CFO Fiduciary Responsibilities and Incentive Compensation

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ABSTRACT

We examine how firms evaluate and compensate their chief financial officers (CFOs). CFOs participate in decision making much like other executives, but unlike most other executives they have fiduciary responsibilities for reporting firms’ financial results and safeguarding the integrity of financial reporting. Responsibility for financial reporting raises the question of whether it is appropriate to reward CFOs contingent on financial performance that is effectively self-reported. In this paper, we provide a framework that characterizes CFO incentive compensation practices as a tradeoff between CFOs’ decision-making responsibilities and their fiduciary duties over financial reporting. This framework yields a number of implications which we examine empirically using a proprietary survey of CFO compensation practices of public and private firms. For instance, we find that from 2003 to 2007 public entities (relative to private entities) reduced the percentage of CFO bonuses contingent on financial performance. We interpret this result as evidence that firms mitigate earnings management or other misreporting practices in part by deemphasizing CFO incentive compensation.
1 Introduction

In response to a number of prominent corporate failures, recent regulations have called for reforms aimed at strengthening financial reporting, executive compensation and other governance practices. Executives most affected by these governance reforms are the chief executive officer (CEO) and chief financial officer (CFO). Although much is written about the role of CEOs and their compensation in corporate governance, there is very little research examining the role of CFOs and their incentives. In this paper, we examine how firms evaluate and compensate their CFOs.

What sets CFOs apart from other executives are their significant responsibilities safeguarding the integrity of financial reporting and other internal organizational controls, areas most recently targeted for governance reform. Although other top executives have fiduciary responsibilities for financial reporting as well, CFOs typically have more of an expertise and capacity to determine what numbers get reported (Mian [2001], Geiger and North [2006]). However, responsibility for financial reporting raises an important question: Is it is appropriate to award CFOs incentive compensation based on performance that is effectively self-reported? Indeed, according to a former IRS commissioner (testifying before the Senate Finance Committee), CFOs, top corporate attorneys, and board chairs who are charged with “minding the cookie jar” should have little or no incentives and instead should get “generous but fixed compensation” (Katz [2006]). While the commissioner’s argument is a prima facie reasonable, prior evidence as well as the survey findings we present in this paper show that firms routinely award CFOs substantial incentive compensation tied to financial performance.

To provide a framework to understand why firms award CFOs compensation tied to financial performance, we present an agency model that features two executives, an operating
manager (say a CEO) performing a productive task and a CFO entrusted with dual responsibilities. We assume the CFO performs a productive task much like other executives but is also charged with fiduciary duties to report profits as accurately as possible. These fiduciary duties imply that CEO and CFO incentives are (positively) linked which is a feature of our model corroborated by our survey evidence. Further, we find that a CFO’s incentive compensation reflects the costs and benefits of his dual responsibilities with the key insight that using reported profit to motivate CFOs to be productive necessarily implies some tolerance for misreporting. While our model has a number of other implications that we subject to empirical scrutiny, we highlight below two results that have implications for changes in CFO compensation practices in the post Sarbanes-Oxley (SOX) environment.

The first result concerns how costs of misreporting borne personally by CFOs affect their incentive compensation. We find that if CFOs bear greater misreporting costs, then firms offer their CFOs steeper incentives tied to financial performance. The intuition is straightforward; if CFOs are more conscientious in discharging their fiduciary duties, then firms are more comfortable offering steeper incentives since rewards for reported performance are less susceptible to unwarranted overpayments. The second result concerns how costs of misreporting borne by firms (as opposed to CFOs) affect CFO incentive compensation. Here, we find that as misreporting becomes more costly, firms are less willing to tolerate misreporting. Hence, firms offer their CFOs weaker incentives tied to financial performance to expressly motivate them to focus more on their fiduciary duties.

In the context of SOX, the empirical implications of our results are as follows. First, to the extent that SOX substantially increased misreporting penalties for executives in charge of the financial reporting process or otherwise exogenously improved financial reporting quality (e.g., Cohen, Dey, and Lys [2007], Zhang [2007]), we expect an increase in the sensitivity of CFO
compensation to reported financial performance. At the same time, if capital market participants are far more sensitive to firms’ accounting (mis)representations and/or react negatively to disclosures of internal control weaknesses in the post-SOX environment (e.g., Ashbaugh-Skaife et al. [2007], Hammersley, Myers, and Shakespeare [2008]), then we expect firms to endogenously motivate improvements in financial reporting quality via a decrease in the sensitivity of CFO compensation to reported financial performance.

Given these two countervailing predictions (as well as the presence of confounding effects such as time trends in executive compensation), isolating the effect of SOX on CFO compensation is an empirical challenge. An ideal test would examine how CFO incentives changed following SOX for firms complying with the legislation vis-à-vis firms unaffected by the legislation. Unfortunately, public databases (e.g., Execucomp) used in prior studies typically cover large public firms all of which had to comply with SOX. In contrast, we rely on a proprietary survey of CFO performance evaluation and compensation practices of public and private firms (described below). Since public firms were affected by SOX much more than private firms, our approach allows for an identification strategy of the SOX-effect on CFO compensation that has not been feasible in prior literature.

Specifically, we use a database of CFO compensation practices obtained by surveying about 30,000 members of the American Institute of Certified Public Accountants who are CFOs, CEOs, or other executives informed about CFO and CEO compensation. In a sample of 1,353

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1 There is some recent evidence suggesting that sensitivity of executive compensation to financial performance has increased in the post-SOX environment (e.g., Carter, Lynch, and Zechman [2007], Chen, Jeter, and Yang [2007]).

2 Moreover, public databases rarely provide details concerning the proportion of incentive compensation linked to reported financial performance, the focus of interest in our study.

3 The dataset includes information corresponding to both corporate and business unit entities. In what follows, the label CFO refers to corporate chief financial officers (for corporate level entities) as well as business unit controllers (for business unit entities). Similarly, CEO refers to the top executive either at the corporate or business unit level.
respondents from both public and private entities, we find that annual bonuses are by far the most common incentive component of CFO compensation plans and that, on average, about fifty percent of CFO bonuses are based on accounting-based financial performance. Moreover, consistent with our model, we show that CEO and CFO incentive compensation tied to financial performance are highly correlated. In addition, we find that cross-sectional variation in the emphasis on financial performance measures in CFO compensation is broadly consistent with the predictions of our model.

More importantly, we find that from 2003 to 2007 public entities (relative to private entities) lowered the percentage of CFO bonuses contingent on financial performance. Specifically, we compare the bonus weight on financial performance measures that is expected in 2007 with the actual bonus weight in 2003 (indicative of incentives in the pre-SOX environment) and find marked differences for public versus private entities. For example, predicted values from one of our regressions suggest that a public company (with median sample characteristics) lowered the percentage of their CFO’s bonus that depends on financial performance by about six percent while a comparable private company with similar characteristics increased the percentage by about three percent.

Our findings contribute to the literature in at least three ways. First, we provide new evidence pertaining directly to the importance of accounting-based financial performance measures in evaluating and compensating CFOs. Second, our findings inform the corporate governance debate whether CFOs should be earning incentive compensation contingent on reported financial performance. Both our theory and evidence corroborate the notion that CFO fiduciary responsibilities are inconsistent with high-powered incentive compensation. At the same time, our results suggest that some incentive compensation is necessary, and more so in settings where CFOs make value-enhancing contributions.
Finally, we contribute to the growing literature on how greater regulatory scrutiny in the post-SOX environment has affected executive compensation. Using private entities as a control group (that did not have to comply with SOX), we find that public entities in our sample have decreased the emphasis on financial performance in CFO compensation in the post-SOX environment. Relying on our theoretical model, we interpret this result as evidence that firms mitigate earnings management or other misreporting practices in part by deemphasizing CFO incentive compensation.

The rest of the paper is organized as follows. In the next section, we briefly outline our theoretical model and characterize the optimal linear contract in a setting where a CFO self-reports performance. Subsequently, we discuss empirical implications of our model. In section 3, we describe our data and empirical measures. In section 4, we present our results and sensitivity analyses. Finally, in section 5 we offer some concluding remarks.

2 Background and Theory

2.1 BACKGROUND AND LITERATURE

A key fiduciary responsibility of a CFO is to produce financial statements that fairly represent a firm’s financial condition. Although overseeing the financial reporting process of a firm is a collective responsibility of all executives, CFO effort in this regard is likely to be the most important determinant of financial reporting quality (Mian [2001]). For example, Geiger and North [2006] find that discretionary accruals decrease significantly following the appointment of a new CFO (and the change is not driven by a concurrent appointment of a new CEO). Prior research also underscores the importance of CFO qualifications in improving internal controls and financial reporting quality (e.g., Aier et al. [2005], Li, Sun, and Ettredge [2007]).
In addition to fulfilling their fiduciary responsibilities, CFOs may also have significant decision-making responsibilities since they often serve as members of firms’ senior executive team (Siegel and Sorensen [1999]). Since incentives for financial performance may be necessary to motivate CFOs to perform their decision-making responsibilities, fiduciary responsibilities over financial reporting effectively means that CFOs are rewarded based on performance measures they themselves generate. The next section incorporates this tension into a theoretical model of CFO compensation which we later rely on to guide our empirical inquiry of how firms design CFO incentives to balance their fiduciary responsibilities (e.g., the need for unbiased reporting) and decision-making responsibilities (e.g., the need for productive effort).

Despite the large body of research on executive compensation issues, empirical research specifically addressing the design of incentive compensation for CFOs is only emerging. Gore, Matsunaga, and Yeung [2007] find CFO incentive strength is negatively associated with the presence of a board finance committee and a CEO with financial expertise. Hoitash, Hoitash, and Johnstone [2007] find that CFO bonuses are negatively associated with the disclosure of internal control material weaknesses and that this relationship is moderated by CFO expertise, reputation, and board of director strength. Burks [2007] finds no association between CFO bonuses and accounting restatements but a greater likelihood of CFO turnover following a restatement.

Closely related to our study, Wang [2006] argues that CFOs are the executive officers primarily responsible for firms’ financial reporting processes and examines the impact of SOX on CFO incentives. Wang’s findings suggest that CFO compensation is more sensitive to stock

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4 There is some evidence that CFOs’ fiduciary and decision-making responsibilities have countervailing consequences. For example, Indjejikian and Matějka [2006] show that when business unit CFOs focus more on helping local managers (as opposed to focusing on corporate-level fiduciary responsibilities), local decision making is improved but at the expense of less control that manifest in the form of local managers enjoying greater budgetary slack.
returns in the post-SOX environment in firms with a weak board structure. Wang also finds that the sensitivity of CFO cash compensation to stock returns has decreased post-SOX for firms with strong boards and operating in high risk environments (characterized by frequent securities litigation or internal control deficiencies).

Also related to our work are several studies examining the impact of SOX on CEO and other executive compensation. Several studies suggest that sensitivity of executive compensation to earnings increased following the enactment of SOX legislation in particular for firms with weak corporate governance in the pre-SOX period (Carter, Lynch, and Zechman [2007], Chen, Jeter, and Yang [2007], Paligorova [2007]). On the other hand, Cohen, Dey, and Lys [2007] find that sensitivity of CEO wealth to changes in shareholder wealth decreased following the passage of SOX and that this trend was accompanied by a decrease in option compensation and an increase in cash compensation levels.

A common feature of all of the above cited studies is that they rely on the Execucomp database when examining the impact of SOX on executive compensation. The limitation of this database is that it only covers large public entities all of which had to comply with the provisions of SOX making it difficult to isolate the effect of the regulatory intervention as distinct from a general time trend (Meyer [1995]). For example, the finding that sensitivity of executive compensation to earnings increased post-SOX could at least partly be attributed to the trend to substitute stock options with cash compensation which started even before the passage of SOX (Cohen, Dey, and Lys [2007]). Many of the above studies explicitly recognize the issue, nevertheless, it remains an empirical challenge to construct control groups that were arguably less affected by SOX (examples of such control groups in prior literature include firms with high percentage of independent directors on their boards, firms with low discretionary accruals prior to 2002, etc.). In contrast, our study relies on survey data including both public companies that
had to comply with SOX and private companies unaffected (or much less affected) by the legislation. Thus, our dataset allows for an identification strategy of the SOX-effect on CFO compensation that has not been feasible in prior literature.

To structure our empirical inquiry, we first derive empirically testable predictions from an agency model of CEO and CFO compensation. Subsequently, we describe our data and test the predictions of our model.

2.2 THEORETICAL MODEL

To characterize a setting where CFOs’ fiduciary and decision-making responsibilities are considered jointly, we rely on an agency model where a risk-neutral principal (hereafter the firm) hires two managers (hereafter the CEO and the CFO) to run the firm. The firm’s economic profit \( x \) is given by

\[
x = \theta + b_{\text{CEO}}e_{\text{CEO}} + b_{\text{CFO}}e_{\text{CFO}}
\]

where \( e_i, i = \text{CEO}, \text{CFO} \) is manager \( i \)’s unobservable effort, and \( b_i \) and \( \theta \) are manager-specific and/or firm-specific characteristics. The \( b_i \)s are known constants representing marginal product of effort, and the \( \theta \) is a normal random variable, \( \mathcal{N}(\bar{\theta}, \sigma^2_\theta) \), representing other economic factors affecting firm value.

Both managers are risk-averse with negative exponential utility and risk aversion parameter \( r_i \) and providing effort that is costly to the tune of \( \frac{1}{2}e_i^2 \). Next, we assume the two managers’ contracts are linear in reported profit \( R \) as in

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5 We can easily extend the model to several agents as long as one of the agents performs a distinct set of duties commonly delegated to a CFO as described below. Also, for simplicity, we assume that managers perform their respective tasks simultaneously and preclude the possibility of collusion between them.
\[ W_i = \alpha_i + \beta_i R \]  

(2)

where \( \alpha_i \) is the fixed component of a manager’s compensation, \( \beta_i \) is the incentive coefficient and \( R \) is a profit report given by

\[ R = x + \varepsilon \]  

(3)

where \( x \) is economic profit as in (1), and \( \varepsilon \) is \( N(\bar{\varepsilon}, \sigma_\varepsilon^2) \). Of course, the firm prefers \( \sigma_\varepsilon^2 \) to be as low as possible since “noisy” performance measures are costly vehicles for evaluating risk-averse executives. We also assume that the firm bears (expected) misreporting costs of \( \frac{1}{2} \lambda \bar{\varepsilon}^2 \) (with \( \lambda > 0 \)) if the profit report is biased. In this spirit, we characterize the CFO’s fiduciary responsibility for financial reporting as his ability to influence the distribution of \( \varepsilon \) so that \( \bar{\varepsilon} \) is reduced or eliminated and \( \sigma_\varepsilon^2 \) is as low as possible, i.e., so that there is a close correspondence between the profit report \( R \) and the economic profit \( x \).

As a baseline, we consider a case with no agency conflict regarding CFO fiduciary responsibilities—we assume that CFO effort to reduce measurement error is observable and that \( \bar{\varepsilon} = 0 \). Later we consider the CFO’s role in reducing bias as well as measurement error.

**Baseline setting \((\bar{\varepsilon} = 0)\)**

Let \( \bar{\varepsilon} = 0 \) and assume that \( \sigma_\varepsilon^2 = \sigma^2 / (1 + h) \) where \( h \in [0, \infty) \) represents activities undertaken by the CFO to reduce measurement error (i.e., \( \sigma_\varepsilon^2 \)) at a cost of \( h \). We assume \( h \) is observable to avoid the need to motivate \( h \) via incentive compensation although we could easily consider a setting where \( h \) is unobservable as well. Given the standard LEN assumptions described above, the CEO’s and the CFO’s optimal productive actions, \( e_{CEO} \) and \( e_{CFO} \) respectively, are given by

\[ e_{CEO} = \beta_{CEO} p_{CEO}; \quad e_{CFO} = \beta_{CFO} p_{CFO}. \]  

(4)
In turn, the optimal incentive coefficients, \((\beta_{CEO}, \beta_{CFO})\) and the optimal choice of \(h\) jointly solve the following (proofs provided in Appendix A).

\[
\beta_{CEO} = \frac{b_{CEO}^2}{b_{CEO}^2 + r_{CEO} \left( \sigma^2 + \frac{\sigma^2}{1+h} \right)}; \quad \beta_{CFO} = \frac{b_{CFO}^2}{b_{CFO}^2 + r_{CFO} \left( \sigma^2 + \frac{\sigma^2}{1+h} \right)} \tag{5a}
\]

and

\[
\frac{(r_{CEO} \beta_{CEO}^2 + r_{CFO} \beta_{CFO}^2) \sigma^2}{2(1+h)^2} = 1. \tag{5b}
\]

As expected, expression (5a) suggests that incentive compensation is necessary to motivate productive effort for both the CEO and CFO. What is less transparent however is that, despite the distinct roles of the CEO and the CFO, the two incentive coefficients are positively linked via the optimal choice of \(h\) in (5b). To see this, consider for instance how CFO incentives change as the CEO becomes more productive (i.e., as \(b_{CEO}\) increases). Clearly, an increase in \(b_{CEO}\) (CEO’s marginal product) implies a first-order increase in \(\beta_{CEO}\) reflecting a need to motivate a more productive CEO. In turn, this creates demand for more accurate reporting and motivates further reductions in measurement error (i.e., higher \(h\)) in (5b) to offset the increasing risk premium associated with an increasing \(\beta_{CEO}\). Of course, less measurement error also implies a higher \(\beta_{CFO}\).

In general, the preceding discussion suggests that, as the need to motivate and reward various decision-makers in an organization increases, CFO incentives also increase. An immediate empirical implication is that CFO incentives are positively correlated with CEO incentives (or other executives’ incentives). However, while strong incentives may be appropriate for the CEO and other executives, CFOs are the ones primarily in charge of the
financial reporting process and strong incentives could conflict with their role in preventing misreporting. Below, we extend our baseline model to examine this conflict.

Motivating a CFO to reduce bias

In this section, we let \( \bar{\epsilon} = k(1 - q) \geq 0 \) so that, on average, reported profits overstate economic profits. We assume \( k \geq 0 \) is a known parameter which measures the extent to which reported profit is susceptible to misreporting, and we let \( q \in [0,1] \) be the CFO’s unobservable choice.\(^6\) In particular, we assume the CFO has a responsibility to ensure that the bias in \( R \) is reduced or eliminated by increasing \( q \) (thereby reducing \( \bar{\epsilon} \)), and that failure to do so inevitably implies a loss of reputation or personal cost to him of \( c(q) = \frac{1}{2}c(1 - q)^2 \) (with known \( c > 0 \)). That is, the CFO invariably prefers unbiased reporting (i.e., \( q = 1 \)) unless of course misreporting is explicitly rewarded.

In this setting, the CEO’s and the CFO’s optimal productive actions, \( e_{CEO} \) and \( e_{CFO} \) respectively, are given by (4) and the CFO’s choice of \( q \) is given by

\[
1 - q = \frac{k\beta_{CFO}}{c}.
\]  

Expression (6) suggests that the CFO’s choice of \( q \) is always less than the preferred maximum of one unless he is paid a flat wage (i.e., \( \beta_{CFO} = 0 \)). Note that this is a confirmation of the intuition in Dye (1988), Evans and Sridhar (1996), Goldman and Slezak (2006) and Crocker and Slemrod (2007) among others, namely that if reported profit is to be used to motivate agents to be productive, then some overstatements of reported performance need to be tolerated.

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\(^6\) Although \( k \) is an exogenously specified parameter in our model, it is conceivable that \( k \) arises endogenously via the strategic choices of other executives in the organization including the CEO.
For the firm, the optimal incentive coefficients \((\beta_{CEO}, \beta_{CFO})\) and the optimal choice of \(h\) jointly solve the following (proofs provided in Appendix A).

\[
\beta_{CEO} = \frac{b_{CEO}^2}{b_{CEO}^2 + r_{CEO}\left(\sigma_\theta^2 + \frac{\sigma^2}{1+h}\right)}, 
\]

\(7a\)

\[
\beta_{CFO} = \frac{b_{CFO}^2}{b_{CFO}^2 + \frac{k^2}{c} + \lambda \left(\frac{k^2}{c}\right)^2 + r_{CFO}\left(\sigma_\theta^2 + \frac{\sigma^2}{1+h}\right)},
\]

\(7b\)

and

\[
\frac{(r_{CEO}\beta_{CEO}^2 + r_{CFO}\beta_{CFO}^2)\sigma^2}{2(1+h)^2} = 1.
\]

\(7c\)

Expressions (7a) through (7c) mirror the corresponding expressions in the baseline setting described above but for the effect of bias in the CFO’s incentive coefficient. Biased reporting is costly to the firm \((\frac{1}{2}\lambda \bar{z}^2)\), entails a reputation loss to the CFO, but nonetheless has to be tolerated to motivate the CFO to be productive. Consequently, the CFO’s incentives are more muted than in the baseline case but not eliminated. Expressions (7a) through (7c) also suggest a number of comparative statics concerning CFO incentives which we summarize in the following proposition (we note that parallel results hold for CEO incentives).

PROPOSITION 1: CFO incentives are (i) increasing in both the CFO’s and CEO’s marginal productivity; (ii) decreasing in the extent to which reported profit is susceptible to misreporting; (iii) increasing in CFO’s personal cost of misreporting; and (iv) decreasing in the cost of misreporting borne by the firm. That is:

\[
(i) \frac{d\beta_{CFO}}{db_{CFO}} > 0, \frac{d\beta_{CFO}}{db_{CEO}} > 0 ; (ii) \frac{d\beta_{CFO}}{dk} < 0 ; (iii) \frac{d\beta_{CFO}}{dc} > 0; \text{ and } (iv) \frac{d\beta_{CFO}}{d\lambda} < 0.
\]
The intuition for the first result is the same as in the baseline case—when either manager is more productive, CFO incentives are steeper. In contrast, if $k$ is high and the profit report is more susceptible to misreporting or if $c$ is low and the CFO is more inclined to tolerate misreporting, CFO incentives are muted to mitigate misreporting in the form of overstated performance (and consequently the payment of excessive compensation). Finally, when the misreporting costs borne by the firm are high, CFO effort in preventing misreporting is more important and incentives are muted to avoid compromising CFO’s fiduciary responsibilities.

2.3 EMPIRICAL IMPLICATIONS

The above results have implications for the extent to which firms emphasize financial performance measures ($R$ in our model) in CFO incentive compensation. Part (i) of Proposition 1 predicts that CFO incentives tied to financial performance will be positively associated with proxies for marginal productivity of CFOs and other executives (section 3 describes our proxies in more detail). Part (ii) predicts a negative association between CFO incentives tied to financial performance and susceptibility of accounting systems to misreporting. In section 4, we test these two predictions to empirically corroborate our model.

Additionally, we rely on parts (iii) and (iv) of Proposition 1 to examine the effect of SOX on CFO incentive compensation. Much of prior literature argues that SOX increased the integrity of financial reporting. However, as explained below, our results suggest that improved financial reporting quality can have very different implications for CFO compensation depending on assumptions about what drove such improvements.

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*While empirical implications of our model can be tested with both CEO and CFO compensation data, we focus on CFO incentives where we expect the conflict between productive and fiduciary responsibilities to be most pronounced.*
One provision of SOX makes CEOs and CFOs responsible for establishing and maintaining internal controls and requires them to certify that financial statements fairly present results of operations. SOX has also increased the severity of civil and criminal penalties (incl. imprisonment) for violations. As a consequence, the personal liability of CEOs and CFOs for misreporting increased (e.g., Carter, Lynch, and Zechman [2007], Cohen, Dey, and Lys [2007]). These SOX provisions can be characterized within the framework of our model as an increase in $c$ (greater CFO loss of reputation or personal cost of misreporting). Ceteris paribus, an increase in $c$ leads to stronger incentives (part (iii) of Proposition 1).

However, in the post-SOX environment misreporting or inadequate internal controls also impose greater costs on the firm and/or its directors. For example, prior studies find that firms disclosing internal control weaknesses in the post-SOX environment experienced significant decreases in market valuation as well as increases in their cost of capital and audit fees (e.g., De Franco, Guan, and Lu [2005], Ashbaugh-Skaife et al. [2007], Hammersley, Myers, and Shakespeare [2008], Hogan and Wilkins [2008]). Within the framework of our model, these effects can be characterized as an increase in $\lambda$ (greater cost of misreporting borne by the firm) which, ceteris paribus, leads to weaker incentives (part (iv) of Proposition 1).

The effects of $c$ and $\lambda$ are countervailing. If the impact of higher personal costs for CFOs (increase in $c$) dominates the impact of higher misreporting costs borne by the firm (increase in $\lambda$), then we predict an increase in CFO compensation tied to financial performance after the passage of SOX. Conversely, if the increase in misreporting costs borne by the firm is the dominant force, then we predict a decrease in CFO incentive compensation tied to financial performance.
3 Empirical Design

3.1 SAMPLE

We construct our sample from a survey of 29,857 members of the American Institute of Certified Public Accountants (AICPA). This population is comprised of all AICPA members working in industry (rather than in public accounting firms) as corporate or business unit (BU) CFOs (controllers, VP finance) or CEOs (general managers). In March 2007, we sent an e-mail (with AICPA endorsement) inviting the AICPA members to participate in an on-line survey (by using an individual log-in key). This invitation was followed by two subsequent e-mails within two weeks of the initial e-mail to request participation of those who had not responded. By the end of May, 2,037 AICPA members fully or partially completed our on-line questionnaire yielding a response rate of 6.8%.

The on-line survey instrument consisted of 8 questionnaires with similar content that were customized depending on the type of respondent (there was a corporate- and BU-level version of the questionnaire for each of the following four types of respondents: CFO, CEO, other respondent informed about CEO/CFO compensation, other respondent not informed). All respondents participated anonymously and the questionnaire did not include any indicators of firm affiliation. The total number of items on the questionnaires ranged between 61 and 88 depending on the type of respondent.

We exclude 684 observations from the initial sample of 2,037 respondents because (i) we lack data on the type of entity (public vs. private or corporate vs. BU level), or (ii) the respondent

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8 In addition, we also surveyed AICPA members with other titles such as president or chief operating officer who are likely to be informed about executive compensation issues.

9 The survey instrument was extensively pre-tested by the authors, numerous colleagues with survey and/or management accounting expertise, and also by a sample of 24 AICPA members and other CFOs/CEOs who participated in earlier surveys of the authors (their responses are included in our data; excluding these 24 observations does not materially affect our results).
is neither CFO/CEO nor informed about their compensation, or (iii) the entity is a governmental or not-for-profit institution, or (iv) the SIC-2 industry classification code is greater than 81 (incl. educational, social services; museums; membership organizations; engineering, accounting, research services), or (v) sales are smaller than $10 million. Our final sample consists of 1,353 corporate and BU entities which meet our sample requirements (the number of observations available for analysis is smaller due to missing values). The respondents in our final sample are mainly CFOs (77% of the 1,353 respondents) but also CEOs (5%) or other executives informed about CFO/CEO compensation (18%).

3.2 MEASURES

3.2.1 Incentive Weight on Financial Performance Measures.

We ask several questions to collect information about CFO incentives. The first question (Question 1a in Appendix B) asks respondents to report the percentage of CFO bonus earned in 2006 that can be attributed to the achievement of (i) financial performance targets (denoted \( \text{FIN06} \)), (ii) financial performance targets of higher levels such as the firm or business group (\( \text{HLF06} \)) where appropriate (e.g., for BU CFOs), (iii) non-financial performance targets (\( \text{NFIN06} \)), and (iv) achievements evaluated subjectively without pre-set targets (\( \text{SUB06} \)). The question is based on an instrument commonly used in prior research (Gupta and Govindarajan [1984], Abernethy, Bouwens, and van Lent [2004]). Variations of this question (Question 1b and 1c) ask respondents to report the corresponding percentages in 2003 and the expected percentages in 2007 assuming performance exactly meets the targets on all measures.\(^{10}\)

\(^{10}\) We use abbreviations similar to those above to denote various components of CFO bonus plans, e.g., \( \text{FIN07} \) is the percentage of 2007 CFO bonus expected to be based on financial performance targets. We also have information on the components of CEO bonus in 2006 which we denote \( \text{FIN06\_CEO}, \text{HLF06\_CEO}, \text{etc.} \)
Question 2 in Appendix B asks respondents to report the dollar amount of bonus (denoted as $BONUS06$), long-term cash compensation, equity-based compensation, and other incentive compensation earned by CFOs in 2006. Question 3 asks respondents to report CFO annual salaries for 2006 ($SALARY$) and Question 4 asks respondents to report the dollar amount of bonuses expected in 2007 if performance exactly meets targets on all measures ($BONUS07$).

Given that annual bonuses represent the primary incentive compensation vehicle for most CFOs (only about 15% CFOs in our sample are eligible for a long-term cash incentive, and 22% for equity incentives), in what follows we focus exclusively on the choice of performance measures underlying annual bonuses. Since our model makes predictions about ex ante incentive strength, we construct our primary empirical measure of incentives using bonuses that CFOs expect to earn if financial performance targets are met in 2007. Specifically, we calculate $FINBON07$ as the percentage of annual salary CFOs expect to earn as a bonus for meeting financial performance targets:\footnote{11 We use 2006 CFO salaries since 2007 salaries are not available.}

$$FINBON07 = \frac{FIN07 \cdot BONUS07}{SALARY} \times 100$$

(8)

As an alternative measure of incentives tied to financial performance, we also consider just the expected percentage of bonus based on financial performance measures, i.e., $FIN07$ in the numerator of (8). Finally, as a third alternative, we construct $FINBON06$, bonuses earned for financial performance in 2006 as a percentage of annual salary:

$$FINBON06 = \frac{FIN06 \cdot BONUS06}{SALARY} \times 100$$

(9)

We note that $FINBON06$ is an ex post measure of incentive strength (e.g., $FINBON06$ can be zero due to poor performance in 2006 even if the compensation contract at the beginning
of the year allowed for a large bonus contingent on performance). Therefore, our tests relying on \textit{FINBON06} also control for performance in 2006.

3.2.2 \textit{Explanatory Variables}

To test the implications of our model (see Proposition 1), we assume that the post- SOX environment corresponds to higher CFO misreporting costs ($c$ in our model) and higher costs of misreporting borne by the firm ($\lambda$). In addition, we construct four cross-sectional proxies for the importance of value-enhancing effort ($b_{\text{CFO}}, b_{\text{CEO}}$) and one proxy for the susceptibility of accounting systems to misreporting ($k$). We discuss construction of these proxies and additional control variables below.

First, we expect the marginal product of effort of all executives (including the CFO) to be greater in high-growth settings because of the high opportunity cost of missed investment opportunities (Smith and Watts [1992], Baber, Janakiraman, and Kang [1996]). We measure \textit{GROWTH} by asking respondents about the percentage increase in sales in their organization relative to the prior year (Question 5 in Appendix B). We winsorize \textit{GROWTH} at the 1\% level to mitigate the influence of outlier observations.

Second, we expect the marginal product of CFO effort to be greater for firms and industries that rely more on external long-term debt financing since CFO input and expertise is likely to be more critical in these settings. We construct the median industry ratio of long-term debt over total assets by averaging the ratio (Data51/Data44) for each firm in the Compustat quarterly data file over all 20 quarters during 2001–2005. We then calculate \textit{LDEBT} as the industry (SIC-2 digit) median. We assign values of \textit{LDEBT} to observations in our sample by matching respondents’ descriptions of their industries (Questions 6 in Appendix B) with the SIC
industry classification. We assign missing values whenever a description does not allow for an unambiguous classification.

Third, we expect the marginal product of CFO effort to be greater for firms and industries with high inventories and/or accounts receivable where CFO involvement in working capital management has a greater impact on firm profits. We calculate $INREC$, the median industry ratio of inventory and receivables over total assets ($(\text{Data37}+\text{Data38})/\text{Data44})$ in a similar way as described above for $LDEBT$.

Fourth, we expect the marginal product of CFO effort to increase over his tenure as the CFO becomes more familiar and knowledgeable about his firm’s operations. We calculate $TENURE$ as the log of the number of years served as the CFO (we use the logarithm transformation to reduce deviations from normality).

Constructing a proxy for susceptibility of accounting systems to misreporting is a challenging task. Prior literature typically has relied on detailed information extracted from firms’ financial statements and other corroborating sources to infer misreporting behavior, often with varying success. Unfortunately, since our respondents’ firm affiliations are unknown, we cannot replicate misreporting or earnings management proxies commonly employed in the literature. Nevertheless, our survey does include information about CEO turnover which is an important predictor of earnings management. For example, prior literature has shown that the period surrounding CEO turnover is associated with greater frequencies of asset write-offs, accounting method changes, and recordings of large accruals (e.g., Murphy and Zimmerman...
[1993], Pourciau [1993]). In this spirit, we use an indicator variable CEOTURN as a proxy for susceptibility of the accounting system to misreporting.\footnote{CEOTURN equals one if a new CEO was appointed in the last two years. Given that respondents answer the question between March and May 2007, it includes all entities with a new CEO during 2006.}

Finally, we also control for ownership status of entities in our sample, the organizational level employing the CFO (corporate vs. BU), as well as the size of the entity. Specifically, we use the following indicator variables: (i) PUBLIC_CORP for publicly listed (independent) companies, (ii) PRIVATE_CORP for independent companies that are privately owned, (iii) PUBLIC_BU for business units of publicly listed companies, and (iv) PRIVATE_BU for business units of privately-owned companies. Our proxy for size, labeled SIZE, is the log of the number of employees at a company or BU in our sample. We recognize that size, ownership status, or entity level (corporate vs. BU) may also proxy for the importance of CFO value-enhancing effort, the susceptibility of accounting systems to misreporting, or the cost of misreporting borne by the firm. Nonetheless, absent theoretical guidance, we make no prediction regarding the effect of these variables in our tests.

4 Results

4.1 DESCRIPTIVE STATISTICS

Table 1 shows that 69% of the 1,353 entities are private companies, 13% are public companies, 10% are BUs of public companies, and 9% are BUs of privately-owned companies. The median entity in our sample has 200 employees and exhibits strong growth in sales (median increase in 2006 sales as compared to the year before is 10%). The median industry ratio of long-term debt over total assets is 14% while the median industry ratio of inventory and receivables over total
assets is 27%. The median tenure of a CFO in our sample is 6 years and about 16% of CEOs in our sample have been appointed in the last two years.

[Insert Table 1]

Table 1 also shows that median CFO salary and bonus in 2006 are $142,000 and $32,000, respectively (for comparison, the median 2006 salary of a CFO in the Execucomp database is $350,000). Table 2 provides additional information on the type of performance measures used in CFO (and CEO) bonus plans. Panel A of Table 2 is specific to corporate entities, while Panel B focuses on BU-level entities. Both panels report percentages of CFO bonus tied to various performance measures in 2006 and 2003 as well as the percentages expected if 2007 performance exactly meets all targets. We find that financial performance measures are by far the most important determinants of CFO bonuses. On average, corporate CFOs expect to earn 53% of their 2007 bonus for financial performance (the percentage for BU CFOs is 46%). The percentages actually earned for financial performance in 2006 and 2003 are only slightly lower (e.g., 50% of corporate CFOs’ bonus in 2006).

[Insert Table 2]

Table 2 also shows that, on average, corporate CFOs expect to earn 14% of their 2007 bonus based on explicit non-financial measures, and about 34% based on subjective evaluations. For BU CFOs, a significant portion of the bonuses is based on higher-level (corporate or business group) financial performance. Such higher-level measures account on average for 15% of BU CFO 2007 bonuses, while 16% is contingent on meeting explicit non-financial indicators, and 20% is determined subjectively. Table 2 shows that these percentages vary widely in our sample.

In addition, we compare CFO incentives tied to financial performance to CEO incentives tied to financial performance. Combining both corporate and BU entities into a sample of 870
entities where information on both CFO and CEO performance measures is available, we estimate that the percentage of 2006 bonus linked to financial performance measures is lower for CFOs than CEOs by 4.4% (p<.001). We also find that the percentage of CFO bonus linked to financial performance measures (FIN06) is highly correlated (r=.80, p<.001; untabulated) with the percentage of CEO bonus linked to financial performance (FIN06_CEO). Similarly, FINBON06, defined in expression (9) as the percentage of CFO salary paid in bonuses based on financial performance measures, correlates with an equivalent incentive measure for CEOs (r=.67, p<.001; untabulated). These positive correlations are consistent with our model predicting a positive link between incentive coefficients of CFOs and CEOs.

4.2 CROSS-SECTIONAL DETERMINANTS OF CFO INCENTIVE WEIGHTS

A key feature of our theoretical model is that CFO incentives tied to financial performance are inconsistent with their fiduciary responsibilities, yet at the same time necessary to motivate productive effort. Reflecting this trade-off, our model predicts that the weight on financial performance measures in CFO incentive compensation increases with the importance of CFO value-enhancing effort and decreases with susceptibility of the accounting system to misreporting. In this section, we empirically examine the extent to which firms take into account the relative importance of CFO fiduciary and productive responsibilities when designing CFO incentive compensation.

Specifically, we estimate the relation between the weight on financial performance measures in CFO bonuses and several proxies for the importance of CFO value-enhancing effort and susceptibility of accounting systems to misreporting. We use three measures of the incentive weight: (i) FINBON07, the proportion of annual salary CFOs expect to earn as bonus if financial performance targets are met in 2007 (see expression 8), (ii) FIN07, the expected percentage of
bonus based on financial performance measures, and (iii) \textit{FINBON06}, the proportion of annual salary CFOs earned as bonus based on financial performance measures in 2006 (see expression 9).

Table 3 presents the results of our Tobit estimates which take into account that our dependent variables are continuous variables with a positive probability mass at zero (and at 100 in case of \textit{FIN07}).\footnote{OLS estimations yield qualitatively similar results.} We impose an additional sampling criterion that CFOs be in their current position for at least two years before participating in our survey during March–May 2007.\footnote{This excludes all entities with CFO turnover in 2006 because values of \textit{FINBON06} for incoming CFOs may not be representative. When estimating our model of \textit{FINBON07}, we require that CFOs be in their position for at least one year prior to participating in our survey.} Consistent with our prediction, the results in Column 1 suggest that the 2007 (ex ante) incentive weight on financial performance measures in CFO bonus plans is positively associated with two of our proxies for high CFO impact on firm value—high industry-level importance of long-term debt ($p=.066$) and CFO tenure ($p=.025$). The two remaining proxies for marginal product of CFO (and/or CEO) effort, namely growth and industry-level importance of inventory and receivables, are not significant predictors of the incentive weight.

[Insert Table 3]

The results in Column 1 also suggest that the incentive weight on financial performance measures in CFO bonus plans is lower ($p=.057$) in the period surrounding CEO turnover. Specifically, the incentive weight on financial performance measures in CFO 2007 bonus plans is lower by about 8% in entities with recent CEO turnover as compared to entities without CEO turnover (this comparison relies on coefficient estimates in Column 1 and assumes all other predictors are constant at their sample medians). The remaining significant results in Column 1 show that the incentive weight on financial performance measures is positively associated with
size as measured by the number of employees ($p < .001$) and higher by about 17% in public corporate entities than in private corporate entities.

The results in Column 2 of Table 3 (with FIN07 as the dependent variable) suggest that the results in Column 1 largely reflect variation in the relative emphasis on financial performance measures (rather than just variation in overall incentive strength). The fact that the dependent variable FIN07 in Column 2 does not depend on the amount of bonus expected in 2007 also allows for a larger sample size (since BONUS07 and consequently FINBON07 have many missing values). As in Column 1, CFO tenure is positively associated ($p < .001$) with the relative emphasis on financial performance measures and with one of the industry-level proxies for CFO value-enhancing effort (the effect of INREC is significantly positive, $p < .025$, while the effect of LDEBT is not significant, which is the reverse of the results in Column 1). Other results are also similar to results in Column 1 except that we find no significant effect of CEO turnover on the relative emphasis on financial performance measures.

The last column of Table 3 presents the results for FINBON06, the ex post incentive weights on financial performance measures in 2006. To alleviate the concern that variation in FINBON06 is largely due to random shocks to financial performance, we control for 2006 performance relative to budget (see question 7 in Appendix B). While we do not interpret the coefficients estimates directly (given endogeneity biases arising from including performance as a regressor), we note that that the results closely parallel those in Column 1.

In summary, we find that the ex ante incentive weight on financial performance measures is positively associated with industry importance of long-term debt and CFO tenure, both of which proxy for greater marginal product of CFO value-enhancing effort. We also find that the incentive weight on financial performance measures is lower during periods of CEO turnover, our proxy for the susceptibility of accounting systems to misreporting. Collectively, these
findings provide basic empirical validation of the key feature in our model that firms balance the need to motivate productive tasks with the importance of CFO fiduciary responsibilities when designing CFO incentive compensation.

4.3 CHANGES IN CFO INCENTIVE WEIGHTS

In this section, we examine whether firms changed the percentage of CFO bonuses based on financial performance measures between 2003 and 2007. We assume the 2003 weights, FIN03, reflect the pre-SOX environment (since they were most likely established in 2002 or earlier) and compare them to FIN07, the expected percentage of the 2007 bonus based on financial performance. We also assume that private entities were affected by SOX much less than public entities which allows us to identify the effect of SOX as a change in CFO incentive weights in public entities relative to the change in private entities (that did not have to comply with SOX provisions).\(^{15}\)

Table 4 Column 1 presents the results of estimating an OLS model of the difference between FIN07 and FIN03 (denoted FIN07-03) as a function of PUBLIC (an indicator variable for companies that are publicly listed or BUs of public companies) representing the SOX “treatment effect.”\(^{16}\) Column 2 presents the results where public corporate-level entities and public BU-level entities are considered separately. Finally, Column 3 presents the results with additional control variables to illustrate the robustness of our results. These control variables include most of the explanatory variables from Table 3 except for the industry-level variables LDEBT and INREC (which, by construction, are constant for the time period under

\(^{15}\) It is well recognized that such difference-in-differences estimation approach dominates a simple before-and-after design without an untreated comparison group (Meyer [1995], Bertrand, Duflo, and Mullainathan [2004]).

\(^{16}\) The estimation sample in Table 4 includes 585 entities (533 in column 3 due to missing values in some of the control variables) with CFO tenure greater than 3 years to ensure that the change captured by FIN07-03 applies to the same CFO. Also, we note that a comparable model of changes in FINBON07 is not feasible since we lack data on CFO bonuses paid in 2003.
consideration). We also include a proxy for past performance (our most distant proxy being 2004 performance relative to budget) in an attempt to control for 2003 ex post weights to be high or low due to random fluctuations in performance unrelated to the ex ante incentive strength.

[Insert Table 4]

Column 1 provides evidence that public entities reduced the weights on financial performance measures in CFO bonuses in the post-SOX environment. In turn, Column 2 suggests that this decrease is largely attributed to public BUs. Specifically, relative to private companies, the evidence suggests that BUs of public companies reduced the weights on financial performance measures in CFO bonuses by about 9% on average ($p=.004$), while a comparable estimate specific to public companies is not significantly different from zero. Column 3 shows that these findings are robust to the inclusion of several control variables. With the exception of $PERF04$, most of the control variables do not have a significant effect on the change in incentive weights ($FIN07-03$).

Comparing Columns 1 and 2, we offer two explanations for our finding that the change in incentive weights tied to financial performance measures in CFO bonuses is more pronounced for public BUs than for public corporate-level entities. First, our model (as explained in Section 2.3) predicts a decrease in incentives tied to financial performance if the increase in misreporting costs borne by a firm dominates the increase in a CFO’s personal costs of misreporting. In this spirit, it is plausible that CFOs in public BUs did not experience a substantial increase in personal liability for misreporting since they do not have to publicly certify the accuracy of financial statements (a requirement SOX introduced only for corporate CFOs). Thus, to the extent that $PUBLIC_BU$ proxies more for cost of misreporting borne by the firm (or corporate executives) than for CFO personal costs, the results in Columns 2 and 3 are consistent with our model.
The second explanation for our finding that the change in incentive weights is most apparent for public BUs revolves around the likely confounding effect of equity compensation. In our analysis thus far, we assumed that bonuses are the primary source of incentive compensation. Although this assumption holds true for most entities in our sample, it does not hold for some of the public companies in our sample. Therefore, in Table 5 we reestimate the regressions in Table 4 after excluding observations where CFOs earn substantial equity compensation, defined as amounts greater than $50,000.\(^{17}\)

[Insert Table 5]

The results in Table 5 confirm that CFOs who earn equity compensation to a large extent account for the insignificant findings for PUBLIC_CORP in Column 2 of Table 4. Indeed, Column 1a shows that both public BUs and public corporate-level entities reduced the weights on financial performance measures in CFO bonuses in the post-SOX environment \((p=.008\) and \(p=.015\), respectively). Column 1b finds similar results after including several control variables as in Column 3 of Table 4.

In Columns 2a and 2b of Table 5 we consider an even narrower sample focusing only on observations where CFO bonuses are significant and the primary source of incentive compensation (greater than 30% of salaries). For this subsample, we find that public companies as well as public BUs reduced the weights on financial performance measures by an average of about 13% compared to private companies.

In summary, we find that relative to private entities public entities reduced the emphasis on financial performance measures in CFO annual bonus plans in the post-SOX environment. For example, based on our estimates in Column 2a of Table 5 (including only CFOs with

\(^{17}\) Using $70,000 or $30,000 as alternative cut-offs yields similar results.
bonuses greater than 30% of their salaries and little or no equity compensation), private companies *increased* the weight on financial performance measures in CFO bonus plans between 2003 and 2007 by about 3%; similarly, BUs of private companies increased the weight by 2%. These changes contrast sharply with those in public entities—both public companies and BUs *reduced* the weight by about 10%.

4.4 ADDITIONAL EVIDENCE

Our analysis thus far has focused on the use of financial performance measures in CFO bonus plans. This subsection provides descriptive evidence pertaining to the use of non-financial performance measures in CFO bonuses (Question 8 in Appendix B). Table 6 shows that the most common type of non-financial measures in CFO bonus plans relates to common management tasks such as improving operations, customer orientation, strategic and/or people management—59% of the 278 bonus plans included at least one non-financial measure from this category. By comparison, 35% included at least one measure related to CFO reporting tasks (such as compliance and control targets, efficiency of reporting, implementation of IT systems, and support of internal decision making) and 19% included measures related to CFOs’ role in obtaining capital, managing finances, and mergers and acquisitions.

[Insert Table 6]

It is noteworthy that most of the non-financial performance measures in CFO bonus plans are intended to motivate value-enhancing activities rather than to reinforce CFO fiduciary responsibilities. Only about 14% of the 278 entities report the use of at least one target related to CFO compliance and control activities (incl. clean audit, no restatements, external/tax reporting, SOX compliance, documentation of procedures, risk management, or regulatory reporting).

Table 7 shows how this frequency of compliance and control measures varies across different
types of entities. The frequency of using at least one compliance and control target is highest (26%) in public corporate-level entities where CFO fiduciary responsibilities are arguably most important and lowest (8%) in private corporate-level entities (the difference is highly significant, \( p = .002 \)). Thus, although it is not very common to rely on non-financial targets to motivate CFO compliance and control effort, variation in the frequency of using these targets seems to be related to the importance of CFO fiduciary responsibilities.

[Insert Table 7]

5 Summary

In this paper, we use survey evidence of CFO compensation practices to examine how firms provide incentives and measure performance of their chief financial officers. Based on a principal-agent characterization of the firm-CFO relationship, we predict that firms’ reliance on financial performance measures in evaluating CFOs reflects the costs and benefits of CFOs’ decision-making responsibilities as well as their fiduciary duties to oversee the financial reporting process. In particular, we find that firms rely less on financial performance measures in settings where CFOs’ fiduciary duties are important, but nevertheless continue to rely on such measures when they are useful to motivate better decision-making.

Our empirical findings are broadly consistent with our theoretical predictions. For instance, we find some evidence that the incentive weight on financial performance measures in CFO bonus plans is positively (negatively) associated with proxies that capture the importance of CFO decision-making (fiduciary) responsibilities. We also find that CFO and CEO incentives are positively correlated, a finding that in part can be attributed to CFOs’ fiduciary duties to oversee the financial reporting process.
We also examine how firms’ reliance on financial performance measures in evaluating CFOs changed in the post SOX environment. In contrast to some prior studies, we find that public companies (relative to private companies) have reduced the percentage of CFO bonuses contingent on financial performance. To the extent that SOX has made firms much more concerned about the integrity of their financial reports and increased the costs of non-compliance, this finding is consistent with our model which predicts that firms offer their CFOs muted incentives in order to motivate them to focus more on their fiduciary responsibilities. In this sense, our study suggests that the design of CFO compensation is an important part of internal controls firms rely on to limit earnings management and other misreporting practices.

Our study is subject to a number of limitations. First, we are unable to augment or validate our survey measures with additional public data since the identity of participating firms is unknown. Second, our sample is not random and the profile of the surveyed entities is different from those considered in prior literature; hence our results need not easily generalize. Third, by the very nature of survey data, we rely on our respondents to accurately communicate sensitive information about their own and other executives’ compensation. Although this may have introduced some measurement error, it is unlikely to be the cause of a systematic bias. Despite these limitations, we believe our study provides unique evidence on the determinants and evolution of CFO evaluation and compensation practices.
References


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SALARY—annual CFO salary in 2006, BONUS06—annual CFO bonus earned in 2006, BONUS07—CFO bonus expected in 2007 if performance exactly meets targets on all measures, PUBLIC_CORP—publicly listed companies (corporate level), PUBLIC_BU—business units of publicly listed companies, PRIVATE_CORP—privately-owned companies (corporate level), PRIVATE_BU—business units of privately-owned companies, GROWTH—percentage increase in annual sales in 2006, LDEBT—average long-term debt over total assets during 2001–2005 (SIC-2 industry median); INREC—average of inventory plus receivables over total assets (SIC-2 industry median), TENURE—number of years CFO has been on the job, CEOTURN—equals one if a new CEO has been appointed in the last two years, SIZE—the log of the number of employees in a company or BU.
Table 2—Percentage of CFO and CEO Bonus Contingent on Different Types of Performance Measures

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Percentages of CFO and CEO bonuses linked to financial performance targets (FIN), non-financial performance targets (NFIN), and subjective evaluation (SUB). FIN07, NFIN07, SUB07 are percentages expected if 2007 performance exactly meets all targets, the other percentages reflect performance in 2006 and in 2003. For example, FIN06 is the percentage of CFO bonus in 2006 earned for meeting financial performance targets (FIN06_CEO is the equivalent for CEOs).
Table 2 (Continued)

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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN07</td>
<td>228</td>
<td>48.1</td>
<td>36.5</td>
<td>0.00</td>
<td>10.0</td>
<td>50.0</td>
<td>80.0</td>
<td>100</td>
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<tr>
<td>HLF07</td>
<td>228</td>
<td>15.0</td>
<td>25.8</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>25.0</td>
<td>100</td>
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<tr>
<td>NFIN07</td>
<td>228</td>
<td>16.1</td>
<td>24.4</td>
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<td>0.00</td>
<td>25.0</td>
<td>100</td>
</tr>
<tr>
<td>SUB07</td>
<td>228</td>
<td>18.3</td>
<td>30.2</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>25.0</td>
<td>100</td>
</tr>
<tr>
<td>FIN06</td>
<td>220</td>
<td>45.6</td>
<td>37.8</td>
<td>0.00</td>
<td>0.00</td>
<td>49.0</td>
<td>80.0</td>
<td>100</td>
</tr>
<tr>
<td>HLF06</td>
<td>220</td>
<td>15.6</td>
<td>26.3</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>25.0</td>
<td>100</td>
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<tr>
<td>NFIN06</td>
<td>220</td>
<td>15.2</td>
<td>24.8</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>25.0</td>
<td>100</td>
</tr>
<tr>
<td>SUB06</td>
<td>220</td>
<td>20.4</td>
<td>32.1</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>27.5</td>
<td>100</td>
</tr>
<tr>
<td>FIN03</td>
<td>151</td>
<td>56.3</td>
<td>40.7</td>
<td>0.00</td>
<td>0.00</td>
<td>70.0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>HLF03</td>
<td>151</td>
<td>8.2</td>
<td>21.5</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>100</td>
</tr>
<tr>
<td>NFIN03</td>
<td>151</td>
<td>12.5</td>
<td>24.0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>20.0</td>
<td>100</td>
</tr>
<tr>
<td>SUB03</td>
<td>151</td>
<td>20.5</td>
<td>34.9</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>25.0</td>
<td>100</td>
</tr>
<tr>
<td>FIN06_CEO</td>
<td>187</td>
<td>54.3</td>
<td>36.9</td>
<td>0.00</td>
<td>25.0</td>
<td>50.0</td>
<td>90.0</td>
<td>100</td>
</tr>
<tr>
<td>HLF06_CEO</td>
<td>187</td>
<td>16.4</td>
<td>25.5</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>25.0</td>
<td>100</td>
</tr>
<tr>
<td>NFIN06_CEO</td>
<td>187</td>
<td>13.5</td>
<td>22.3</td>
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<td>0.00</td>
<td>0.00</td>
<td>25.0</td>
<td>100</td>
</tr>
<tr>
<td>SUB06_CEO</td>
<td>187</td>
<td>13.1</td>
<td>26.1</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>20.0</td>
<td>100</td>
</tr>
</tbody>
</table>

Percentages of CFO and CEO bonuses linked to financial performance targets (FIN), higher-level financial performance (HLF), non-financial performance targets (NFIN), and subjective evaluation (SUB). See also notes to Panel A of this table.
## Table 3—Tobit Models of the Incentive Weight on Financial Performance Measures

<table>
<thead>
<tr>
<th>Variables</th>
<th>Expected Sign</th>
<th>Column 1 (FINBON07)</th>
<th>Column 2 (FIN07)</th>
<th>Column 3 (FINBON06)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>-57.65 (.000)</td>
<td>-21.40 (.257)</td>
<td>-106.77 (.000)</td>
</tr>
<tr>
<td>PUBLIC_CORP</td>
<td></td>
<td>15.46 (.016)</td>
<td>25.71 (.001)</td>
<td>13.34 (.002)</td>
</tr>
<tr>
<td>PUBLIC_BU</td>
<td></td>
<td>-1.95 (.666)</td>
<td>11.40 (.156)</td>
<td>13.67 (.002)</td>
</tr>
<tr>
<td>PRIVATE_BU</td>
<td></td>
<td>-4.38 (.550)</td>
<td>-11.74 (.195)</td>
<td>2.18 (.698)</td>
</tr>
<tr>
<td>GROWTH</td>
<td>+</td>
<td>0.11 (.182)</td>
<td>-0.02 (.896)</td>
<td>0.11 (.203)</td>
</tr>
<tr>
<td>LDEBT</td>
<td>+</td>
<td>70.06 (.066)</td>
<td>21.09 (.538)</td>
<td>54.97 (.058)</td>
</tr>
<tr>
<td>INREC</td>
<td>+</td>
<td>-4.13 (.809)</td>
<td>47.24 (.025)</td>
<td>2.75 (.842)</td>
</tr>
<tr>
<td>TENURE</td>
<td>+</td>
<td>6.70 (.025)</td>
<td>11.04 (.003)</td>
<td>5.25 (.021)</td>
</tr>
<tr>
<td>CEOTURN</td>
<td>-</td>
<td>-7.52 (.057)</td>
<td>-5.76 (.425)</td>
<td>-8.55 (.028)</td>
</tr>
<tr>
<td>SIZE</td>
<td></td>
<td>6.57 (.000)</td>
<td>6.24 (.001)</td>
<td>8.68 (.000)</td>
</tr>
<tr>
<td>PERF06</td>
<td></td>
<td></td>
<td>8.41 (.000)</td>
<td></td>
</tr>
<tr>
<td>Log-likelihood value</td>
<td></td>
<td>-2.360</td>
<td>-2.759</td>
<td>-2.896</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.14</td>
<td>0.09</td>
<td>0.19</td>
</tr>
<tr>
<td>$\hat{\sigma}$</td>
<td></td>
<td>40.71</td>
<td>67.38</td>
<td>38.88</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>563</td>
<td>845</td>
<td>857</td>
</tr>
</tbody>
</table>

Two-sided p-values in brackets (based on White heteroskedasticity-adjusted standard errors). Industry (SIC-2) indicator variables included but not reported. R-squared is the square of the correlation coefficient between actual and fitted values of the dependent variables (Wooldridge [2002]).

FINBON07—CFO 2007 bonus based on financial performance measures as a percentage of CFO salary in 2006 (as expected if all targets are met); FIN07—percentage of CFO 2007 bonus based on financial measures; FINBON06—CFO 2006 bonus based on financial measures as a percentage of CFO salary in 2006; PERF06—2006 performance relative to budget. Other variables defined in Table 1.
### Table 4—OLS Regressions of Changes in Weights on Financial Performance Measures between 2007 and 2003

<table>
<thead>
<tr>
<th>Variables</th>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.16</td>
<td>3.33</td>
<td>12.72</td>
</tr>
<tr>
<td></td>
<td>(.003)</td>
<td>(.003)</td>
<td>(.053)</td>
</tr>
<tr>
<td>PUBLIC</td>
<td>-4.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.025)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUBLIC_CORP</td>
<td>-0.93</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.767)</td>
<td>(.933)</td>
<td></td>
</tr>
<tr>
<td>PUBLIC_BU</td>
<td>-8.77</td>
<td>-7.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.004)</td>
<td>(.022)</td>
<td></td>
</tr>
<tr>
<td>PRIVATE_BU</td>
<td>-1.72</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.622)</td>
<td>(.830)</td>
<td></td>
</tr>
<tr>
<td>GROWTH</td>
<td></td>
<td>-0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.791)</td>
<td></td>
</tr>
<tr>
<td>TENURE</td>
<td></td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.636)</td>
<td></td>
</tr>
<tr>
<td>CEOTURN</td>
<td></td>
<td>-4.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.145)</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td></td>
<td>-0.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.925)</td>
<td></td>
</tr>
<tr>
<td>PERF04</td>
<td></td>
<td>-3.32</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.001)</td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.01</td>
<td>0.01</td>
<td>0.03</td>
</tr>
<tr>
<td>N</td>
<td>585</td>
<td>585</td>
<td>533</td>
</tr>
</tbody>
</table>

Two-sided $p$-values in brackets (based on White heteroskedasticity-adjusted standard errors).
Column 1–3 include all sample observations where CFO tenure is greater than 3 years. In addition to control variables reported above, Column 3 also includes SIC-2 industry indicator variables in a stepwise estimation procedure (SIC 65—Real estate retained as the only significant effect; not reported above).
FIN07-03—2007 weight on financial performance measures in CFO bonus minus the weight in 2003.
PUBLIC—publicly listed entities (both at the corporate and BU level). PERF04—2004 performance relative to budget. Other variables defined in Table 1.
Table 5—OLS Regressions of Changes in Weights on Financial Performance Measures between 2007 and 2003 (Alternative Samples)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Column 1a</th>
<th>Column 1b</th>
<th>Column 2a</th>
<th>Column 2b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.14</td>
<td>16.08</td>
<td>3.25</td>
<td>21.25</td>
</tr>
<tr>
<td></td>
<td>(.007)</td>
<td>(.039)</td>
<td>(.059)</td>
<td>(.050)</td>
</tr>
<tr>
<td>PUBLIC_CORP</td>
<td>-8.70</td>
<td>-8.30</td>
<td>-13.25</td>
<td>-12.89</td>
</tr>
<tr>
<td></td>
<td>(.008)</td>
<td>(.019)</td>
<td>(.004)</td>
<td>(.013)</td>
</tr>
<tr>
<td>PUBLIC_BU</td>
<td>-6.86</td>
<td>-5.92</td>
<td>-13.48</td>
<td>-12.46</td>
</tr>
<tr>
<td></td>
<td>(.015)</td>
<td>(.040)</td>
<td>(.002)</td>
<td>(.003)</td>
</tr>
<tr>
<td>PRIVATE_BU</td>
<td>-1.39</td>
<td>0.88</td>
<td>-1.13</td>
<td>-1.16</td>
</tr>
<tr>
<td></td>
<td>(.716)</td>
<td>(.825)</td>
<td>(.798)</td>
<td>(.773)</td>
</tr>
<tr>
<td>GROWTH</td>
<td>-0.03</td>
<td>-0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.501)</td>
<td>(.508)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TENURE</td>
<td>-0.53</td>
<td>-0.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.779)</td>
<td>(.811)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEO TURN</td>
<td>-3.51</td>
<td>-2.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.383)</td>
<td>(.633)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.08</td>
<td>-0.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.900)</td>
<td>(.797)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERF04</td>
<td>-3.43</td>
<td>-4.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.005)</td>
<td>(.008)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.01</td>
<td>0.04</td>
<td>0.03</td>
<td>0.10</td>
</tr>
<tr>
<td>N</td>
<td>506</td>
<td>456</td>
<td>245</td>
<td>222</td>
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</table>

Two-sided p-values in brackets (based on White heteroskedasticity-adjusted standard errors). SIC-2 industry indicator variables included in a stepwise estimation procedure (SIC 65—Real estate retained as the only significant effect; not reported above). Column 1a and 1b exclude observations where CFOs earn $50,000 or more in equity compensation from the sample in Table 4. In addition, Column 2a and 2b also exclude observations where CFOs’ bonuses are equal or less than 30% of their salaries. Column 1b and 2b includes SIC-2 industry indicator variables in a stepwise estimation procedure (SIC 65—Real estate retained as the only significant effect; not reported above).
Table 6—Frequency of Different Types of Non-Financial Performance Measures in CFO Bonus Plans (n=278)

<table>
<thead>
<tr>
<th>I) General management targets</th>
<th>59.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>24.1%</td>
</tr>
<tr>
<td>People management</td>
<td>16.5%</td>
</tr>
<tr>
<td>Strategic management</td>
<td>14.0%</td>
</tr>
<tr>
<td>Customer orientation</td>
<td>14.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II) Reporting targets</th>
<th>35.3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance &amp; control</td>
<td>13.3%</td>
</tr>
<tr>
<td>Efficiency of reporting</td>
<td>13.3%</td>
</tr>
<tr>
<td>IT &amp; systems</td>
<td>10.8%</td>
</tr>
<tr>
<td>Support of internal decision making</td>
<td>5.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III) Financing targets</th>
<th>19.1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term financial management</td>
<td>7.2%</td>
</tr>
<tr>
<td>Mergers &amp; acquisitions</td>
<td>6.8%</td>
</tr>
<tr>
<td>Obtaining capital</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IV) Communication &amp; teamwork</th>
<th>6.8%</th>
</tr>
</thead>
</table>

The above categories include the following examples:

I) General management: Operations—efficiency, quality, safety, process improvement, or cost control; People management—employee turnover, staff development, recruiting, contribution to performance evaluations, or corporate culture; Strategic management—market share, business development milestones, business growth, R&D goals, implementation of profitability strategies, restructuring, organizational structure, or design of incentives; Customer orientation—customer satisfaction, on-time delivery, community involvement, supplier relations, or PR initiatives.

II) Reporting targets: Compliance & control—clean audit, no restatements, external/tax reporting, SOX compliance, documentation of procedures, risk management, or regulatory reporting; Efficiency of reporting—timeliness, accuracy, lean accounting, reporting in new acquisitions, or accounting department efficiency; IT & systems—ERP implementation, software upgrades, or IT projects; Support of internal decision making—working on projects for BUs, useful information for management, management satisfaction, or setting BU performance targets.

III) Financing targets: Short-term financial management—collections, cash-flow, working capital, financial condition, debt covenants, or forecasting; Mergers & acquisitions—divestitures, deals, or capital investment evaluations; Obtaining capital—banking/investor relations, communication with analysts, or IPO.

IV) Communication & teamwork—leadership, interpersonal skills, interaction with managers or board members, loyalty, or work ethics.
Table 7—Frequency of Compliance & Control Targets in CFO Bonus Plans in Different Types of Entities

<table>
<thead>
<tr>
<th>Entity</th>
<th>N</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIVATE</td>
<td>167</td>
<td>8.4%</td>
</tr>
<tr>
<td>PRIVATE_BU</td>
<td>31</td>
<td>19.4%</td>
</tr>
<tr>
<td>PUBLIC</td>
<td>39</td>
<td>25.6%</td>
</tr>
<tr>
<td>PUBLIC_BU</td>
<td>41</td>
<td>17.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>278</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

Frequency refers to the percentage of CFO bonus plans that include one of the compliance & control targets (see Table 6).
Appendix A—Proofs

Consider a LEN agency model where a risk-neutral principal (hereafter the firm) hires two managers (hereafter the CEO and the CFO) to run the firm. We can also consider \( n > 2 \) agents as long as one of the agents is entrusted with CFO duties as described below. Also, for simplicity, we assume that all managers perform their respective tasks simultaneously and preclude the possibility of collusion between them. The firm’s economic profit \( x \) is given by

\[
x = \theta + b_{CEO}e_{CEO} + b_{CFO}e_{CFO}
\]  \hspace{1cm} (A1)

where \( e_i, i = CEO, CFO \) is manager \( i \)'s unobservable effort, and \( b_i \) and \( \theta \) are manager-specific and/or firm-specific characteristics. The \( b_i \) s are known constants representing marginal product of effort, and the \( \theta \) is a normal random variable, \( N(\bar{\theta}, \sigma_\theta^2) \), representing other economic factors affecting firm value.

Both managers are risk-averse with negative exponential utility and risk aversion parameter \( r_i \), and providing effort is costly to the tune of \( \frac{1}{2} e_i^2 \). Next, we assume the two managers' contracts are linear in reported profit \( R \) as in

\[
W_i = \alpha_i + \beta_i R
\]  \hspace{1cm} (A2)

where \( \alpha_i \) is the fixed component of a manager’s compensation and \( \beta_i \) is the incentive coefficient. Let \( R \) be given by

\[
R = x + \varepsilon
\]  \hspace{1cm} (A3)

where \( x \) is economic profit as in (A1), and \( \varepsilon \) is \( N(\bar{\varepsilon}, \sigma_\varepsilon^2) \). Of course, the firm prefers \( \sigma_\varepsilon^2 \) to be as low as possible since “noisy” performance measures are costly vehicles for evaluating risk-averse executives. We also assume that the firm prefers an unbiased profit report since biases cost the firm an expected amount of \( \frac{1}{2} \lambda \bar{\varepsilon}^2 \) (with \( \lambda > 0 \)). In this spirit, we characterize the CFO’s
fiduciary responsibility to safeguard the integrity of financial reporting as his ability to influence the distribution of $\varepsilon$ so that $\overline{\varepsilon}$ is reduced or eliminated and $\sigma_{\varepsilon}^2$ is as low as possible.

In particular, we let $\overline{\varepsilon} = k(1 - q) \geq 0$ so that, on average, reported profits overstate economic profits. We assume $k \geq 0$ measures the extent to which reported profit is susceptible to misreporting; although $k$ is an exogenous parameter in our model, the model can also accommodate $k$ arising endogenously via the strategic choices of the CEO or other executives employed by the firm. We assume $q \in [0,1]$ is the CFO’s unobservable choice (fiduciary responsibility) where higher $q$ represents the CFO’s attempts to reduce or eliminate overstatements in $R$. Moreover, we assume that a failure reduce overstatements inevitably leads to a loss of reputation or personal cost to the CFO of $c(q) = \frac{1}{2}c(1-q)^2$ (with known $c > 0$). That is, the CFO prefers unbiased reporting (i.e., $q = 1$) unless of course misreporting is explicitly rewarded.

In a similar vein, we let $\sigma_{\varepsilon}^2 = \frac{\sigma^2}{1 + h}$ where $h \in [0, \infty)$ represents activities undertaken by the CFO to reduce measurement error at a cost of $h$. To simplify the analysis we assume $h$ is observable to avoid the need to motivate $h$ via incentive compensation although we could also consider a setting where $h$ is unobservable as well.

Given the standard LEN assumptions, the CEO solves

$$\max_{\alpha_{CEO} + \beta_{CEO}} E(\alpha_{CEO} + \beta_{CEO} R) - \frac{1}{2} e_{CEO}^2 - \frac{\sigma_{CEO}^2}{2} \text{Var}(\alpha_{CEO} + \beta_{CEO} R)$$

(A4)

and the CFO solves

$$\max_{\alpha_{CFO}, q} E(\alpha_{CFO} + \beta_{CFO} R) - \frac{1}{2} e_{CFO}^2 - \frac{1}{2} c(1-q)^2 - \frac{\sigma_{CFO}^2}{2} \text{Var}(\alpha_{CFO} + \beta_{CFO} R) .$$

(A5)

Given $R = \theta + b_{CEO} e_{CEO} + b_{CFO} e_{CFO} + \varepsilon$ with $\varepsilon \sim N(k(1-q), \sigma_{\varepsilon}^2 /(1+h))$, the first order conditions for A4 and A5 satisfy
\[ e_{CEO} = \beta_{CEO} p_{CEO}; \quad e_{CFO} = \beta_{CFO} p_{CFO}; \quad \text{and} \quad 1 - q = \frac{k \beta_{CFO}}{c} \] (A6)

with the second-order conditions easily satisfied.

The last term in expression (A6) suggests that the CFO’s choice of \( q \) is always less than the preferred maximum of one unless \( R \) is not susceptible to overstatements (i.e., \( k = 0 \)) or he is paid a flat wage (i.e., \( \beta_{CFO} = 0 \)). If \( k > 0 \) and incentive compensation is necessary to motivate productive effort \( e_{CFO} \), then the CFO will tolerate (perhaps even encourage) overstatements of \( R \) since he is partly rewarded for such overstatements.

For the firm, the optimal incentive coefficients \((\beta_{CEO}, \beta_{CFO})\) and the optimal choice of \( h \) jointly solve the following

\[ \max_{\alpha_i, \beta_i, h} E \left( x - \frac{\lambda k^2 (1 - q)^2}{2} - \sum_i (\alpha_i + \beta_i R) \right) \] (A7)

subject to (A6) and the IR constraints that the contracts be acceptable to both managers. Solving the IR constraints (assuming reservation wages of zero) we have

\[ \sum_i (\alpha_i + \beta_i R) = \frac{1}{2} \sum_i \left( e_i^2 + r_i \beta_i^2 \sigma^2 + r_i \beta_i^2 \sigma^2 + \frac{1}{2} \sigma (1 - q)^2 \right). \] (A8)

Substituting for (A6) and (A8) in (A7) gives the first-order conditions

\[ \beta_{CEO} = \frac{b_{CEO}^2}{b_{CEO}^2 + r_{CEO} \left( \sigma^2 + \frac{\sigma^2}{1 + h} \right)}, \] (A9)

\[ \beta_{CFO} = \frac{b_{CFO}^2}{b_{CFO}^2 + \frac{k^2}{c} + \lambda \left( \frac{k^2}{c} \right)^2 + r_{CFO} \left( \sigma^2 + \frac{\sigma^2}{1 + h} \right)}, \] (A10)

and \[ \frac{(r_{CEO} \beta_{CEO}^2 + r_{CFO} \beta_{CFO}^2) \sigma^2}{2(1 + h)^2} = 1, \] (A11)
which are presented as expression (7) in section 2 (with \( k = 0 \), expressions (A9) through (A11) are characterized in expression (5) in section 2).

To characterize the second-order conditions, we substitute (A11) into (A9) and (A10) and rewrite those first-order conditions as:

\[
J_1 \equiv b_{CEO}^2 - \beta_{CEO} \left( b_{CEO}^2 + r_{CEO} \sigma^2 + \frac{r_{CEO} \sigma \sqrt{2}}{\sqrt{r_{CEO} \beta_{CEO}^2 + r_{CFO} \beta_{CFO}^2}} \right) = 0
\]

\[
J_2 \equiv b_{CFO}^2 - \beta_{CFO} \left( b_{CFO}^2 + \frac{k^2}{c} + \frac{\lambda^2 k^4}{c^2} + r_{CFO} \sigma^2 + \frac{r_{CFO} \sigma \sqrt{2}}{\sqrt{r_{CEO} \beta_{CEO}^2 + r_{CFO} \beta_{CFO}^2}} \right) = 0
\]

We note that there is a unique positive pair \((\beta_{CEO}, \beta_{CFO})\) that solve (A12) and the second-order conditions are met since \( J_{11} < 0 \), \( J_{22} < 0 \) and \( J_{11} J_{22} - J_{12}^2 > 0 \) (where the subscripts denote partial derivatives with respect to the first and second variables \( \beta_{CEO} \) and \( \beta_{CFO} \) respectively).

To derive the comparative statics presented in Proposition 1 in section 2, we have

\[
\frac{d \beta_{CFO}}{d b_{CFO}} = \frac{-J_{11} J_{2b_{CFO}} + J_{12} J_{b_{CFO}}}{J_{11} J_{22} - J_{12}^2} > 0,
\]

\[
(A13a)
\]

\[
\frac{d \beta_{CEO}}{d b_{CEO}} = \frac{-J_{11} J_{2b_{CEO}} + J_{12} J_{b_{CEO}}}{J_{11} J_{22} - J_{12}^2} > 0,
\]

\[
(A13b)
\]

\[
\frac{d \beta_{CFO}}{d k} = \frac{-J_{11} J_{2k} + J_{12} J_{k}}{J_{11} J_{22} - J_{12}^2} < 0,
\]

\[
(A13c)
\]

\[
\frac{d \beta_{CFO}}{d c} = \frac{-J_{11} J_{2c} + J_{12} J_{c}}{J_{11} J_{22} - J_{12}^2} > 0,
\]

\[
(A13d)
\]

\[
\frac{d \beta_{CFO}}{d \lambda} = \frac{-J_{11} J_{2\lambda} + J_{12} J_{\lambda}}{J_{11} J_{22} - J_{12}^2} < 0.
\]

\[
(A13e)
\]
Appendix B—Questionnaire Items

1a. What percentage of the 2006 annual bonus incentive component did you earn based on the achievement of

1b. If performance exactly meets targets on all measures, what percentage of your 2007 annual bonus do you expect to be based on the achievement of

1c. What percentage of the 2003 annual bonus did you earn based on the achievement of

   Financial performance targets of the division

   Financial performance targets of higher levels (e.g., the firm, business group)

   Non-financial performance targets

   Achievements evaluated subjectively (i.e., without pre-set targets)

   Other, please specify below

2. How much did you earn through the following incentive components in 2006?

   (Fill in zero if an incentive opportunity was offered but did not pay out.)
   (Leave blank if no such incentive opportunity offered.)

   Annual bonus

   Long-term cash compensation plan

   Equity-based compensation

   Other, please specify below

3. Your annual salary in 2006 was

4. If performance exactly meets targets on all measures, your 2007 annual bonus should be about

5. Last year’s annual sales growth was about \( \% \)

6. Please describe your industry.

   (For example: manufacturing—components for the auto industry; wholesale—industrial packaging products; management, IT, and strategy consulting)
7. How well did the firm perform in the last three years relative to the budget?

   2006 performance
   2005 performance
   2004 performance

Scale:
Far below budget
Below budget
About the same as budget
Above budget
Far above budget
N/A

8. What were the most important non-financial targets in your 2006 annual bonus?