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ABSTRACT: Our study explores how managerial stock holdings and option holdings affect CEOs' income smoothing incentives. Given the different roles of stock holdings and option holdings in solving agency problems, managers may smooth past earnings using discretionary accruals for the purpose of revealing information to help investors better predict future earnings, or alternatively, for the purpose of hiding volatility of past earnings. We find that the association between past smoothing and predictability of future earnings is increasing (decreasing) in CEO stock (option) holdings. The results are consistent with stock holdings aligning the interests of managers and shareholders, and managers using discretionary accruals to smooth past earnings to reveal information to investors about future performance. In contrast, option holdings have been linked with excessive risk-taking by managers, and managers use discretionary accruals to mask volatility of less predictable earnings. Thus, we provide evidence that income smoothing can be informative or opportunistic, depending on the incentives of CEOs.

Keywords: stock holdings; option holdings; equity-based executive compensation; income smoothing; earnings predictability; earnings management incentive

INTRODUCTION

Managers' use of discretionary accruals to smooth reported earnings is pervasive in practice (Graham, Harvey, and Rajgopal 2005). Such smoothing behavior is presumed by much of the academic literature to represent manipulative reporting. Managers are motivated to use discretionary accruals to dampen the volatility of underlying performance caused by their own opportunistic risk-taking behavior. By lowering volatility of reported performance, managers attempt to bias downward investors' and creditors' perceived risk of the firm. An alternative, more benign explanation for the existence of discretionary accruals-based income smoothing is managers' desire to help investors better predict future performance. By using discretionary accruals to reduce the volatility of reported earnings caused by transitory items, managers better reveal to investors the firm's expected future performance. Thus, there are two competing motivations for the existence of discretionary accruals-based income smoothing. Our study explores how CEOs' equity-based compensation (i.e., managerial stock holdings and option holdings) affects the motivation to smooth earnings via discretionary accruals.

The literature has not provided a clear answer with respect to how equity-based compensation motivates CEOs to smooth their firms' earnings (Dechow, Ge, and Schrand 2010). On the one hand, equity ownership is expected to be a natural solution to agency problem caused by separation of management and ownership (Jensen and Meckling 1976). Equity ownership is intended to incentivize the manager to align her actions with those in shareholders' best interest. When managers' actions are aligned, they have less to hide from shareholders and are more likely to use financial reporting to reveal their actions that benefit shareholders (Warfield, Wild, and Wild 1995; Klein 2002), leading to informative income smoothing. On the other hand, some forms of equity compensation may exacerbate the agency problem by motivating managers'

opportunistic risk-taking behavior. When such behavior is not in shareholders' or other stakeholders' best interest, managers will attempt to use financial reporting to hide their risky actions (Healy 1985; Aboody and Kasznik 2000; Nagar, Nanda, and Wysocki 2003), leading to opportunistic income smoothing.[1]

We differentiate between two types of CEO equity-based compensation – stock holdings and option holdings. These two forms of compensation potentially provide the CEO with different incentives to use discretionary accruals to smooth income. Stock holdings are meant to better align shareholders' and managers' changes in wealth tied to firm performance and therefore incentivize managers to increase their efforts and make decisions in shareholders' best interest. In this context, managers may want to smooth income to reveal private information related to their actions. In particular, managers can reduce earnings fluctuations arising from transitory events so that the firm's future economic performance is better signaled through the (smoother) trend in past profitability.

Option holdings also tie managers' wealth to stock performance, but they potentially affect managers' income smoothing behavior in a different way. Stock options encourage risk-taking behavior. The reason is that the value of stock options represents a convex payoff structure that increases with the volatility of stock price (Guay 1999). Such option-based compensation could therefore motivate managers to increase the firm's overall risk beyond a level that is optimal for shareholders, bondholders, suppliers, employees, etc. Managers may use discretionary accruals to smooth income to hide such risk, which would otherwise be revealed

[1] For example, debtholders' adverse responses to managers' excessive risk-taking include increased interest costs, accelerated maturity periods, tightened collateral requirements, and stronger borrowing restrictions (Collins et al. 1981; Imhoff and Thomas 1988; Rajan and Winton 1995; Harris and Raviv 1995; Amiram and Owen 2012; Li 2013; Zhang 2008). Even though outside shareholders receive most of the upside gains from risky investments and therefore expect managers to undertake more risk, not all forms of risk and associated volatility necessarily fit shareholders' risk preferences. They still prefer to avoid risky projects that managers undertake for private benefits at the expense of firm value.

through volatility of the firm's earnings stream. To the extent that managers' income smoothing is motivated by hiding suboptimal actions related to risk taking, past income smoothing will be associated with more volatile (i.e., less predictable) future performance. Thus, we offer different expectations of the association between *past* income smoothing and predictability of *future* earnings based on whether equity compensation relates to stock holdings versus option holdings.

To test whether stock holdings and option holdings affect the relation between past income smoothing and the predictability of future earnings, we use two approaches. We first use the approach in Tucker and Zarowin (2006). Tucker and Zarowin employ a prices-leading-earnings model developed by Collins, Kothari, Shanken, and Sloan (1994) to test whether past income smoothing relates to the predictability of future earnings. They find that, in general, past income smoothing relates positively to more predictable earnings. The result is consistent with managers' income smoothing representing a desire to better signal future performance to investors (information role) rather than hide volatility of performance (opportunistic role). The purpose of our study is to understand whether the positive association between past income smoothing and predictability of future earnings documented by Tucker and Zarowin varies based on the type of equity compensation to CEOs. As discussed above, stock holdings versus option holdings may have a different effect on managers' motive for income smoothing. Our second approach to measure earnings predictability involves a mechanical earnings persistence model that does not rely on investors' perceptions of future earnings.

Our data of managerial equity holdings are collected from *Execucomp*. The final sample consists of 11,579 firm-year observations from 1994 to 2010 (with data required for future performance through 2013). We find that CEOs' stock holdings enhance the positive association between past income smoothing and predictability of future earnings, whereas option holdings

reduce the association. These results hold for both the market-based approach of the prices-leading-earnings model, as well as the time-series-based earnings persistence model. Our findings support the following conjectures. As CEO stock ownership increases, her income smoothing behavior more likely represents a desire to convey private information about future profitability (i.e., income smoothing is used to reduce earnings volatility caused by transitory items). As option-based compensation increases, however, the CEO's income smoothing behavior more likely represents an attempt to mask the volatility of the firm's true underlying performance (i.e., income smoothing is used to reduce earnings volatility caused by permanent operations). In the case of options, CEOs are more likely to make operating decisions that increase risk beyond the level optimal for shareholders and debtholders, and these managers then use discretionary accruals to smooth earnings in an attempt to hide these risky activities.

We conduct several additional analyses and a variety of robustness tests to corroborate our primary tests. Our conclusions remain unchanged. In particular, we show that results are stronger in subsamples in which theory and prior empirical evidence suggest they should. For example, managers are expected to behave more opportunistically when the CEO also serves as the chairman of the board (i.e., CEO duality) and when the CEO is in the early years of service (i.e., CEO tenure). The CEO is expected to take on additional risks when options are out-of-the-money. We find greater evidence that option holdings relate to the opportunistic role of income smoothing in these settings. Other tests show that restricted stock holdings have a similar effect on income smoothing as do stock holdings, as expected.

Our study offers several important contributions. First, prior research provides mixed conclusions on the impact of managerial equity holdings on a firm's financial reporting (Burns and Kedia 2006; Erickson, Hanlon, and Maydew 2006; Efendi, Srivastava, and Swanson 2007;

Larcker, Richardson, and Tuna 2007; Cheng and Farber 2008; Armstrong, Jagolinzer, and Larcker 2010; Armstrong, Larcker, Ormazabal, and Taylor 2013; Yu 2014). Our study reconciles previous findings through the lens of managers' income smoothing incentive induced by their compensation structure. In many different contexts, including equity compensation, prior studies presume that a positive association with income smoothing is indicative of opportunistic reporting behavior (e.g., Cheng and Warfield 2005; Grant, Markarian, and Parbonetti 2009).[2] However, as concluded by Tucker and Zarowin (2006) and confirmed in our study, a positive relation with discretionary accruals-based income smoothing could be indicative of either managers' opportunistic behavior or managers' informative behavior. This suggests that simply documenting more or less income smoothing associated with equity compensation cannot provide unequivocal conclusions as to managers' motivation for discretionary reporting. The uniqueness of our research design is to compare stock holdings to option holdings to differentiate between the informative role versus the opportunistic role for of income smoothing.

Our study also adds to the interesting debate on the role of discretionary accruals in financial reporting in general (Watts and Zimmerman 1978; Dechow et al. 2010) and in relation to executive compensation in particular (Christie and Zimmerman 1994; Bowen, Rajgopal, and Venkatachalam 2008). Graham et al. (2005) document that more than 96 percent of the executive respondents prefer smooth earnings streams, and the explanations offered by executives for this preference include achieving lower cost of equity and debt, preserving a higher credit rating, assuring customers and suppliers achieve better terms of trade, conveying higher growth prospects to investors, and *helping analysts and investors predict future earnings*. Each of these

[2] Prior studies offer a similar conclusion when documenting a positive relation between managers' equity incentives and the absolute value of discretionary accruals (e.g., Cheng and Warfiled 2005; Bergstresser and Phillippon 2006; Armstrong et al. 2013).

specific benefits characterizes income smoothing as an important communication tool used by management. While managers have other channels of communication (e.g., management forecasts, press releases, management's discussion and analysis disclosure, etc.), reported earnings are highly visible and likely represents the single-best summary measure by which stakeholders make decisions. Our study validates the positive aspect of discretionary accruals to smooth earnings by linking improved earnings predictability with a higher level of managerial stock ownership. This result is consistent with the notion that shareholders *benefit* from earnings management when managers and shareholders' interests are aligned (Healy and Wahlen 1999; Dechow and Skinner 2000; Louis and Robinson 2005; Linck, Netter, and Shu 2013). This conclusion, however, differs from some prior research which suggests that income smoothing associated with equity compensation is driven by an opportunistic reporting incentive (Cheng and Warfield 2005; Grant et al. 2009; Armstrong et al. 2013).

Our study also has timely and practical implications. The recent financial crisis raised concerns from regulators, standard setters, and politicians that excessive equity-based pay schemes induce managers to engage in suboptimal risk-taking behavior (Bebchuk 2009; Bhattacharyya and Cohn 2010). The literature offers several reasons why managers' compensation packages may contain more than the optimal level of equity compensation. These reasons include cash compensation being limited by liquidity constraints (Yermack 1995; Core and Guay 1999; Hall and Murphy 2002), CEOs exerting power over captive boards of directors to influence the terms of their own pay packages (Hill and Phan 1991; Yermack 1997; Bebchuk, Fried, and Walker 2002), and the favorable accounting treatment of option compensation prior to the implementation of FAS 123R (Carter, Lynch, and Tuna 2007; Hayes, Lemmon, and Qiu

2012).[3] The SEC (2010, 10) states in its discussion of Proxy Disclosure Enhancements, "Another concern expressed by commenters was that the linkage between risk-taking and executive compensation is not well understood, and that the disclosures provided under the proposed amendments would likely be boilerplate that could give investors a false sense of comfort regarding risk and risk-taking."[4] This sentiment has led recent studies to call for additional research on managers' equity-based compensation (Bebchuk and Fried 2010; Bhagat and Romano 2009). Our study contributes to the current discussion of equity-based compensation by separately identifying the effects of stock holdings and option holdings. These results are important as the trend in recent years in equity compensation contracts has been away from stock options and toward restricted stock, although option compensation remains a significant component.[5] We also discuss how certain managerial characteristics (CEO duality and CEO tenure) may further affect the impact of equity compensation on income smoothing.

In the next section, we discuss income smoothing and present our hypotheses. The third section introduces our research design. The fourth section provides empirical results of our primary tests. The fifth section demonstrates additional analyses and robustness tests. In the final section we provide conclusions.

[3] In addition, the Troubled Asset Relief Program (TARP) issued by the Treasure Department on June 10, 2009, limits cash pay to top executives and requires most compensation to be paid in the form of equity (Core and Guay 2010). However, Treasury Secretary Timothy Geithner addressed in his report on the U.S. Treasury Budget in 2009 that "… what happened to compensation and the incentives in creative risk taking *did* contribute in some institutions to the vulnerability that we saw in this financial crisis."

[4] http://www.sec.gov/rules/final/2009/33-9089.pdf

[5] Equilar, a California-based company that tracks executive compensation, documents in their 2015 CEO Pay Strategies report that 58 percent of S&P 500 CEOs received stock options in fiscal year 2014 (Equilar 2015). In addition, U.S. CEOs typically hold several times more stock and options than their European peers (Conyon, Core, and Guay 2010). Our result relating option holdings to opportunistic income smoothing echoes the recent concern that, because U.S. executives already hold sufficient risk-taking incentive, requiring further option-based compensation induces managerial behavior to the detriment of shareholders (Core and Guay 2010).

HYPOTHESES

Income smoothing represents managerial behavior to "intentionally dampen the fluctuations of a firm's earnings realizations" (Beidleman 1973). Through flexibility afforded in GAAP, managers can use judgments in estimating accruals to shift earnings from periods with high profits to those with low profits, thereby reducing the volatility in reported performance over time. There are two broad views put forth in the literature on the motivations of managers to smooth income.

One view is that managers smooth earnings to better communicate the firm's underlying economic performance to shareholders. Historical-cost GAAP-based earnings may contain transitory items that do not reflect managers' current performance or expectations of long-term performance. Managers can use discretionary accruals to dampen the fluctuations in earnings caused by these transitory items, giving investors a more accurate picture of future economic performance (Trueman and Titman 1988; Kirschenheiter and Melumad 2002). This type of income smoothing represents the "information" role of earnings management. When managers' actions are more likely to be in shareholders' best interest, there is less need for managers to hide performance, and they are more willing to signal information which reveals their actions that benefit shareholders (Sankar and Subramanyam 2001; Gu 2005; Demerjian, Donovan, and Lewis-Western 2016).

The second view of income smoothing in the accounting literature is the "opportunistic" role of earnings management to hide information from shareholders (Leuz, Nanda, and Wysocki 2003; Jayaraman 2008). Opportunistic income smoothing also represents managers' discretionary reporting to dampen fluctuations in earnings, but the motive for doing so is different. Rather than from the perspective of helping investors better predict future economic

performance, opportunistic income smoothing is motivated to conceal volatility of past performance. When managers undertake excessively risky operations, those decisions will be revealed through volatile earnings performance. Managers can attempt to hide the true volatility of earnings arising from excessive risk taking by attempting to mimic the earnings stream of firms without such opportunistic investment and financing policies (Dechow and Skinner 2000). This opportunistic perspective of income smoothing implies that discretionary accruals choices are made to deceive shareholders and enhance the manager's personal welfare (Healy 1985; Fudenberg and Tirole 1995; Leuz et al. 2003). Other studies conclude that income smoothing can be particularly misleading when such behavior makes it difficult for shareholders to predict future prospects (DeFond and Park 1997; Demski 1998).[6]

Cheng and Warfield (2005) and Grant et al. (2009) document that managers with more equity compensation (stock or option) are more likely to smooth earnings. However, these studies do not address whether such smoothing is motivated for informational reasons or for opportunistic reasons. The purpose of our study is to test these two competing explanations for income smoothing. We do this using the model proposed by Tucker and Zarowin (2006). They find that past income smoothing increases the predictability of future earnings. This finding is consistent with the information role of income smoothing, on average. We assess how the positive association between past income smoothing and predictability of future earnings varies based on the type of equity compensation.

We predict that the association between past smoothing and predictability of future

[6] The Office of Federal Housing Enterprise Oversight (OFHEO) confirmed an SEC investigation into the financial reporting practice of Fannie Mae in May 2006. The report states that Fannie Mae was accused of manipulating the timing of reporting nearly $11 billion dollars of net income and the manipulation was motivated by income smoothing for considerations related to executive compensation. The penalties include imposing a $400 million fine, freezing the company's loan portfolio, seeking restitution from former executives, and considering a possible criminal indictment (OFHEO 2006).

earnings will increase as stock holdings increase. Stock holdings are intended to align management's incentives with those of shareholders. In this case, the use of discretionary accruals to smooth income more likely represents an attempt to reveal information about future performance to investors (i.e., to reduce the effects of transitory items on the volatility of reported performance). This is our first hypothesis.

H1: The association between past income smoothing and predictability of future earnings is increasing in stock holdings.

Option holdings also represent equity-based compensation but offer a convex payoff to managers. The more volatile the expected payoff of the firm's underlying security, the more valuable the option is compared to the expected payoff of the underlying security. As a result, stock options potentially incentivize managers to make excessively risky decisions, which lead to higher performance volatility.[7] However, such excessive risk can reduce firm value, creating a conflict between managers and shareholders. Large fluctuations in firm performance can also directly affect the manager's tenure and job security (Carlson and Bathala 1997; Ronen and Sadan 1981), incentivizing managers to hide such activities. To the extent that managers' income smoothing is motivated by hiding sub-optimal actions related to excessive risk taking, past income smoothing will be associated with more volatile (i.e., less predictable) future performance. This leads to our second hypothesis of the opportunistic role of income smoothing.

H2: The association between past income smoothing and predictability of future earnings is decreasing in option holdings.

Note that the *firm-specific* effect of opportunistic smoothing is to reduce the volatility of reported performance. This could potentially lead to more predictable future performance for the firm (compared to no smoothing at all). However, our prediction is made in the *cross section*.

[7] The positive relation between option-based compensation and managerial risk taking is well-documented in the literature (e.g., Rajgopal and Shevlin 2002; Coles, Daniel, and Naveen 2006).

Riskier operations are, on average, associated with more volatile performance and therefore less predictable future earnings. Thus, in the cross section, those firms using discretionary accruals to hide the volatility of true underlying performance (i.e., opportunistic smoothing) will have less predictable future earnings.[8]

RESEARCH DESIGN AND SAMPLE

Measures of Equity Holdings

We calculate managerial stock holdings based on the percentage of stock shares directly owned by the manager (*STK_HOLD*), which is measured as the number of common stock shares held by the CEO divided by the total number of shares outstanding. Similarly, we calculate managerial option holdings using the percentage of stock options held by the CEO (*OPT_HOLD*), which is the total number of stock option shares held by the CEO divided by the total number of common shares outstanding.[9] To control for the changing structure of executive compensation over time (Frydman and Jenter 2010), both *STK_HOLD* and *OPT_HOLD* are adjusted by subtracting the industry median in each year.

Measure of Discretionary Accruals-Based Income Smoothing

To measure discretionary accruals-based income smoothing (*IS*), we calculate the correlation between the change in discretionary accruals (*DA*) and the change in pre-

[8] H2 predicts that excessive option holding will lead to excessive risk taking, increasing the value of options held by managers as part of their compensation packages. These options are *non-tradable*. Therefore, the value of these options is not based on investors' perception of underlying risk, which would be directly affected by the volatility of reported earnings. Instead, the ex ante value of managers' non-tradable options is based only on underlying risk activities of the firm. To the extent that managers dampen the fluctuation in reported earnings using accruals but do not change the underlying risk activities of the firm, the value of their non-tradable option holdings should not change. If, however, managers perceive the value of their options would be affected by the volatility of reported performance, then they have less incentive to use accruals to artificially smooth income. This possibility adds tension to H2.

[9] We also measure managerial equity holdings using stock (option) holdings of CFOs. Data for CFO compensation is required after 2006 and is available prior to 2006 if the CFO is among the top five most paid executives. Our conclusions using CFO equity holdings are similar to those we report using CEO equity holdings.

discretionary income (*PDI*) over the five previous years. *PDI* is measured as income before extraordinary items less *DA*. We multiply *IS* by minus one so that a higher value represents greater income smoothing. To control for industry and year effects, we convert *IS* into fractional rankings within each industry-year.

Our estimation of discretionary accruals is based on a modified version of the Dechow and Dichev (2002) model and accounts for the asymmetric timelier recognition of unrealized losses (Ball and Shivakumar 2006).

$$Accruals_t = \alpha_0 + \alpha_1 OCF_{t-1} + \alpha_2 OCF_t + \alpha_3 NegOCF_t + \alpha_4 OCF_t * NegOCF_t + \alpha_5 OCF_{t+1} + \alpha_6 \Delta Sales_t + \alpha_7 PPE_t + \varepsilon_t \quad (1)$$

We modify the Dechow and Dichev (2002) model by allowing the coefficient on operating cash flows (*OCF*) in the current year to vary between observations with positive and negative amounts (*NegOCF*). *Accruals* are calculated as the difference between net income and *OCF*. Following McNichols (2002), we also include the growth in sales (Δ*Sales*) and property, plant, and equipment (*PPE*) for the current year. We estimate model (1) for each industry-year (defined by two-digit SIC code) with at least 10 observations. The residuals from model (1) are discretionary accruals (*DA*).

Earnings Predictability and Income Smoothing Incentive

The information role of income smoothing improves the predictability of future earnings, whereas the opportunistic role distorts accounting information and creates earnings opacity. To distinguish the two components, Tucker and Zarowin (2006) adopt a prices-leading-earnings framework developed by Collins et al. (1994).

$$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \varepsilon_t \quad (2)$$

R_t is the ex-dividend stock return for fiscal year t. X_{t-1} and X_t represent past and current

EPS and are used to control for unexpected earnings in the current year. X_{t3} equals the sum of EPS from year t+1 to t+3 and controls for expectations for future earnings in year t. All EPS measures are scaled by beginning price. Because using realized future earnings as a proxy for current expectations could introduce measurement error problems, realized stock returns for years t+1 through t+3 (R_{t3}) are used to control for future events not anticipated in year t. The coefficient on X_{t3} is the future earnings response coefficient (*FERC*) and reflects the extent to which information about future earnings is impounded in current returns (R_t). Because *FERC* captures revisions in shareholders' expectations about future prospects, a higher *FERC* implies higher predictability of firms' future earnings.

To examine the impact of past income smoothing on predictability of future earnings, Tucker and Zarowin (2006) add *IS* to model (2) and estimate model (3).

$$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IS_t + \beta_6 IS_t * X_{t-1} + \beta_7 IS_t * X_t + \beta_8 IS_t * X_{t3} + \beta_9 IS_t * R_{t3} + \varepsilon_t \quad (3)$$

They find a significantly positive coefficient on the interaction $IS_t * X_{t3}$ and conclude that past income smoothing is associated with more predictable earnings. Tucker and Zarowin (2006) also confirm these results using a mechanical earnings persistence model that does not rely on investors' ability to predict earnings. We provide those results as an alternative approach in the additional analysis section.

To test the effect of managerial stock (option) holdings on income smoothing incentive, we split the sample into two groups based on the median value of *STK_HOLD* (*OPT_HOLD*) and estimate model (3) separately for high and low stock (option) holdings. In particular, we are interested in whether the cross-sectional association between R_t and the interaction of IS_t and X_{t3} changes with different levels of equity holdings (i.e., *STK_HOLD* and *OPT_HOLD*). As

discussed in our hypothesis section, we expect the positive association between R_t and $IS*X_{t3}$ documented in Tucker and Zarowin to be more (less) pronounced in the group with high *STK_HOLD* (*OPT_HOLD*), consistent with income smoothing practice of managers with high stock (option) holdings driven by an informative (opportunistic) incentive.

We control for a number of variables expected to be related with a firm's operating environment and earnings smoothness (Dou, Hope, and Thomas 2013). Specifically, we include control variables as main effects and interacted with IS_t*X_{t3}. Firm size (*SIZE*) is measured as the natural logarithm of total assets at the beginning of year t. Growth opportunities (*GROWTH*) are proxied by the annual percentage change in sales from year t–1 to t. To gauge future earnings variability (*EARNVAR*), we use the standard deviation of EPS for years t+1 through t+3. The book-to-market ratio (*BM*) is calculated as the book value over the market value of common equity at the beginning of year t. To control for the extent of other implicit claims between a firm and its stakeholders, we control for investment intensity (*INVEST*) and fixed assets (*PPE*) at the beginning of year t.

Prior evidence shows that debt contracting creates a demand for income smoothing, which helps firms to prevent adverse effects on debt rating (Trueman and Titman 1988; Minton and Schrand 1999). Accordingly, we control for the effect of leverage (*LEV*) using the ratio of long-term debt over the sum of long-term debt and the book value of common equity at the beginning of year t. Incidence of negative earnings realization is represented by an indicator variable *LOSS*, which takes the value one if a firm has a negative current EPS and zero otherwise. Finally, we measure analyst coverage (*ANALYST*) as the natural logarithm of one plus the average number of analyst coverage for each firm-year combination (Yu 2008).

Sample Selection

The sample used for our primary test covers the period from 1994 to 2010 (with data required for future performance through 2013). The sample selection process is presented in Table 1. We obtain managerial equity holdings from Standard & Poor's *Execucomp* and gather financial and accounting data from *Compustat*. Firm-year observations with missing data are deleted. To mitigate effects of extreme observations, all continuous variables are winsorized at their 1st and 99th percentiles.[10] We exclude firms in the financial and utilities industries (SIC codes between 4000 and 4999 and between 6000 and 6999) on *Compustat* before they are merged with firms on *Execucomp*. Our *Compustat* sample used to estimate discretionary accruals has 50,870 firm-year observations. After merging *Compustat* data with *Execucomp* data, the final sample for our primary test consists of 11,579 firm-year observations with non-missing variable.

PRIMARY RESULTS

Descriptive Statistics

Table 2 provides descriptive statistics for the key variables used in the primary empirical analyses. Panel A of Table 2 outlines the distributions of the variables. The mean of *STK_HOLD* (*OPT_HOLD*) by the CEO is 0.0130 (0.0030).[11] The earnings and returns variables are generally consistent to those reported in Tucker and Zarowin (2006). In particular, the mean (median) stock returns R_t of the final test sample is 0.1638 (0.0947), while the mean (median) value of current earnings X_t is 0.0276 (0.0502).

Panel B of Table 2 presents the correlation matrix among the key variables used in the

[10] The results are robust to winsorizing the variables at the 2nd and 98th percentiles.
[11] Untabulated results show the unadjusted mean (median) percentage of stock holdings by CEOs is 0.0175 (0.0029), while the mean (median) percentage of options holdings is 0.0164 (0.0117).

primary analyses. Spearman (Pearson) correlations are below (above) the diagonal. As expected, *STK_HOLD* and *OPT_HOLD* are significantly and positively correlated, with the Spearman (Pearson) correlation of 0.123 (0.072). The correlations between managerial equity holdings and control variables for firm characteristics are consistent with previous findings (Cheng and Warfield 2005; Grant et al. 2009). In addition, consistent with previous research on the prices-leading-earnings model, R_t is negatively correlated with X_{t-1} and R_{t3}, and is positively correlated with X_t and X_{t3} (Collins et al. 1994; Tucker and Zarowin 2006).

Benchmark Models of Earnings Predictability and Income Smoothing

To compare with previous research, we present the results of the baseline model (2) linking current returns with future earnings in Panel A of Table 3, using the *Compustat* sample and the final sample, respectively. As predicted, both the *ERC* and the *FERC* are significantly positive. This indicates that information about current and future earnings has been impounded in current stock returns, consistent with the prices-leading-earnings framework (Collins et al. 1994).

Panel B of Table 3 reports the results of the benchmark model linking income smoothing with earnings predictability in model (3). Again, we use both the *Compustat* sample and the final sample. The positive coefficient on IS_t*X_{t3} suggests that managers' income smoothing behavior, on average, enhances earnings predictability. In addition, the estimated *FERCs* are highly comparable to the *FERC* in Tucker and Zarowin (2006, Table 3, Panel B), which gives us confidence that our primary models should provide reliable benchmarks to test our hypotheses.

Tests of Hypotheses

Panel A (Panel B) of Table 4 provides the results of our test of H1 (H2) after splitting the

sample on median equity holdings.[12] Before discussing hypotheses tests, we first note that the coefficients for the prices-leading-earnings model are similar across the two samples in Panel A and the two samples in Panel B. Expanding the model to include interactions with income smoothing (*IS*) and control variables, the coefficient on X_{t3} remains positive and similar in magnitude across partitions. The similarity indicates that firms with low income smoothing in each sample are not fundamentally different. Our interest is in whether the predictability of earnings as income smoothing increases (i.e., the coefficient on X_{t3}*IS) differs between samples.

In Panel A, consistent with H1, the coefficient on IS_t*X_{t3} is significantly greater in the group with higher managerial stock holdings (F-test = 6.84). Therefore, we document that as stock holdings increase, the association between past income smoothing and predictability of future earnings increases. This result is consistent with the information role of income smoothing. As managers' actions become more aligned with shareholders' interest, managers are more likely to convey information that reveals those actions. In this case, managers use discretionary accruals to dampen the fluctuations in reported earnings caused by transitory items to better reveal to investors the firm's underlying (expected future) performance.

In Panel B, consistent with H2, the coefficient on IS_t*X_{t3} is significantly less in the group with high managerial option holdings (F-test = 11.42). In fact, the coefficient is *negative* for the high option holdings group. As option holdings increase, the association between past income smoothing and predictability of future earnings decreases. This result is consistent with the opportunistic role of income smoothing. To the extent that discretionary accruals are used by managers to mask the volatility of risky (permanent) operations, past income smoothing will be

[12] Our measures of stock holdings and option holdings are fairly sticky. For our sample, 85.5 percent of observations with above (below) median *STK_HOLD* in year t have above (below) median *STK_HOLD* in year t+1. Similarly, 82.5 percent of observations with above (below) median *OPT_HOLD* in year t have above (below) median *OPT_HOLD* in year t+1. The stickiness of equity holdings makes clearer the incentives for smoothing.

associated with less predictable future performance.

Table 5 provides the results of an alternative model to test H1 and H2. Instead of comparing coefficients across subsamples as in Table 4, we use the full sample and add to model (3) the interaction of *STK_HOLD* or *OPT_HOLD* with all variables. The three-way interactions of $STK\_HOLD_{t-1}*IS_t*X_{t3}$ and $OPT\_HOLD_{t-1}*IS_t*X_{t3}$ provide our hypotheses tests.[13] The results are shown in Table 5 using both continuous variables (first column) and indicator variables defined as above/below the median (second column) for *STK_HOLD* and *OPT_HOLD*. Consistent with conclusions from Table 4, the coefficient on $STK\_HOLD_{t-1}*IS_t*X_{t3}$ in Panel A is significantly positive. The result is consistent with informative income smoothing. In contrast, the coefficient on $OPT\_HOLD_{t-1}*IS_t*X_{t3}$ in Panel B is significantly negative. This finding is consistent with opportunistic income smoothing.[14]

For ease in presenting results, the remainder of our tests use the three-way interaction model presented in Table 5. Many of our subsequent analyses involve comparisons of subsamples to validate our primary findings. These comparisons are made easier by comparing the three-way interaction coefficients across two subsamples, rather presenting four-way interactions.

Subsample Tests Based on CEO characteristics

In this section, we test our hypotheses for subsamples based on managerial characteristics.

[13] Given that our regression models include many interaction variables, we check the variance inflation factors (VIFs) of the interactions between our equity holdings variables, earnings variables and the income smoothing measure. The VIFs have an average value between 7 and 8. We also replicate the sample in Tucker and Zarowin (2006) and find that the variables of interest in their models have VIFs ranging between 4 and 6. In Table 5 and all remaining tests, all VIFs are below 10.

[14] We also estimate the relation between managers' equity compensation and income smoothing by taking the five-year *average* of equity holdings during the same time period (i.e., a five-year smoothing measure is examined in conjunction with a five-year compensation measure). Additionally, we examine a group of firms that experience no CEO turnover during the five-year smoothing period. For each of these alternative specifications, our conclusions remain the same. We report several other sensitivity tests later.

To the extent our results reflect hypothesized constructs, we expect those results to be stronger for subsample in which theory and prior empirical evidence suggest they should. As a caveat, subsample tests may naturally be more susceptible to endogeneity and collinearity concerns, and therefore these results should be interpreted with caution.

We first test the effect of CEO duality. Prior research shows that CEOs who also serve as the chairman of the board have more power and greater discretion (Fama and Jensen 1983; Jensen 1993). Consistent with this argument, accounting studies document a negative relation between CEO duality and financial reporting quality (Gul and Leung 2004; Klein 2002; Farber 2005). We split the sample into two groups based on CEO duality (*Duality*).

Results in Panel A of Table 6 show that the coefficient on $STK\_HOLD_{t-1}*IS_t*X_{t3}$ remains significantly positive for both groups (similar to results in Table 5). However, the coefficient on $OPT\_HOLD_{t-1}*IS_t*X_{t3}$ in Panel B is significantly negative for the duality group and becomes less negative for the non-duality group. This difference in coefficients is consistent with dual CEOs engaging in greater opportunistic smoothing. Such duality reduces the board's independence and therefore its ability to govern the CEO's actions (Fama and Jensen 1983).

We next test the effects of CEO tenure. Previous studies conclude that tenure affects managerial incentive to manage reported earnings (DeAngelo 1988; Ali and Zhang 2015). To the extent that CEOs earlier in their tenure have the potential to receive greater payoffs associated with their riskier actions, we expect managerial stock options to be associated with opportunistic income smoothing. For stock holdings, managers face a linear payoff structure, and that payoff is not expected to vary with tenure. Therefore, we have less reason to expect tenure to affect conclusions related to the association between income smoothing and stock holdings. To provide our tests, we split the sample into two groups based on the median of CEO tenure (*Tenure*).

Results for CEO stock holdings in Panel A of Table 6 show that the coefficient on $STK\_HOLD_{t-1}*IS_t*X_{t3}$ is significantly positive for both low and high tenure groups, and the two coefficients are not significantly different. For CEO option holdings in Panel B, the coefficient on $OPT\_HOLD_{t-1}*IS_t*X_{t3}$ is significantly more negative for the low tenure group. These findings are consistent with managers with higher option holdings having stronger incentives to smooth earnings opportunistically in the earlier years of their service (Ali and Zhang 2015).

ADDITIONAL ANALYSES AND ROBUSTNESS TESTS

Earnings Persistence

We use earnings persistence as an alternative lens to investigate the role of equity holdings on managers' income smoothing incentives. Earnings persistence reflects at least partially current earnings' ability to impound information about future earnings (Subramanyam 1996). If income smoothing improves earnings predictability, it should strengthen the relation between future earnings and current earnings. We use the following model to explore the informational-versus-opportunistic perspective of income smoothing.

$$X_{t3} = \gamma_0 + \gamma_1 IS_t + \gamma_2 X_t + \gamma_3 IS_t*X_t + \varepsilon_{t3} \quad (4)$$

Tucker and Zarowin show that the coefficient on IS_t*X_t is significantly positive, consistent with income smoothing, on average, being associated with greater earnings persistence. In a similar vein, we use this earnings-based test to complement our returns-based test of earnings predictability. Similar to our approach in Table 4, we estimate model (4) separately for high and low stock (option) holdings. We are interested in whether the cross-sectional association between X_{t3} and IS_t*X_t changes with different levels of equity holdings.

Panels A and B in Table 7 provide the results. Consistent with our expectations, the

positive association between X_{t3} and $IS*X_t$ is more (less) pronounced in the group with high *STK_HOLD* (*OPT_HOLD*). These findings confirm that the income smoothing practice of managers with high stock (option) holdings is driven by an informative (opportunistic) incentive.

Out-of-the-Money Options

In our primary tests, we measure option holdings relative to the industry-year median. This measure is meant to provide an indication of the excessive risk-taking incentive of the CEO. As an alternative measure of the CEO's incentive to engage in excessively risky activities, we examine options that are out-of-the-money (i.e., the exercise price greater than market price). The convex payoff structure of options is especially apparent when options are out-of-the-money. CEOs holding out-of-the-money options have an incentive to engage in additional risky activities that increase the variance of performance outcomes. Performance outcomes that lead to lower firm value have no effect on the CEO's option-related wealth (because the options were already out-of-the-money). At the same time, the higher probability of positive outcomes increases the likelihood that firm value will increase to the point that the options become in-the-money. As options move further in-the-money, their payoff structure is closer to that of stock holdings.

Following prior research, we use the number of out-of-the-money options held by the CEO scaled by the firm's total number of shares outstanding (*OM_OPT*) (Armstrong et al. 2013; Core and Guay 2002; Efendi et al. 2007). Similar to our measures of *STK_HOLD* and *OPT_HOLD*, we subtract the industry median each year in our tests using *OM_OPT*.

Table 8 present the result. Consistent with H2, Panel A shows that the coefficient on IS_t*X_{t3} is significantly less for the high *OM_OPT* group (F-test = 15.51). Panel B provides a similar conclusion using the full sample with a three-way interaction. The coefficient on $OM\_OPT_{t-1}*IS_t*X_{t3}$ is negative and statistically significant. The subsample tests show that the

coefficient on $OM\_OPT_{t-1}*IS_t*X_{t3}$ is more negative for subsamples with CEO duality or low CEO tenure. Overall, the results in Table 8 provide strong evidence consistent with option holdings motivating opportunistic income smoothing.[15]

Restricted Stock Holdings

Restricted stock shares have become an increasingly popular form of equity compensation and provide the holder with the right to receive a specified number of shares after a predetermined vesting period (Frydman and Jenter 2010). Restricted stock with no performance or market conditions can be viewed as a fixed option with an exercise price of zero. These restricted stock holdings therefore generally have a linear payoff structure and behave more like unrestricted common stock holdings than option holdings (Gao and Shrieves 2002; Hayes et al. 2012). We replace stock holdings (*STK_HOLD*) in the model to test H1 with industry-year adjusted restricted stock holdings (*RSTK_HOLD*). Similar to findings for stock holdings, the coefficient on $RSTK\_HOLD_{t-1}*IS_t*X_{t3}$ is significantly positive. The results are consistent with the information role of income smoothing.

Joint Tests of Managers' Stock Holdings and Option Holdings

In all of our tests above, we separately examine the effects of stock holdings and option holdings. However, many managers hold both stocks and options, potentially creating conflicting incentives for income smoothing. In this section, we briefly address this possibility. First, we note that all of our inferences remain unchanged when *both* stock holdings and option holdings

[15] As an additional test along these lines, we split the sample based on the industry-year adjusted percentage of *exercisable* option holdings (*EXER_OPT*). Managers with exercisable options are more concerned with short-term price movements, and thus these options more likely induce incentives and payoff structures closer to stock holdings (i.e., there is less incentive to smooth for opportunistic reasons). Consistent with this prediction, we find that for the group of firms with above median *EXER_OPT*, the coefficient on $OPT\_HOLD*IS*X_{t3}$ in Table 5 is negative and *insignificant*. In contrast, the coefficient on $OPT\_HOLD*IS*X_{t3}$ for the group of firms with below median *EXER_OPT* is negative and *significant*. The difference in coefficients between the two groups is significant (F-test = 9.84).

are included in a joint model. Given the large number of variables required for the joint model, results in Tables 4-8 are reported using separate tests to simplify the presentation, but none of our conclusions change.

Second, we investigate subsamples where equity holdings are less likely to create conflicting incentives. We devise two subsamples: (1) firms whose managers have above median *STK_HOLD* and below median *OPT_HOLD* and (2) firms whose managers have below median *STK_HOLD* and above median *OPT_HOLD*. Firms in group (1) are expected to have the strongest incentive to smooth income for informative purposes, while those in group (2) are expected to have the strongest incentive for opportunistic purposes.[16] For completeness, we also examine the two groups with potentially conflicting incentives: (3) firms whose managers have above median *STK_HOLD* and above median *OPT_HOLD* and (4) firms whose managers have below median *STK_HOLD* and below median *OPT_HOLD*. Results confirm expectations. The coefficient on is $IS*X_{t3}$ in Table 4 is significantly positive only for group (1) and is significantly negative only for group (2).[17]

Alternative Measures of Income Smoothing

We use two alternative measures of income smoothing that are *not* based on estimated discretionary accruals. Following Bhattacharya, Daouk, and Welker (2003), we calculate the correlation between the change in total accruals and the change in cash flows from operations over the previous five years, multiplied by minus one, and refer to this measure as *IS_1*. We define *IS_2* as the ratio of the standard deviation of net income to the standard deviation of cash

[16] For our sample, 83.4 percent of observations classified in group (1) in year t are classified in group (1) in year t+1. Similarly, 81.1 percent of observations classified in group (2) in year t are classified in group (2) in year t+1.

[17] We further test the impact of CEO characteristics in Table 6 using groups (1) and (2). To the extent these subsamples better isolate the hypothesized incentives, we expect stronger effects of CEO characteristics on H1 for group (1) and on H2 for group (2). While sample sizes for these tests are greatly reduced, we conclude that the results generally strengthen our overall conclusions.

flows from operations over the previous five years, multiplied by minus one (Leuz et al. 2003; Francis et al. 2004; Jung et al. 2013). Both *IS_1* and *IS_2* use the volatility of cash flows from operations as the benchmark and are designed to capture the extent to which managers reduce earnings volatility via accounting accruals. The correlation between *IS_1* and *IS_2* is 0.706. The correlation between *IS_1* and *IS_2* and our primary income smoothing measure (*IS*) is 0.359 and 0.130, respectively. These correlations are well below one, suggesting that they capture some unique information about managers' income smoothing behavior. Untabulated results indicate that our inferences continue to hold.

Endogeneity

The endogenous nature of managers' equity holdings allows the possibility that our findings are spurious as a result of unobservable factors that relate to both equity holdings and income smoothing. To alleviate such concern, we control for several variables in the accounting and finance literature related to equity compensation and earnings quality (see control variables in the Appendix). We find that results are very similar with or without these control variables.

We also note that concerns of reverse causality from income smoothing to CEOs' equity holdings are minimized by our reliance on an interaction effect. We find that the ability of income smoothing to increase earnings predictability increases with stock holdings and decreases with option holdings. Both Rajan and Zingales (1998) and Lang and Maffett (2011) emphasize that using interaction terms to offer conclusions makes reverse causality less likely (i.e., it is more difficult to explain why results are stronger for a particular subsample). For example, it is not enough to argue that income smoothing is correlated with forms of equity compensation. Such a relation could exist for a number of legitimate business reasons. Instead, one would need to offer an explanation as to why income smoothing is expected to be more or less related to the

predictability of earnings as equity compensation varies.

Beyond our interaction tests, we showed earlier that results are stronger for subsamples in which they are expected to be stronger. For example, as previously reported, the relation between CEO option holdings and the opportunistic role of income smoothing is greater for firms with CEO duality, lower CEO tenure, and more out-of-the-money options. Explanations for endogeneity are more difficult to envision when results occur more strongly for subsamples in which theory and prior empirical evidence suggest they should.

Finally, as one possible way to address endogeneity concerns, we examine our results around implementation of FAS 123R, which eliminated the accounting benefits associated with granting option-based compensation. FAS 123R requires firms to recognize option-based compensation as an expense in the income statement at its fair value. Such expenses generally were not recognized prior to FAS 123R. The additional option-based compensation expense (at least partially) explains the reason for the decline in option-based compensation in recent years. Thus, FAS 123R provides an exogenous shock (i.e., decline) in excessive option-based compensation (Hayes et al. 2012; Brown and Lee 2011; Chava and Purnanandam 2010) and could therefore potentially dampen the motivation for opportunistic income smoothing. FAS 123R, however, did not affect the accounting for managerial stock holdings, so we do not predict a differential effect for stock holdings around implementation.

We partition our sample into the pre-FAS 123R period (fiscal years 2001 through 2005) and the post-FAS 123R period (fiscal years 2006 through 2010). Untabulated results for CEO stock holdings demonstrate that the coefficient on $STK\_HOLD_{t-1}*IS_t*X_{t3}$ remains significantly positive for both periods with similar magnitudes. The similarity in results across periods is expected, given the lack of accounting consequences FAS 123R should have had on stock

holdings. In contrast, the results for CEO option holdings show that the coefficient on $OPT\_HOLD_{t-1}*IS_t*X_{t3}$ is significantly negative in the pre-FAS 123R period but becomes insignificant in the post-FAS 123R period. Our findings are consistent with reduced impact that option holdings had on CEOs' income smoothing incentive after implementation of FAS 123R.

CONCLUSION

This study examines the role of equity-based holdings in determining CEOs' income smoothing incentive and in particular, the association between income smoothing and earnings predictability. Prior research provides mixed conclusions on whether discretionary accruals-based income smoothing by managers represents informative earnings management to communicate information about future performance or whether it represents managers' opportunistic behavior to hide sub-optimal activities and the extraction of private benefits. We use the extent of stock holdings and option holdings to predict which of these two roles of income smoothing is more likely occurring.

Stockholdings are intended to align managers' actions with shareholders' interests by linking managers' and shareholders' wealth. Consistent with high manager-shareholder alignment, we find that the relation between past income smoothing and investors' ability to predict future earnings increases with stock holdings. This result is consistent with the information role of income smoothing.

Option holdings also represent equity-based compensation, but they potentially create an adverse effect through incentivizing excessive risk-taking activities. Options offer a convex payoff structure where the value of the option to the manager relates positively to the volatility of the asset's expected payoff. Managers therefore benefit proportionately more from engaging in

risky actions in the presence of option holdings. Consistent with managers attempting to hide their excessive risk-taking activities (i.e., highly volatile performance), we find that the relation between income smoothing and future earnings predictability decreases with option holdings.

Results are consistent after considering different measures of earnings predictability, discretionary accruals, and income smoothing and after controlling for a number of firm characteristics. We also find that the relation between CEO option holdings and the opportunistic role of income smoothing is greater for firms with CEO duality, lower CEO tenure, and more out-of-the-money options. Our study offers an explanation for the mixed conclusions in prior research on the role of income smoothing, and it contributes to the debate on the role of equity-based compensation in affecting managers' behavior. In particular, we emphasize the importance of differentiating the incentives behind managers' earnings management when examining the impact of executive compensation on managerial behavior.

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APPENDIX
Variable Definitions

Test Variables	
R_t	The ex-dividend stock return during fiscal year t.
X_{t-1}	Earnings per share (adjusted for stock splits and stock dividends) at the end of fiscal year t-1, scaled by the stock price at the beginning of fiscal year t.
X_t	Earnings per share (adjusted for stock splits and stock dividends) at the end of fiscal year t, scaled by the stock price at the beginning of fiscal year t.
X_{t3}	The sum of earnings per share (adjusted for stock splits and stock dividends) for fiscal years t+1 through t+3, scaled by the stock price at the beginning of fiscal year t.
R_{t3}	The annually compounded stock return for fiscal year t+1 through t+3.
IS_t	The correlation between change in discretionary accruals and change in pre-managed income over five fiscal years, multiplied by minus one. Pre-managed income is calculated as net income scaled by average total assets minus discretionary accruals, where discretionary accruals are the residuals from $Accruals_t = \alpha_0 + \alpha_1 OCF_{t-1} + \alpha_2 OCF_t + \alpha_3 NegOCF_t + \alpha_4 OCF_t * NegOCF_t + \alpha 5 OCF_{t+1} + \alpha_6 \Delta Sales_t + \alpha_7 PPE_t + \omega_t$
IS_1_t	The correlation between change in total accruals and change in cash flows from operations over five fiscal years, multiplied by minus one.
IS_2_t	The standard deviation of net income scaled by the standard deviation of cash flows from operations over five fiscal years, multiplied by minus one.
STK_HOLD_{t-1}	The industry-year adjusted percentage of stock shares owned by the CEO, calculated as the number of stock shares owned by the CEO scaled by total outstanding common stock shares of the firm at the beginning of fiscal year t. For empirical tests, in each year we subtract the industry median stock holding from the CEO's stock holding.
OPT_HOLD_{t-1}	The industry-year adjusted percentage of stock shares owned by the CEO, calculated as the number of option shares owned by the CEO scaled by total outstanding common stock shares of the firm at the beginning of fiscal year t. For empirical tests, in each year we subtract the industry median option holding from the CEO's option holding.

(Appendix continued on next page)

APPENDIX (Continued)

Control Variables	
SIZE	The natural logarithm of total assets at the beginning of the fiscal year.
BM	The book value of common equity scaled by the market value of common equity at the beginning of the fiscal year.
GROWTH	The annual percentage change in sales at the beginning of the fiscal year.
LEV	The total debt of the firm scaled by the market value of common equity at the beginning of the fiscal year.
INVEST	R&D expenses plus capital expenditures minus sales of fixed assets, scaled by total assets at the beginning of the fiscal year.
PPE	The net value of property, plant and equipment scaled by total assets at the beginning of the fiscal year.
EARNVAR	The standard deviation of earnings per share (adjusted for stock splits and stock dividends) for three fiscal years ahead.
ANALYST	The natural logarithm of one plus the average number of analyst forecasts at the beginning of the fiscal year.
LOSS	An indicator variable that is equal to one if the firm has negative earnings per share (adjusted for stock splits and stock dividends) at the end of the fiscal year, and zero otherwise.
DUALITY	An indicator variable that takes on the value of one if the CEO is also the chairman of the board, and zero otherwise.
TENURE	The number of years the CEO has held the CEO title at the current firm
OM_OPT	The percentage of out-of-the-money option shares owned by the CEO, calculated as the number of out-of-the-money option shares owned by the CEO scaled by total outstanding common stock shares of the firm at the beginning of fiscal year t. For empirical tests, in each year we subtract the industry median out-of-the-money holding from the CEO's out-of-the-money holding.

TABLE 1
Sample Selection

	Firm-year observations	Firm-CEO observations
Non-financial, non-utility *Compustat* sample with non-missing returns and earnings, 1994 – 2010[a]	107,717	13,818
Compustat sample with available data to estimate the prices-leading-earnings model and with non-missing income smoothing measure[b]	50,870	6,641
Combined sample with *Execucomp*[c]	19,496	1,871
Missing data to calculate managerial equity holdings	(7,917)	(224)
Test sample	11,579	1,647

a. The sample period begins with 1994 because 1988 is the first year in which firms are required to report cash flow statements, and we use five-year observations to calculate the income-smoothing measure. The sample period ends with 2010 because we require firms to have three future years of earnings and returns to estimate the prices-leading-earnings model.
b. We require firms to have available data from *Compustat* to compute our variables of interest (i.e., earnings and returns) and control variables, and require firms to have available data from *Execucomp* at the beginning of the year to compute managerial equity holdings.
c. *Execucomp* contains information primarily for the S&P 1500.

TABLE 2
Descriptive Statistics (N=11,579)

Panel A: Distributions of Variables

Variables	Mean	Std. Dev.	Median	P10	P25	P75	P90
(1) R_t	0.1638	0.5261	0.0947	–0.3776	–0.1486	0.3624	0.7264
(2) X_{t-1}	0.0104	0.1872	0.0451	–0.0414	0.0217	0.0641	0.0864
(3) X_t	0.0276	0.1195	0.0502	–0.0483	0.0222	0.0717	0.0982
(4) X_{t3}	0.1370	0.5956	0.1625	–0.1369	0.0514	0.2559	0.3814
(5) R_{t3}	0.4347	0.8543	0.3521	–0.4454	–0.0382	0.7836	1.3364
(6) IS	0.6457	0.4891	0.8809	–0.1509	0.5133	0.9764	0.9957
(7) STK_HOLD	0.0130	0.0383	0.0000	–0.0031	–0.0017	0.0070	0.0418
(8) OPT_HOLD	0.0030	0.0102	0.0000	–0.0053	–0.0028	0.0051	0.0151
(9) SIZE	7.3331	1.5194	7.2457	5.4275	6.2467	8.3665	9.4182
(10) BM	0.4704	0.3503	0.3999	0.1438	0.2519	0.5999	0.8368
(11) GROWTH	0.1103	0.2385	0.0827	–0.1232	–0.0025	0.1872	0.3570
(12) LEV	0.1804	0.1552	0.1631	0.0000	0.0372	0.2781	0.3847
(13) INVEST	0.0966	0.0800	0.0749	0.0206	0.0409	0.1266	0.2027
(14) PPE	0.2919	0.2182	0.2341	0.0655	0.1280	0.3945	0.6211
(15) EARNVAR	0.0433	0.0648	0.0203	0.0054	0.0099	0.0464	0.1038
(16) ANALYST	2.1173	0.8765	2.2513	0.8824	1.6740	2.7674	3.1209
(17) LOSS	0.1658	0.3719	0.0000	0.0000	0.0000	0.0000	1.0000

(Table 2 continued on next page)

TABLE 2 (Continued)

Panel B: Correlations among Variables

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*	*(16)*	*(17)*
(1)		**0.063**	**0.379**	**0.381**	**–0.103**	**0.039**	**0.020**	**0.009**	**0.018**	**–0.344**	**0.207**	**–0.063**	–0.001	**0.021**	**0.096**	**0.019**	**–0.208**
(2)	**–0.146**		**0.485**	**0.290**	**0.020**	**0.202**	**–0.011**	**–0.049**	**0.154**	**0.114**	**–0.081**	**0.033**	**–0.144**	**0.122**	**–0.089**	**0.032**	**–0.318**
(3)	**0.156**	**0.489**		**0.459**	–0.008	**0.173**	**–0.006**	**–0.044**	**0.136**	**–0.043**	**0.226**	–0.014	**–0.124**	**0.111**	**–0.070**	**0.040**	**–0.658**
(4)	**0.225**	**0.181**	**0.337**		**0.396**	**0.124**	**–0.001**	**–0.058**	**0.114**	**–0.117**	**0.066**	0.006	**–0.128**	**0.112**	**–0.195**	**0.070**	**–0.306**
(5)	**–0.120**	**–0.075**	**–0.116**	**0.285**		**–0.017**	**0.031**	**0.032**	**–0.035**	**0.110**	**–0.057**	**0.023**	0.006	**0.025**	**0.039**	–0.003	**0.049**
(6)	–0.008	**0.199**	**0.183**	**0.098**	**–0.049**		**0.023**	**–0.096**	**0.119**	**–0.060**	**0.086**	**0.021**	**–0.117**	**0.028**	**–0.202**	**0.069**	**–0.243**
(7)	**0.032**	–0.008	–0.002	0.013	**0.042**	**0.032**		**0.123**	**–0.308**	**0.061**	**0.073**	**–0.040**	**0.029**	**0.027**	**0.039**	**–0.212**	0.010
(8)	**0.049**	**–0.117**	**–0.126**	**–0.092**	**0.038**	**–0.093**	**0.072**		**–0.342**	**0.096**	–0.001	**–0.023**	0.011	**–0.049**	**0.175**	**–0.257**	**0.105**
(9)	**–0.043**	**0.127**	**0.138**	**0.096**	**–0.079**	**0.120**	**–0.197**	**–0.334**		**–0.091**	**–0.041**	**0.269**	**–0.171**	**0.137**	**–0.134**	**0.589**	**–0.152**
(10)	**–0.325**	**–0.052**	**–0.158**	**–0.182**	**0.153**	**–0.071**	**0.015**	**0.080**	**–0.102**		**–0.224**	**0.065**	**–0.256**	**0.044**	**0.303**	**–0.254**	**0.171**
(11)	**0.190**	**0.093**	**0.216**	**0.047**	**–0.045**	**0.043**	**0.046**	**0.015**	**–0.046**	**–0.194**		**–0.099**	**0.187**	0.010	**–0.076**	**0.103**	**–0.260**
(12)	**–0.053**	**–0.109**	**–0.128**	**–0.037**	**0.036**	0.003	**–0.066**	**–0.014**	**0.233**	**0.059**	**–0.073**		**–0.258**	**0.018**	**0.069**	**–0.035**	**0.083**
(13)	**0.034**	**–0.027**	**–0.061**	**–0.104**	**0.052**	**–0.137**	**0.024**	**0.061**	**–0.212**	**–0.223**	**0.198**	**–0.203**		**0.249**	**–0.019**	**0.176**	**0.049**
(14)	–0.002	**0.060**	**0.075**	**0.071**	0.007	**0.017**	**0.008**	**–0.058**	**0.124**	**0.046**	**0.048**	**0.072**	**0.233**		**0.021**	**0.130**	**–0.086**
(15)	**0.183**	**–0.346**	**–0.280**	**–0.354**	**0.071**	**–0.167**	**0.014**	**0.153**	**–0.093**	**0.265**	**–0.033**	**0.145**	–0.014	**0.019**		**–0.217**	**0.284**
(16)	**–0.024**	**0.155**	**0.147**	**0.107**	**–0.022**	**0.077**	**–0.130**	**–0.218**	**0.508**	**–0.236**	**0.070**	**–0.041**	**0.118**	**0.127**	**–0.217**		**–0.162**
(17)	**–0.138**	**–0.332**	**–0.658**	**–0.299**	**0.107**	**–0.245**	**–0.007**	**0.131**	**–0.159**	**0.237**	**–0.210**	**0.114**	**0.118**	**–0.070**	**0.276**	**–0.167**	

Table 2 provides descriptive statistics of key variables employed. Panel A presents the distributions of the variables, and the correlation matrix is provided in Panel B. A detailed description of variable measurement is provided in the Appendix. Bolded text in Panel B indicates correlations statistically significant at the 0.05 level or lower in a two-tailed test. The upper right-hand portion of Panel B presents *Spearman* rank-order correlations, and the lower left-hand portion presents the *Pearson* product-moment correlations.

TABLE 3
Benchmark Models of Earnings Predictability and Income Smoothing

Panel A: Prices-leading-earnings model

		Compustat Sample		Test Sample	
Variables:	Expected Sign	Coefficient Estimate	p-value	Coefficient Estimate	p-value
Intercept		0.1925	<.0001	0.1319	<.0001
X_{t-1}	–	–0.5400	<.0001	–0.8145	<.0001
X_t	+	0.6603	<.0001	0.8514	<.0001
***X*$_{t3}$**	**+**	**0.1431**	**<.0001**	**0.4836**	**<.0001**
R_{t3}	–	–0.0790	<.0001	–0.1177	<.0001
Adj. R^2		0.074		0.169	
N		50,870		11,579	

Panel B: Prices-leading-earnings model with income smoothing

		Compustat Sample		Test Sample	
Variables	Expected Sign	Coefficient Estimate	p-value	Coefficient Estimate	p-value
Intercept		0.2009	<.0001	0.1716	<.0001
X_{t-1}	–	–0.3926	<.0001	–0.6508	<.0001
X_t	+	0.5909	<.0001	0.6804	<.0001
X_{t3}	+	–0.0336	0.0137	0.3305	<.0001
R_{t3}	–	–0.0693	<.0001	–0.1213	<.0001
IS_t		–0.0304	0.0085	–0.0854	<.0001
IS_t*X_{t-1}		–0.5488	<.0001	–0.6391	<.0001
IS_t*X_t		0.3314	<.0001	0.6796	<.0001
***IS*$_t$*X*$_{t3}$**	**+**	**0.4417**	**<0.001**	**0.3384**	**<.0001**
IS_t*R_{t3}		–0.0296	0.0025	–0.0041	0.8037
Adj. R^2		0.080		0.174	
N		50,870		11,579	

Table 3 provides test results for the benchmark model of earnings predictability in Panel A and test results for the benchmark model of income smoothing in Panel B, using the Compustat sample and the final test sample, respectively. The dependent variable is the annual stock return (R_t). Standard errors are clustered by firms. Year fixed effect indicators are not reported for brevity. A detailed variable description is provided in the Appendix.

TABLE 4
Managerial Equity Holdings, Income Smoothing and Earnings Predictability

Panel A: Managerial Stock Holdings

Variables	High		Low	
Intercept	0.2157***	0.2277***	0.1523***	0.2827***
X_{t-1}	–0.7558***	–0.3660***	–0.7153***	–0.5065***
X_t	0.8688***	0.1369***	0.7274***	0.3169***
X_{t3}	0.4835***	0.3510***	0.3707***	0.4122***
R_{t3}	–0.1057***	–0.1316***	–0.0852***	–0.1185***
IS_t		–0.0313		–0.0115
IS_t*X_{t-1}		–0.3101**		0.1442
IS_t*X_t		–0.1187		–0.4075**
IS_t*X_{t3}		**0.3033*** **		**0.1562** **
IS_t*R_{t3}		0.0414**		0.0167
SIZE		–0.0163***		–0.0233***
BM		–0.5203***		–0.5356***
GROWTH		0.1965***		0.1962***
LEV		–0.1816***		–0.2513***
INVEST		0.0002		–0.1761**
PPE		–0.0319		0.0399*
EARNVAR		0.5673***		0.8026***
ANALYST		0.0036		–0.0068
LOSS		0.1256***		0.1365***
Controls$*IS_t*X_{t3}$		Yes		
Adj. R2	0.247	0.408	0.267	0.400
N	5,789	5,789	5,790	5,790

F-test of H1: High ***IS_t*X_{t3}*** = Low ***IS_t*X_{t3}*** =6.84***

(Table 4 continued on next page)

TABLE 4 (Continued)

Panel B: Managerial Option Holdings

Variables	High		Low	
Intercept	0.1529***	0.2382***	0.1237**	0.2871***
X_{t-1}	–0.8142***	–0.6720***	–0.7804***	–0.5364***
X_t	0.7726***	0.3296***	0.9851***	0.5901***
X_{t3}	0.4017***	1.4252***	0.4405***	1.0073***
R_{t3}	–0.1018***	–0.1218***	–0.0788***	–0.1270***
IS_t		0.0462		–0.1026***
IS_t*X_{t-1}		–0.1632		0.3462
IS_t*X_t		0.6535**		0.1173
IS_t*X_{t3}		**–0.2575*** **		**0.2502***
IS_t*R_{t3}		0.0129		0.0172
SIZE		–0.0134**		–0.0131**
BM		–0.4709***		–0.4273***
GROWTH		0.2601***		0.2113***
LEV		–0.1688***		–0.1211***
INVEST		0.0165		–0.0165
PPE		–0.0349		–0.0142
EARNVAR		3.1287***		0.1342***
ANALYST		–0.0080		–0.0187**
LOSS		0.0902***		0.0326
Controls$*IS_t*X_{t3}$		Yes		
Adj. R2	0.247	0.385	0.267	0.401
N	5,791	5,791	5,788	5,788

F-test of H2: High $\boldsymbol{IS_t*X_{t3}}$ = Low $\boldsymbol{IS_t*X_{t3}}$ = 11.42***

Panel A (Panel B) of Table 4 provides the results of our test of H1 (H2) by splitting the sample on the median value of CEO stock (option) holdings, after subtracting the industry median in each year. The dependent variable is the annual stock return (R_t). *, **, and *** represent significance levels at 0.10, 0.05, and 0.01 (two-sided test), respectively. Standard errors are clustered by firms. Year fixed effect indicators are not reported for brevity. A detailed variable description is provided in the Appendix.

TABLE 5
Managerial Equity Holdings, Income Smoothing and Earnings Predictability

Panel A: Managerial Stock Holdings

Variables	Coefficient Estimate (*STK_HOLD* = continuous measure)	Coefficient Estimate (*STK_HOLD* = 1 if greater than median, 0 otherwise)
Intercept	0.2661***	0.3338***
X_{t-1}	–0.6193***	–0.6349***
X_t	0.3998***	0.4498***
X_{t3}	1.2804***	1.5804***
R_{t3}	–0.1261***	–0.1162***
IS_t	–0.0050	–0.0031
IS_t*X_{t-1}	0.0706	0.1173
IS_t*X_t	0.4375*	0.2703
IS_t*X_{t3}	–0.1260	–0.1844
IS_t*R_{t3}	0.0160	0.0038
STK_HOLD_{t-1}	0.0084***	0.0089
$STK\_HOLD_{t-1}*X_{t-1}$	0.0691***	0.0746***
$STK\_HOLD_{t-1}*X_t$	0.0662***	0.0812**
$STK\_HOLD_{t-1}*X_{t3}$	–0.0183	–0.0209
$STK\_HOLD_{t-1}*R_{t3}$	–0.0020	–0.0027
$STK\_HOLD_{t-1}*IS_t$	–0.0152	–0.0157*
$STK\_HOLD_{t-1}*IS_t*X_{t-1}$	–0.1662***	–0.1748***
$STK\_HOLD_{t-1}*IS_t*X_t$	0.0525	0.0304
$STK\_HOLD_{t-1}*IS_t*X_{t3}$	**0.0795*** **	**0.0911*** **
$STK\_HOLD_{t-1}*IS_t*R_{t3}$	–0.0031	–0.0030
Controls	YES	YES
Controls$*IS_t*X_{t3}$	YES	YES
Adj. R^2	0.385	0.378
N	11,579	11,579

(Table 5 continued on next page)

TABLE 5 (Continued)

Panel B: Managerial Option Holdings

Variables	Coefficient Estimate (*OPT_HOLD* = continuous measure)	Coefficient Estimate (*OPT_HOLD* = 1 if greater than median, 0 otherwise)
Intercept	0.2505***	0.2667***
X_{t-1}	–0.6374***	–0.6532***
X_t	0.4312***	0.6279***
X_{t3}	1.2914***	1.0469***
R_{t3}	–0.1196***	–0.1153***
IS_t	0.0250	–0.0684
IS_t*X_{t-1}	–0.1506	–0.0935
IS_t*X_t	0.4727*	0.4373*
IS_t*X_{t3}	–0.1446	–0.2362*
IS_t*R_{t3}	0.0087	0.0188
OPT_HOLD_{t-1}	0.0080	0.0124
$OPT\_HOLD_{t-1}*X_{t-1}$	0.0102	–0.0062
$OPT\_HOLD_{t-1}*X_t$	–0.0881*	–0.0897*
$OPT\_HOLD_{t-1}*X_{t3}$	0.0562**	0.0469**
$OPT\_HOLD_{t-1}*R_{t3}$	0.0064	0.0051
$OPT\_HOLD_{t-1}*IS_t$	0.0198	0.0109
$OPT\_HOLD_{t-1}*IS_t*X_{t-1}$	–0.1503	–0.1041
$OPT\_HOLD_{t-1}*IS_t*X_t$	0.3589***	0.3106***
$OPT\_HOLD_{t-1}*IS_t*X_{t3}$	**–0.1536*** **	**–0.1348*** **
$OPT\_HOLD_{t-1}*IS_t*R_{t3}$	–0.0080	–0.0072
Controls	YES	YES
Controls$*IS_t*X_{t3}$	YES	YES
Adj. R^2	0.394	0.389
N	11,579	11,579

Panel A (Panel B) of Table 5 provides test results using the full sample and adding to model (3) the interaction of *STK_HOLD* (*OPT_HOD*) three-way interaction with all variables. The three-way interaction of $STK\_HOLD*IS_t*X_{t3}$ ($OPT\_HOLD*IS_t*X_{t3}$) provide our hypothesis test of H1 (H2). The results are shown using both continuous variables (first column) and indicator variables defined as above/below the median (second column) for *STK_HOLD* and *OPT_HOLD*. The dependent variable is the annual stock return (R_t). Two-sided p-values are presented along with coefficient estimates. Standard errors are clustered by firms. Year fixed effect indicators are not reported for brevity. A detailed variable description is provided in the Appendix.

TABLE 6
Managerial Equity Holdings, CEO Characteristics and Income Smoothing Incentive

Panel A: Managerial Stock Holdings

	CEO Duality		CEO Tenure	
Variables	Yes	No	Low	High
Intercept	0.2063***	0.3572***	0.3143***	0.2617***
X_{t-1}	–0.4654***	–0.8186***	–0.7485***	–0.3849***
X_t	0.1322***	0.5895***	0.6073***	0.3349***
X_{t3}	0.5581***	0.5755***	1.1060***	1.3961***
R_{t3}	–0.1473***	–0.0945***	–0.1119***	–0.1170***
IS_t	–0.0558*	–0.0953**	–0.0067	–0.0152
IS_t*X_{t-1}	–0.2313***	0.4897***	0.4982***	–0.5878***
IS_t*X_t	–0.1767***	0.1940	0.0304	0.7592***
IS_t*X_{t3}	0.4914**	0.6799**	0.0023	–0.1374
IS_t*R_{t3}	0.0714*	–0.0295	0.0031	0.0023
STK_HOLD_{t-1}	–0.0006	0.0308***	–0.0082	0.0123
$STK\_HOLD_{t-1}*X_{t-1}$	0.0312	0.1225***	0.0788***	0.0367
$STK\_HOLD_{t-1}*X_t$	0.1036**	–0.0390	–0.0775	0.1492***
$STK\_HOLD_{t-1}*X_{t3}$	–0.0089	–0.0692***	0.0822***	–0.0217
$STK\_HOLD_{t-1}*R_{t3}$	0.0055	–0.0109	–0.0030	–0.0078
$STK\_HOLD_{t-1}*IS_t$	–0.0039	–0.0429**	0.0070	–0.0196
$STK\_HOLD_{t-1}*IS_t*X_{t-1}$	–0.0498	–0.2248*	–0.3138***	–0.0299
$STK\_HOLD_{t-1}*IS_t*X_t$	–0.0259	0.0907	0.4054***	–0.1364
$STK\_HOLD_{t-1}*IS_t*X_{t3}$	**0.0683****	**0.1696*****	**0.0732*****	**0.0846*****
$STK\_HOLD_{t-1}*IS_t*R_{t3}$	–0.0139	0.0029	–0.0009	0.0020
Controls	YES			
Controls$*IS_t*X_{t3}$	YES			
Adj. R^2	0.412	0.399	0.410	0.387
N	5,542	6,037	5,792	5,787
F-Test	7.73***		1.28	

(Table 6 continued on next page)

TABLE 6 (Continued)

Panel B: Managerial Option Holdings

	CEO Duality		CEO Tenure	
Variables	Yes	No	Low	High
Intercept	0.2902***	0.2961***	0.2719***	0.3349***
X_{t-1}	–0.4887***	–1.1444***	–0.6361***	–0.7505***
X_t	0.4589***	1.2956***	0.8650***	0.5334***
X_{t3}	0.4485***	0.5459***	0.4010***	0.5154***
R_{t3}	–0.0970***	–0.0529	–0.0834***	–0.0840***
IS_t	–0.1249***	–0.0305	–0.0674	–0.1018*
IS_t*X_{t-1}	–0.2520	1.0439*	–0.3219	0.4726
IS_t*X_t	–0.0555	–0.0009	–0.7515	–0.7122
IS_t*X_{t3}	1.2488***	0.1216***	0.5913	1.0233***
IS_t*R_{t3}	–0.0263	–0.0817	0.0009	–0.0656
OPT_HOLD_{t-1}	–0.0138	0.0190	0.0082	–0.0098
$OPT\_HOLD_{t-1}*X_{t-1}$	0.0206	0.0826	–0.0463	0.0910*
$OPT\_HOLD_{t-1}*X_t$	–0.0219	–0.4345***	–0.1891*	–0.0988
$OPT\_HOLD_{t-1}*X_{t3}$	0.1015***	0.0294	0.0924***	0.0336
$OPT\_HOLD_{t-1}*R_{t3}$	–0.0137	–0.0232	–0.0279*	–0.0002
$OPT\_HOLD_{t-1}*IS_t$	0.0584***	–0.0190	0.0299	0.0265
$OPT\_HOLD_{t-1}*IS_t*X_{t-1}$	–0.1337	–0.4361***	0.1510	–0.4938***
$OPT\_HOLD_{t-1}*IS_t*X_t$	0.1517	1.3052***	0.5780***	0.5229***
$OPT\_HOLD_{t-1}*IS_t*X_{t3}$	**–0.2248*** **	**–0.0664**	**–0.1809*** **	**–0.0973**
$OPT\_HOLD_{t-1}*IS_t*R_{t3}$	0.0251	0.0287	0.0282	0.0065
Controls	YES			
Controls$*IS_t*X_{t3}$	YES			
Adj. R^2	0.388	0.414	0.402	0.391
N	5,542	6,037	5,792	5,787
F-Test	15.68***		15.13***	

Table 6 provides subsample test results partitioned on CEO duality and median CEO tenure. *, **, and *** represent significance levels at 0.10, 0.05, and 0.01 (two-sided test), respectively. Standard errors are clustered by firms. Year fixed effect indicators are not reported for brevity. A detailed variable description is provided in the Appendix.

TABLE 7
Managerial Equity Holdings, Income Smoothing and Earnings Persistence

Panel A: Managerial Stock Holdings

Variables	High		Low
Intercept	0.1261***		0.2470***
X_t	0.7959***		0.1970***
IS_t	–0.0204		–0.1196*
IS_t*X_t	**1.7580*** **		**0.5712*** **
Controls		YES	
ControlsIS_t*X_t*		YES	
Adj. R^2	0.245		0.304
N	5,790		5,789
F-Test		9.86***	

Panel B: Managerial Option Holdings

Variables	High		Low
Intercept	0.2656***		0.1757***
X_t	0.2130***		0.5536***
IS_t	–0.1823***		–0.1639***
IS_t*X_t	**0.1890*** **		**0.5339*** **
Controls		YES	
ControlsIS_t*X_t*		YES	
Adj. R^2	0.262		0.219
N	5,790		5,789
F-Test		8.12***	

Panel A (Panel B) of Table 6 provides test results for the earnings persistence model, using the CEO's stock (option) holdings. The dependent variable is cumulative earnings over the subsequent three years (X_{3t}). Standard errors are clustered by firms. Year fixed effect indicators are not reported for brevity. A detailed variable description is provided in the Appendix.

TABLE 8
Tests of Out-of-the-Money Option Holdings

Panel A: Median Split Approach

	OPT_HOLD = OM_OPT	
Variables	High	Low
Intercept	0.3001***	0.3864***
X_{t-1}	–0.3580***	–0.4957***
X_t	0.5541***	0.8252***
X_{t3}	0.8651***	0.3999***
R_{t3}	–0.1028***	–0.1273***
IS_t	–0.1662***	–0.2903***
IS_t*X_{t-1}	–0.6376***	0.0055
IS_t*X_t	0.1474***	0.4360***
IS_t*X_{t3}	**–0.1898*** **	**0.2167*** **
IS_t*R_{t3}	–0.0123	0.0842***
SIZE	0.0014	0.0194***
BM	–0.4296***	–0.4465***
GROWTH	0.2582***	0.2405***
LEV	–0.4171***	–0.2577***
INVEST	0.1143	–0.1221
PPE	0.0457	0.0285
EARNVAR	2.2520***	2.6603***
ANALYST	–0.0103	0.0006
LOSS	0.1033***	0.0469**
ControlsIS_t*X_{t3}*	YES	
Adj. R^2	0.459	0.440
N	5,785	5,794

F-test of H2: High ***IS_t*X_{t3}*** = Low ***IS_t*X_{t3}*** = 15.51***

TABLE 8 (Continued)

Panel B: Full Model and CEO Characteristics

	All Firms	CEO Duality		CEO Tenure	
Variables		Yes	No	Low	High
Intercept	0.2331***	0.2145***	0.2607***	0.2373***	0.2530***
X_{t-1}	–0.6935***	–0.5135***	–1.0062***	–0.6212***	–0.7731***
X_t	0.4501***	0.4498***	0.6261***	0.4510***	0.4754***
X_{t3}	1.3779***	1.4323***	1.1123***	1.4304***	1.2089***
R_{t3}	–0.1247***	–0.1382***	–0.1058***	–0.1412***	–0.1060***
IS_t	0.0172	0.0173	0.0348	–0.0043	0.0386
IS_t*X_{t-1}	–0.1554	–0.3479	0.3152	–0.2220	0.0404
IS_t*X_t	0.6925**	0.5377	0.6338	0.5200	0.6976
IS_t*X_{t3}	–0.1524*	–0.0795	–0.2854**	–0.0670	–0.1138
IS_t*R_{t3}	0.0257	0.0430	0.0025	0.0392	0.0078
OM_OPT_{t-1}	0.0011	–0.0153	0.0268**	–0.0138	0.0165
$OM\_OPT_{t-1}*X_{t-1}$	0.0340	–0.0028	0.0976***	0.1163***	–0.0847*
$OM\_OPT_{t-1}*X_t$	–0.1152***	–0.0475	–0.2054***	–0.2664***	0.0432
$OM\_OPT_{t-1}*X_{t3}$	0.0429*	0.0912***	0.0143	0.0779***	0.0426
$OM\_OPT_{t-1}*R_{t3}$	0.0055	–0.0013	0.0054	0.0191***	–0.0107
$OM\_OPT_{t-1}*IS_t$	0.0105	0.0418***	–0.0352	0.0312**	–0.0170
$OM\_OPT_{t-1}*IS_t*X_{t-1}$	–0.1452	–0.0818	–0.2188	–0.4909***	0.2868**
$OM\_OPT_{t-1}*IS_t*X_t$	0.3740***	0.1789	0.5966***	0.7448***	–0.0437
$OM\_OPT_{t-1}*IS_t*X_{t3}$	**–0.1068*** **	**–0.1938*** **	**–0.0515**	**–0.1678*** **	**–0.0517**
$OM\_OPT_{t-1}*IS_t*R_{t3}$	–0.0135	–0.0017	–0.0158	–0.0290*	0.0043
Controls			YES		
Controls$*IS_t*X_{t3}$			YES		
Adj. R^2	0.388	0.383	0.417	0.397	0.398
N	11,579	5,218	6,361	5,792	5,787
F-Test		6.92***		10.98***	

Table 8 provides test results of H2 using the percentage of out-of-the-money options. Panel A (Panel B) is based on the median-split (three-way interaction) approach. The dependent variable is the annual stock return (R_t). Standard errors are clustered by firm. Year fixed effects and control variables are not reported for brevity. A detailed variable description is provided in the Appendix. *, **, and *** represent significance levels at 0.10, 0.05, and 0.01 (two-sided test), respectively.