3	(3) Upp = 1 ETR4_ETR3
Diff_Thrs_PreE_Low	1.439**		

Table 10: CEO Bonus Incentive and LCEM - Industry Fixed Effect

	(1)	(2)	(3)	(4)
VARIABLES	ETR4_ETR3	ETR4_ETR3	ETR4_ETR3	ETR4_ETR3
Diff_Thrs_PreE_Low	1.756***			1.742***
	(2.86)			(2.85)
Diff_Max_PreE_Mid		-1.014***		-0.966***
		(-2.75)		(-2.62)
Diff_PreE_Max_Upp			0.042	0.042
			(0.36)	(0.36)
Upp	0.027***	0.014**	0.027***	0.013*
	(4.19)	(2.08)	(3.49)	(1.71)
Low	0.004	0.017*	0.031***	-0.009
	(0.36)	(1.95)	(3.53)	(-0.78)
Size	-0.008	-0.009*	-0.010*	-0.007
	(-1.43)	(-1.74)	(-1.81)	(-1.35)
Lev	-0.030	-0.035	-0.025	-0.040
	(-1.00)	(-1.10)	(-0.78)	(-1.32)
ETR3	-0.115	-0.099	-0.096	-0.118
	(-1.30)	(-1.13)	(-1.10)	(-1.33)
Accrual	-0.003	-0.009	-0.009	-0.003
	(-0.21)	(-0.63)	(-0.60)	(-0.25)
Tax_Owed	-0.061	-0.020	-0.016	-0.063
	(-0.56)	(-0.18)	(-0.15)	(-0.58)
Induced_ΔETR	-0.403***	-0.390**	-0.389**	-0.404***
	(-2.69)	(-2.58)	(-2.57)	(-2.70)
CEODelta	-0.007	-0.009	-0.007	-0.008
	(-0.38)	(-0.44)	(-0.37)	(-0.41)
CEOVega	0.001	0.003	0.002	0.001
	(0.26)	(0.67)	(0.54)	(0.29)
CEOChair	-0.016*	-0.020**	-0.020**	-0.016*
	(-1.68)	(-2.02)	(-2.04)	(-1.66)
Boardsize	0.001	0.001	0.001	0.000
	(0.23)	(0.29)	(0.40)	(0.12)
Indp	0.016	0.007	0.008	0.014
	(0.27)	(0.12)	(0.14)	(0.22)
CEOTenure	0.001	0.001	0.001	0.001
	(0.88)	(1.10)	(1.04)	(0.96)
Constant	0.077	0.103	0.083	0.098
	(1.08)	(1.47)	(1.20)	(1.36)
Observations	948	948	948	948
SIC 2-Digit FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.205	0.182	0.177	0.208

This table reports the regression results from Equation (1) using industry fixed effect. The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at firm level; t-statistics are reported below the coefficients. *,**,*** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 11: CEO Bonus Incentive and LCEM - Subgroup Analysis

VARIABLES	(1) Low = 1 ETR4_ETR3	(2) Mid = 1 ETR4_ETR3	(3) Upp = 1 ETR4_ETR3
Diff_Thrs_PreE_Low	1.360**		
	(2.12)		
Diff_Max_PreE_Mid		-1.044***	
		(-2.98)	
Diff_PreE_Max_Upp			-0.017
			(-0.19)
Size	-0.019	-0.009	0.003
	(-1.56)	(-1.35)	(0.66)
Lev	-0.139**	-0.014	0.039
	(-2.15)	(-0.41)	(1.43)
ETR3	0.124	-0.029	-0.089
	(0.78)	(-0.23)	(-1.62)
Accrual	-0.009	0.005	0.001
	(-0.46)	(0.43)	(0.21)
Tax_Owed	-0.096	-0.086	0.101**
	(-0.65)	(-0.97)	(2.23)
Induced_ΔETR	-0.538***	-0.309	0.138
	(-2.99)	(-0.92)	(0.94)
CEODelta	0.067	-0.029	-0.045*
	(1.16)	(-1.09)	(-1.82)
CEOVega	0.001	0.008	-0.001
	(0.09)	(1.23)	(-0.15)
CEOChair	-0.041**	-0.003	0.005
	(-2.18)	(-0.21)	(0.89)
Boardsize	0.002	0.003	0.001
	(0.33)	(1.06)	(0.34)
Indp	0.243	-0.090	-0.102
	(1.20)	(-1.30)	(-1.62)
CEOTenure	0.001	0.001	0.001*
	(0.64)	(0.58)	(1.73)
Constant	-0.033	0.129	0.035
	(-0.19)	(1.22)	(0.65)
Observations	327	389	232
SIC 2-Digit FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R-Squared	0.407	0.208	0.106

This table reports the subsample analyses. The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at firm level; t-statistics are reported below the coefficients. *,**,*** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 12: Use Pre-Managed Earnings to Differentiate the Low and Mid Portfolios

VARIABLES	(1) Full Sample ETR4_ETR3	(2) Mid_R = 1 ETR4_ETR3
Diff_Max_PreE_MidR	-1.122**	-0.859**
	(-1.98)	(-2.01)
Upp	0.002	
	(0.21)	
Low_R	-0.024*	
	(-1.70)	
Observations	948	388
Constant	Included	Included
Control Variables	Included	Included
Firm FE	Yes	No
SIC 2-Digit FE	No	Yes
Year FE	Yes	Yes
Adjusted R-Squared	0.311	0.093

This table reports the regression results using pre-managed earnings to classify the Low and Mid Portfolios. The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in the Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at the firm level; t-statistics are reported below the coefficients. *, **, *** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 13: Tax Misstatement, Bonus Incentive and LCEM

VARIABLES	(1) Low = 1 ETR4_ETR3	(2) Mid = 1 ETR4_ETR3	(3) Upp = 1 ETR4_ETR3
Diff_Thrs_PreE_Low*TaxMiss	3.181**		
	(2.40)		
Diff_Max_PreE_Mid*TaxMiss		-5.511**	
		(-2.45)	
Diff_PreE_Max_Upp*TaxMiss			0.630
			(0.90)
Diff_Thrs_PreE_Low	1.329**		
	(2.06)		
Diff_Max_PreE_Mid		-0.959***	
		(-2.80)	
Diff_PreE_Max_Upp			-0.025
			(-0.27)
TaxMiss	-0.005	0.091**	-0.031
	(-0.13)	(2.33)	(-1.30)

F Test of	Diff_Thrs_PreE_Low*TaxMiss + Diff_Thrs_PreE_Low = 0	Diff_Max_PreE_Mid*TaxMiss + Diff_Max_PreE_Mid = 0	Diff_PreE_Max_Upp*TaxMiss + Diff_PreE_Max_Upp=0
Coefficient	4.510***	-6.470***	0.606
F-statistic	12.53	7.97	0.76
Observations	327	389	232
Constant	Included	Included	Included
Control Variables	Included	Included	Included
SIC 2-Digit FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R-Squared	0.40	0.21	0.10

This table reports the regression results from Equation (2). The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in the Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at the firm level; t-statistics are reported below the coefficients. *, **, *** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Table 14: Tax Accrual, Bonus Incentive and Last Chance Earnings Management

VARIABLES	(1) Low = 1 ETR4_ETR3	(2) Mid = 1 ETR4_ETR3	(3) Upp = 1 ETR4_ETR3
Diff_Thrs_PreE_Low*LTAQ	0.687		
	(0.56)		
Diff_Max_PreE_Mid*LTAQ		-1.348*	
		(-1.89)	
Diff_PreE_Max_Upp*LTAQ			0.182
			(1.00)
Diff_Thrs_PreE_Low	0.944		
	(1.21)		
Diff_Max_PreE_Mid		-0.481	
		(-1.40)	
Diff_PreE_Max_Upp			-0.104
			(-0.86)
LTAQ	-0.017	-0.005	-0.006
	(-0.78)	(-0.34)	(-0.53)

F Test of	Diff_Thrs_PreE_Low*LTAQ + Diff_Thrs_PreE_Low = 0	Diff_Max_PreE_Mid*LTAQ + Diff_Max_PreE_Mid = 0	Diff_PreE_Max_Upp*LTAQ + Diff_PreE_Max_Upp=0
Coefficient	1.631*	-1.829***	0.078
F-statistic	3.03	8.23	0.31
Observations	327	389	232
Constant	Included	Included	Included
Control Variables	Included	Included	Included
SIC 2-Digit FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adjusted R-Squared	0.405	0.230	0.102

This table reports the regression results from Equation (2). The Dependent variable is the difference between the 4th quarter and the 3rd quarter ETR. All variables are defined in the Appendix, and the sample spans the period 2010-2017. Standard errors are clustered at the firm level; t-statistics are reported below the coefficients. *, **, *** indicate significance at the two-tailed 10%, 5% and 1% levels, respectively.

Appendix: Variable Definition

Variable	Definition
Accrual	Total accruals scaled by pre-tax book income, as specified by Dhaliwal et al. (2004).
Boardsize	The number of board directors
CEOChair	An indicator variable which equals to 1 if firm's CEO is the board chair, otherwise 0
CEODelta	The sensitivity of the CEO's equity portfolio value to changes in the firm's stock price, measured following Core and Guay (2002). We use the standardized Delta in our regression analyses.
CEOTenure	The number of years the CEO has been in office
CEOVega	The sensitivity of the CEO's equity portfolio value to changes in stock return volatility, measured following (Core and Guay 2002). We use the standardized Vega in our regression analyses.
Control	An array of control variables including *Accrual*, *Boardsize*, *CEOChair*, *CEODelta*, *CEOTenure*, *CEOVega*, *ETR3*, *Indp*, *Induced_ΔETR*, *Lev*, *Low*, *Size*, *Tax_Owed*, and *Upp*.
Diff_BonusGoal_PreE	The variable of interest in Equation 2. It represents *Diff_Thrs_PreE_Low* when examining the Low Portfolio, *Diff_Max_PreE_Mid* when examining the Mid Portfolio, or *Diff_PreE_Max_Upp* when examining the Upp Portfolio.
Diff_Max_PreE_Mid	The difference between incentive maximum and pre-managed earnings, scaled by total assets if a firm-year is classified into the Mid Portfolio, 0 otherwise. We measure pre-managed earnings as the pretax income times 1 minus ETR3. If firms use EPS in the cash incentive plan, we multiply EPS target by common shares used to calculate earnings target.
Diff_Max_PreE_Mid3	The difference between incentive maximum and pre-managed earnings, scaled by total asset if the pre-managed earnings are lower than incentive maximum but higher than target, 0 otherwise. We measure pre-managed earnings as the pretax income times 1 minus ETR3. If firms use EPS in the cash incentive plan, we multiply EPS target by common shares used to calculate bonus maximum. This measure only applies to firms in the Mid Portfolio.
Diff_Max_PreE_MidR	The difference between incentive maximum and pre-managed earnings, scaled by total assets if a firm-year is classified into the Mid_R Portfolio, 0 otherwise. We measure pre-managed earnings as the pretax income times 1 minus ETR3. If firms use EPS in the cash incentive plan, we multiply EPS target by common shares used to calculate earnings target.
Diff_PreE_Max_Upp	The difference between pre-managed earnings and incentive maximum, scaled by total assets if a firm-year is classified into the Upp Portfolio, 0 otherwise. We measure pre-managed earnings as the pretax income times 1 minus ETR3. If firms use EPS in the cash incentive plan, we multiply EPS maximum by common shares used to calculate earnings maximum.
Diff_Tar_PreE_Mid2	The difference between incentive target and pre-managed earnings, scaled by total asset if the pre-managed earnings are lower than incentive target but higher than threshold, 0 otherwise. We measure pre-managed earnings as the pretax income times 1 minus ETR3. If firms use EPS in the cash incentive plan, we multiply EPS target by common shares used to calculate earnings target. This measure only applies to firms in the Mid Portfolio.

Diff_Thrs_PreE_Low	The difference between incentive threshold and pre-managed earnings, scaled by total assets if a firm-year is classified into the Low Portfolio, 0 otherwise. We measure pre-managed earnings as the pretax income times 1 minus ETR3. If firms use EPS in the cash incentive plan, we multiply EPS threshold by common shares used to calculate earnings threshold.
Diff_Thrs_PreE_Mid1	The difference between incentive threshold and pre-managed earnings, scaled by total asset if the pre-managed earnings are lower than incentive threshold, 0 otherwise. We measure pre-managed earnings as the pretax income times 1 minus ETR3. If firms use EPS in the cash incentive plan, we multiply EPS threshold by common shares used to calculate earnings threshold. This measure only applies to firms in the Mid Portfolio.
Discrete	An indicator variable which equals 1 if a bonus plan has a non-zero initial payout ratio at bonus threshold.
ETR3	The firm's ETR in the 3rd quarter, measured as the sum of income taxes from the 1st through the 3rd quarter, divided by the sum of pretax income from the 1st through the 3rd quarter.
ETR4_ETR3	Change in the firm's ETR from 3rd to 4th quarter, measured as the 4th quarter ETR minus the 3rd quarter ETR.
Indp	The ratio of independent directors to the number of board directors
Induced_ΔETR	The change in total tax expense due to the difference between actual earnings per share and the consensus forecast divided by pretax income. Calculated as the statutory tax rate (0.35 for our sample) minus ETR3 times the difference between actual earnings per share and the consensus analyst forecast times common shares used to calculate EPS divided by 1 minus the statutory tax rate (0.35) all divided by pretax income.
Lev	Total liability scaled by total asset at the end of the fiscal year
Low	An indicator variable which equals to 1 if a firm-year is classified into the Low Portfolio, otherwise 0.
Low_R	An indicator variable which equals 1 if the pre-managed earnings of a firm miss the bonus threshold.
LTAQ	An indicator variable which equals to 1 if a firm-year's tax accrual quality is below sample median, otherwise 0.
Mid	An indicator variable which equals to 1 if a firm-year is classified into the Mid Portfolio, otherwise 0.
Mid_R	An indicator variable which equals 1 if the pre-managed earnings of a firm meet the bonus threshold but miss the bonus maximum.
PreMeetAF	An indicator variable which equals 1 if the pre-managed earnings of a firm meet the analyst consensus forecast.
Size	Natural log of total assets at the end of the fiscal year.
Tax_Owed	Taxes payable minus tax refund receivable divided by pretax income.
TAQ	Following Choudhary et al. (2016), tax accrual quality based on the mapping of t-1, t, and t+1 tax cash flows to tax accruals.
TaxMiss	An indicator variable which equals to 1 when a firm misstated its financial statements related to tax account in a given year. We define tax-related misstatements per Audit Analytics code '|18|'.
Upp	An indicator variable which equals to 1 if a firm-year is classified into the Upp Portfolio, otherwise 0.