Performance Measures, Discretionary Accruals, and CEO Cash Compensation

Simon S.M. Yang
School of Business, Adelphi University
Phone: (516) 877-4618
Fax: (516) 877- 4607
Email address: yang@adelphi.edu

Jennifer Yin*
School of Business, Rutgers University - Camden
Phone: (856)225-6693
Fax: (856)225-6241
Email address: yin@crab.rutger.edu

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*corresponding author.

This paper has benefited from comments by Steve Balsam, Sung Kwon, and Emeka Nwaeze. Yin acknowledges the financial support from the Office of Research and Sponsored Programs at the Rutgers University.

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Abstract

In this paper, we examine the effect of discretionary accruals on the incremental weights of performance measures in rewarding executive cash compensation. Based on the agency theory, we predict and test that the weight placed on accounting earnings decreases and those on the alternative measures such as returns and operating cash flows increase, as the likelihood of discretionary accruals causing information uncertainty in earnings increases. Our results support the predictions.

JEL Classifications: J33, M41

Keywords: Cash compensation, discretionary accruals, accounting earnings, performance measures.

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1. Introduction

Prior studies show that compensation is related to stock prices and accounting earnings (Lewellen and Huntsman 1970; Lambert and Larcker 1987; Jensen and Murphy 1990; Bushman and Smith 2001; Sloan 1993). Recent studies find that operating cash flows play a role in compensation contracts (Natarajan 1996; Nwaeze, Yang and Yin 2003). In this paper we investigate the effect of discretionary accruals on the incremental weights on stock price-based and accounting-based performance measures, i.e., returns, earnings, and operating cash flows.[1]

Researchers often assume that discretionary accruals introduce noise in reported earnings (Guay, Kothari, and Watts 1996; Ryan and Zarowin 1995; Choi and Jeter 1992; Beaver, Lambert, and Morse 1980). Prior studies find that discretional accruals are mispriced by the market (Subramanyam 1996; Xie 2001), less persistent (Sloan 1996; Beneish and Vargus 2002), and an opportunistic manipulation tool (Matsumoto 2002; Teoh, Welch and Wong 1998a and 1998b). The valuation implications of discretionary accruals are complex (Thomas and Zhang 2002; Beneish and Vargus 2002; Bradshaw, Richardson, and Sloan 2001; DeFond and Park 2001; Xie 2001; Hribar 2000). Even sophisticated market participants such as auditors and analysts do not fully understand the persistence and valuation implications of accounting accruals.

Compensation committees, when compensating CEOs based on their performance, may also not be able to see through discretionary accruals. Monitoring problems may arise when discretionary accruals are presented because (1) the wide breadth of strategic options available makes it more difficult for a compensation committee to fully understand and, hence, fully evaluate the potential of managerial actions, and (2) outcome uncertainty increases (Finkelstein and Boyd 1998). In addition, there is considerable evidence that discretionary accruals distort information in earnings and increase the level of difficulty in interpreting firm performance. For example, Teoh, Welch and Wong (1998a, 1998b) and Teoh, Welch, Wang and Rao (1998) find that firms with aggressive accruals management during initial public offerings (IPOs) experience significant underperformance compared to those with less aggressive accruals management in a five-year period after IPOs. Large discretionary accruals contained in accounting earnings reflect higher levels of information asymmetry, and the corporate costs due to potentially distorted information flow can be substantial.

On the other hand, accounting accruals indicate future growth (Fairfield, Whisennant, and Yohn 2002). Investors award firms that report consistent EPS growth, consistently meet analysts' earnings forecasts, and avoid earnings disappointments (Barth, Elliot, and Finn 1999; Myers and Skinner 1999; Bartov, Givoly, and Hayn 2002; Skinner and Sloan 2002). Balsam (1998) finds that compensation committees reward CEOs' use of discretionary accruals to achieve earnings targets. Kwon and Yin (2003) find that the association between compensation and discretionary accruals is stronger for high-tech firms, especially when pre-managed earnings fall below earnings expectation. Stein (1989) shows that fully rational investors in imperfect capital markets with information asymmetries end up rewarding managers for earnings management.

Regardless whether discretionary accruals are opportunistic or convey managerial private information, they increase the level of uncertainty and the level of difficulty in interpreting managerial performance. In an efficient managerial labor market, CEO compensation is based on the economic activities underlying the reported numbers. Compensation committees are expected to adjust weights on different performance measures to reflect the precision and sensitivity of each measure to indicate managerial actions. In this study we investigate the magnitude (large vs. small) and sign (positive or income-increasing vs. negative or income decreasing) of discretionary accruals and predict that the incentive weight[2] placed on accounting earnings will decrease and those on alternative performance measures will increase, as the likelihood of discretionary accruals causing uncertainty in earnings increases. Our exposition is based on models of principal-agent relationships and the contracting theory, which suggest that, the relative weight of each performance measure used in the compensation contract reflects its precision to measure managerial efforts and the economic value of the firm (Banker and Datar 1989; Feltham and Xie 1994; Natarajan 1996). When discretionary accruals are presented, earnings become less likely to precisely reflect managerial actions. Thus compensation committees are more likely to adjust its weight in the compensation contract accordingly.

We first compare the relative weights of the three most commonly used performance measures: returns, earnings, and operating cash flows, to provide a benchmark and assess the explanation power of each measure. We find that returns carry the highest weight, and cash flows the lowest in determining executive cash compensation. We then examine the effect of discretionary accruals on the weights of performance measures, especially when information uncertainty resulted from discretionary accruals is presented. Specifically, we investigate whether the weight on the performance measure with higher uncertainty will be substituted away toward alternative measures with lower uncertainty as predicted by the agency theory. We find that when large or negative discretionary accruals are presented, the weight on earnings decreases, and those on returns and operating cash flows increase.

Our study corroborates the compensation literature on the relative weights of performance measures with three new perspectives. First, prior compensation studies have used various approaches to distinguish the information conveyed in different performance measures. For example, Natarajan (1996) compares the variance of earnings with variance of cash flows.

Lambert and Larcker (1987) examine the correlation between stock returns and returns on equity. Sloan (1993) compares the noise in stock prices and the noise in accounting earnings. This study uses well-documented characteristics of discretionary accruals and investigates their effects on performance measures in the compensation contract. Discretionary accruals provide a useful tool to distinguish information conveyed in stock returns, earnings and cash flows because discretionary accruals, as one of earnings components, are consistently found to cause information uncertainty in earnings but do not directly (or fully) affect stock returns and cash flows.

Second, we supplement Balsam's (1998) finding that discretionary accruals are a significant determinant of executive cash compensation. There are two major differences between our paper and Balsam (1998). Balsam (1998) implicitly assumes that compensation committees distinguish among components of earnings, i.e., cash flows, discretionary accruals, and non-discretionary accruals, in designing an optimal contract. We assume that only aggregate performance measures are used in a compensation contract. As Gaver (1998) points out, earnings components are not distinguished ex ante according to their differential usefulness as managerial performance measures. In other words, we examine the shifts in the weights among *aggregate* performance measures rather than the weights on the *components* of earnings. In addition, while Balsam (1998) examines the direct relationship between discretionary accruals and compensation, we focus on the effect of discretionary accruals as a proxy for information uncertainty in earnings, on the incremental weights of returns, earnings, and cash flows in the compensation contract.

Third, prior studies find that stock returns carry more weight than earnings in compensation contracts. Our results show that after we control for the effect of the magnitude of discretionary accruals, earnings and stock returns possess roughly equal contracting value.

The rest of the paper is structured as follows. Section 2 develops our research hypotheses. Section 3 describes empirical methods. Section 4 presents empirical results and Section 5 offers concluding remarks.

2. Hypotheses Development

Datar, Kulp, and Lambert (2001) suggest that in a setting with multi-actions, a contract rewards the manager's actions on creating aggregate firm value. The value of the firm (V) is given by a mixed allocation of managerial efforts:

$$V = v_1 e_1 + v_2 e_2 + v_3 e_3 + \varepsilon_{v1} + \varepsilon_{v2} + \varepsilon_{v3} \tag{A1}$$

e_1, e_2, and e_3 reflect different dimensions of managerial activities. Since it is difficult to measure the value of the firm directly, and the outcome of managerial efforts is not directly observable, contractible performance measures are used to imperfectly capture managers' contribution to firm value. The wage contract, W, based on three different performance measures P, A and CF, is:

$$W = \beta_0 + \beta_P P + \beta_A A + \beta_C CF \tag{A2}$$

P, A, and CF are stock price-based, earnings-based, and cash flows-based performance measures. β_P, β_E, and β_{CF} are incentive coefficients on performance measures.

We assume that accounting performance only captures a subset of the CEO's actions, but stock performance captures the effects of all CEO actions (Boschen, Gordon, and Smith 2003). Therefore, stock prices contain larger and richer information about managerial actions than earnings. We also assume that earnings are more informative about managerial actions than operating cash flows. These assumptions are practically reasonable because stock prices impound not only accounting information but also other private value-relevant information. For example, the stock price-based measure reflects information such as customer satisfaction, market share, quality control and other long-term growth information that is not reflected in accounting earnings. Moreover, accounting rules preserve the conservative convention and delay uncertain value relevant information that is impounded in stock prices (Bushman, Indjejikian and Smith 1996). Similarly, earnings contain a larger amount of information than operating cash flows because accounting accruals mitigate the timing and matching problems and earnings have shown to have higher predictability for future earnings than cash flows (Dechow 1994; Bernard and Stober 1989).

Following Bushman and Smith (2001), we let stock prices reflect managerial efforts $e_1 + e_2 + e_3$, while accounting earnings and cash flows reflect managers' partial actions $e_1 + e_2$, and e_1, respectively:

$$\begin{aligned} P &= p_1 e_1 + p_2 e_2 + p_3 e_3 + \varepsilon_P \\ A &= a_1 e_1 + a_2 e_2 + \varepsilon_A \\ CF &= c_1 e_1 + \varepsilon_{CF} \end{aligned} \tag{A3}$$

e_1, e_2, and e_3 are reported managerial efforts.[3] Parameters p, a and c capture the sensitivity of stock price, earnings, and cash flows to the agent's action e; ε_P, ε_A and ε_{CF} are stochastic variables. The equations imply that current accounting earnings A does not reflect managerial activities e_3, which is impounded in the price. Cash flows from operations do not reflect managerial activities e_2. Examples of e_3 include analyst forecast information, non-accounting information, competitors' performance evaluation, and so on. Examples of e_2 include activities related to changes in accruals (i.e., discretionary and non-discretionary accruals) that are not reflected in operating cash flows. The relative informativeness of performance measures affects their relative weights in the compensation contract. A performance measure will carry a higher weight if it reflects broader and more generalized information about managerial actions.

That is, the richer the information captured by the performance measure, the higher the contracting weight it has. Therefore, the relative weights β_P/β_A and β_A/β_{CF} are expected to be an increasing function of e_3 and e_2, respectively. We expect stock returns to carry the highest weight, and operating cash flows the lowest, in the compensation contract. The first hypothesis, stated in the alternate form, is:

> H_1: *Ceteris paribus, the weight place on the stock-based measure will be larger than that on earnings; the weight placed on earnings will be larger than that on operating cash flows in the compensation contract.*

2.2 The effect of discretionary accruals on the relative weights of performance measures

Theoretical work on performance evaluation using multiple signals in agency settings (Holmstom 1979; Banker and Datar 1989; Feltham and Xie 1994; Ittner, Larcker and Rajan 1997) finds that the informational value of a performance measure is affected by its noise, or the level of precision with which the performance measure provides information about the manager's actions. For example, Smith and Watts (1992) show that as a firm adopts more growth options, the observability of managerial actions decreases because outside shareholders have difficulty predicting the outcomes of future projects, making accounting numbers a less accurate measure for performance. Bushman and Smith (2001) find that stock price-based measures become more important than earnings-based measures, as investment opportunities increase. Ittner, Larcker and Rajan (1997) find that the use of financial measures in the compensation contract decreases with the level of noise in them.

The principal-agent models predict that the weights on performance measures in the compensation contract is a function of their sensitivity and precision to measure managerial actions. When discretionary accruals are presented, the information contained in earnings becomes less certain. The true economic value of observed discretionary accruals can be either opportunistic or informative, but discretionary accruals virtually induce higher uncertainty in accounting earnings because of mixed signals. In other words, discretionary accruals increase the level of information asymmetry. Clinch and Magliolo (1993) report that management discretion could limit the effectiveness of earnings as a performance measure in compensation contracts. When discretionary accruals decrease the sensitivity and precision of earnings measuring managerial actions, the incentive weight placed on accounting earnings is expected to decrease. We present the second hypothesis as follows:

H_2: *Ceteris paribus, the weight placed on accounting earnings will decrease as the likelihood of discretionary accruals causing uncertainty in earnings increases.*

On the other hand, discretionary accruals affect returns to a lesser extent and do not directly affect operating cash flows. Therefore, compensation committees are likely to increase the relative weights of returns and cash flows in the compensation contract in the presence of discretionary accruals. Ittner, Larcker and Rajan (1997) find that when the noise in financial measures increases, the use of non-financial measures increases. Thus when the use of earnings is decreased because of discretionary accruals, the use of alternative measures such as returns and cash flows will increase. We thus present the third hypothesis as follows:

H_3: *Ceteris paribus, the weights placed on stock returns and cash flows from operations will increase, as the likelihood of discretionary accruals causing uncertainty in earnings increases.*

3. Empirical Methods

3.1 Estimate of discretionary accruals

We use three alternative measures of discretionary accruals because of the potential problems of measurement errors reported in the prior earnings management studies (e.g., Dechow, Sloan and Sweeney 1995, among others). Discretionary accruals are estimated using the modified Jones model (Dechow, Sloan, and Sweeney 1995), the Healy model (Healy 1985), and the DeAngelo Model (DeAngelo 1986).

3.1.1 Discretionary accruals under the Healy model

Healy (1985) uses total accruals to proxy for discretionary accruals. Discretionary accruals are computed as:

$$TACCR_{it} = (NI_{it} - CF_{it}) / A_{it-1} \qquad \text{(A4)}$$

Where for firm i at time t:

$TACCR_{it}$ = total accruals;
NI_{it} = net income before extraordinary items and discontinued operations (item #18);
CF_{it} = cash flows from operations (item #308); and
A_{it-1} = total assets at the beginning of the year (item # 6).

3.1.2 Discretionary accruals under the modified Jones model

In this paper, the modified Jones model (Dechow, Sloan, and Sweeney 1995) is estimated cross-sectionally each year and by industry membership. The cross-sectional approach has the advantage of controlling for the effects of changing industry-wide economic circumstances on total accruals and allowing the coefficients to change across years due to possible structural changes. In addition, the cross-sectional model is not constrained by data availability. For the years from 1993 to 1998, in each industry (measured by two-digit SIC) with at least ten firms, the following model is estimated every year:

$$TACCR_{it}/A_{it-1} = a_{it}(1/A_{it-1}) + b_{1it}(\Delta REV_{it} - \Delta REC_{it})/A_{it-1} + b_{2it}(PPE_{it}/A_{it-1}) + \varepsilon_{it} \qquad \text{(A5)}$$

where, for firm i at time t in each two-digit SIC j,

$TACCR_{it}$ = total accruals, see equation (A4) above;
A_{it-1} = total assets at the beginning of the year (item #6);
ΔREV_{it} = change in sales revenues (item #12);
ΔREC = change in receivables (item #2);
PPE_{it} = gross property, plant and equipment (item #7); and
ε_{it} = error term.

Discretionary accruals are estimated as the difference between reported total accruals and fitted values of total accruals (nondiscretionary accruals) using coefficient estimates from equation (A5) for the years 1993-98:

$$DA_{it} = TACCR_{it}/A_{it-1} - [a_{it} (1/A_{it-1}) + b_{1it} (\Delta REV_{it} - \Delta REC_{it})/A_{it-1} + b_{2it} PPE_{it}/A_{it-1}] \quad \text{(A6)}$$

Where DA_{it} is discretionary accruals and ΔREC_{it} is change in accounts receivables (item #2).

3.1.3 Discretionary accruals under the DeAngelo model

DeAngelo (1986) assumes the expected nondiscretionary accruals to be the previous year's total accruals and discretionary accruals are defined as:

$$DA_{it} = TACCR_{it} - TACCR_{it-1} \quad \text{(A7)}$$

Where for firm i at time t:
DA_{it} = discretionary accruals;
$TACCR_{it}$ = total accruals, see equation (A4) above; and
$TACCR_{it-1}$ = total accruals at the beginning of the year.

3.2 Models

3.2.1 The importance of returns, earnings, and cash flows in the compensation contract

We first model cash compensation as a function of various performance measures to examine the separate roles of returns, earnings, and cash flows in determining CEO cash compensation:

Return Model: $$\Delta COMP_{it} = b_{10} + b_{11} RET_{it} + \varepsilon_{it} \quad (1)$$

Earnings Model: $$\Delta COMP_{it} = b_{20} + b_{22} \Delta E_{it} + \varepsilon_{it} \quad (2)$$

Cash Flows Model: $$\Delta COMP_{it} = b_{30} + b_{33} \Delta CF_{it} + \varepsilon_{it} \quad (3)$$

Full Model: $$\Delta COMP_{it} = b_0 + b_1 RET_{it} + b_2 \Delta E_{it} + b_3 \Delta CF_{it} + \varepsilon_{it} \quad (4)$$

where, for firm i in year t:

$\Delta COMP_{it}$ = change in cash compensation (salary + bonus) deflated by lagged salary;
ΔE_{it} = change in earnings, deflated by beginning period book value of equity;

ΔCF_{it} = change in cash flows from operations, deflated by beginning period book value of equity;
RET_{it} = raw returns;[4] and
ε_{it} = error term.

Following Baber, Kang and Kumar (1999), we scale the dependent variable, *ΔCOMP,* by prior period base salary.[5] Although in recent years equity-based compensation has increased significantly (Bushman and Smith 2001; Hall and Liebman 1998), we focus only on cash compensation for the following reasons. First, since our goal is to examine the substitution effect of relative weights among returns, earnings, and cash flows, adding executives' stock option holdings and other long-term incentives will unavoidably induce an upward (and other unknown) bias upon the stock-based measure and confound our interpretation of the coefficients. Second, because of the allowed discretions in SEC reporting rules, measurement problems are increased for the valuations of grants, transfers and exercises of restricted stocks and options at various unobservable vested and unvested time periods during the year.

In models (1)-(3), we regress change in cash compensation on a single performance measure and compare R^2s of the models. A finding that the R^2 from one regression is significantly greater than the R^2 from the other constitutes evidence that the relative importance of one performance measure in the executive contract is greater than that of the other. In the full model (4), we add all performance measures, including stock returns, earnings, and cash flows simultaneously in the model and compare the relative importance of each performance measure. Because the three performance indicators are measured in different units, standardizing all the variables in the full model enables us to compare the incentive weights on these three performance measures at the same time.

3.2 The effect of discretionary accruals on the weights of performance measures

To examine the effect of discretionary accruals on the incremental weights of returns, earnings, and cash flows in the compensation contract, we develop the following regression model:

$$\Delta COMP_{it}=c_0+c_1 RET_{it}+c_2\Delta E_{it}+c_3\Delta CF_{it}+c_4DA_{it}\times RET_{it}+c_5DA_{it}\times\Delta E_{it}+c_6DA_{it}\times\Delta CF_{it}+\varepsilon_{it} \qquad (5)$$

where ΔCOMP is change in cash compensation (salary + bonus) from year t-1 to year t, scaled by lagged salary; RET is raw returns; ΔE is change in earnings scaled by book value of equity at the beginning of the year; ΔCF is change in cash flows from operations scaled by book value of equity at the beginning of the year.

We use two separate indicators to describe the characteristics of discretionary accruals (DA). Following Reitenga, Buchheit, Yin and Baker (2002), who find that managers use large magnitude of discretionary accruals to maximize bonuses in response to IRC Section 162(m), we set DA equal to 1 if the absolute value of discretionary accruals is above the yearly cross-sectional median and 0 otherwise. The underlying assumption is that large discretionary accruals tend to create more noise in earnings (Sloan 1996; Xie 2001).

Healy (1985), Gaver, Gaver, and Austin (1995), and Holthausen, Larcker, and Sloan (1995) find that the use of income-increasing (positive) and income decreasing (negative) discretionary accruals is associated with incentives provided by bonus plans. These studies, however, do not directly examine the effect of discretionary accruals on compensation. Nwaeze (2003) finds that market prices positive and negative discretionary accruals differently. Balsam (1998) finds that the association between positive discretionary accruals and CEO cash compensation is greater than that for negative discretionary accruals. He interprets this as evidence of pay for performance since positive accruals are used to approach or achieve certain earnings goals. Managers use income-increasing discretionary accruals to achieve positive profits, to meet or beat certain income benchmarks. To examine the effect of positive versus negative discretionary accruals, we set DA equal to 1 if discretionary accruals are negative and 0 if positive. Since positive items including positive discretionary accruals are found to be rewarded by compensation committees (Balsam 1998; Gaver and Gaver 1998), we interpret this as positive discretionary accruals, relative to their negative counterpart, being more informative about managerial actions. Therefore, the presence of negative discretionary accruals is more likely to decrease the precision of earnings to measure managerial efforts and result in higher level of difficulty in interpreting the possible outcomes.

We use indicators rather than continuous variables of discretionary accruals in order to mitigate problems of measurement errors arising from the estimates of discretionary accruals and the possibility of multicollinearity among variables in the models. The modified Jones model (Dechow, Sloan and Sweeny 1995), the Healy model (Healy 1985), and the DeAngelo model (DeAngelo 1986) are used to estimate discretionary accruals. [6]

In model (5), we focus on the interaction terms $DA \times RET$, $DA \times \Delta E$, and $DA \times \Delta CF$ to examine the effect of discretionary accruals on the incremental weights of the three performance measures. H_2 predicts that the weight on ΔE will decrease and H_3 predicts that the weights on RET and ΔCF will increase, as the likelihood of discretionary accruals causing uncertainty in earnings increases. Therefore, c_4 and c_6 are expected to be positive and c_2 negative.

We also analyze the effect of discretionary accruals on the shifts in weights of performance measures by examining the explanatory powers of these measures. We form portfolios of discretionary accruals with different magnitudes and signs and run regression models (1)-(3) separately on each portfolio. By comparing the R^2s of these models across portfolios, we assess the impact of discretionary accruals on each performance measure.

3.3 Sample selection and data

CEO compensation data are obtained from Standard and Poor's ExecuComp from 1992 to 1998. Financial statement data are obtained from COMPUSTAT. The initial sample consists of 10,421 firm-year observations and 2,049 firms. We then delete missing cash compensation, earnings, cash flows, and stock return data. Observations with changes in CEOs are deleted because full year compensation data may not be available. We also delete the top and bottom 1 percent of each variable to reduce the influence of outliers on results. Since we require calculations of changes in variables, 1993 is the first year for which usable data are available. The final sample consists of 6,924 firm-year observations.

4. Results

4.1 Descriptive statistics and correlation results

Table 1 reports the descriptive statistics and correlation results for changes in cash compensation and various performance measures. Panel A of Table 1 shows that the mean (median) cash compensation of our sample is $1,017,000 ($783,000).[7] The average change in cash compensation is 17.4 percent of prior years' salary. The mean discretionary accruals is 2.9 percent of beginning assets for the modified Jones model and 9.5 percent of beginning assets for the DeAngelo model. Mean total accruals is negative and 4.7 percent of beginning total assets. The negative number is due to the presence of depreciation expense.

Panel B1 of Table 1 presents Pearson correlations between changes in cash compensation and various performance measures. Changes in earnings, cash flows, and raw returns are all significantly related to change in cash compensation, with raw returns having the highest correlation and cash flows the lowest. This is consistent with prior research which finds that these measures play a role in rewarding CEO compensation. The result is also consistent with H_1 that stock returns have a higher weight than earnings, and earnings have a higher weight than cash flows in the compensation contract.

Panel B2 of Table 1 shows that discretionary accruals are positively correlated with change in earnings and negatively correlated with change in operating cash flows, consistent with prior findings (Dechow, Kothari and Watts 1998; Dechow 1994). Returns are less correlated with discretionary accruals, compared with accounting earnings and operating cash flows, consistent with prior studies that find prices do not fully reflect the information in discretionary accruals (Subramanyam 1996; Xie 2001). Panel B2 also shows that the pairwise correlations between the three measures of discretionary accruals are generally high, ranging from 0.348 to 0.553, and are all significant at the $p < 0.01$ level.

[Insert Table 1 about here]

4.2 Regression results

We estimate models (1)-(4) year-by-year from 1993 to 1998 to control for the effects of time-related shifts in the use of performance measures. We first calculate the mean of each parameter from the estimates for years 1993-1998, and then divide the mean by the standard error of the estimates to obtain the t-value.[8] Table 2 presents the regression results.

The average coefficients on stock returns, earnings, and cash flows are positive and significant in all four models, consistent with prior findings that these performance measures play a role in determining CEO cash compensation. In the full model that simultaneously includes all three performance measures, the average coefficients on stock returns, earnings, and cash flows are positive and significant, indicating that these performance measures provide incremental contracting value to each other. It also implies that the accrual component of earnings carries contracting value. Variables in the full model are also standardized so that we can compare the relative weights on performance measures. The average standardized coefficients on returns, earnings, and cash flows are 0.254, 0.18, and 0.054, respectively. T-tests results show that the weight coefficient on returns is significantly higher than that on earnings and the weight coefficient on earnings is significantly higher than that on operating cash flows.

The average adjusted R^2s for the univariate returns, earnings, and cash flow models are 10.1%, 7.3%, and 2.1%, respectively, suggesting that stock returns explain the most and cash flows the least variations in change in executive cash compensation. Vuong's (1989) likelihood ratio tests are conducted to assess the relative importance of the three performance measures in the compensation contract.[9] Results of Vuong tests show that stock returns are the most important performance measure in the compensation contract; they carry significantly more explanatory power in the compensation model than earnings and cash flows. Compensation committees view stock returns to be significantly more informative about managerial actions than earnings (Z=3.19), and earnings to be more informative than cash flows (Z=6.72). This is consistent with H1.

Overall, the comparison of coefficients on performance measures in the standardized full model, as well as the comparison of adjusted R^2 values of univariate regression models, provide evidence that is consistent with H_1.

[Insert Table 2 about here]

In Table 3 we investigate the effect of the magnitude of discretionary accruals (high versus low) on the incremental weights of performance measures. We focus on the interactions between the discretionary accruals indicator variable and the three performance measures to evaluate the mediating effect of high magnitude of discretionary accruals on the weights assigned to returns, earnings and operating cash flows. The average coefficient on DA×RET is positive in all three measures of discretionary accruals and is significant under the DeAngelo model, indicating that high magnitude of discretionary accruals improves the weight on returns. The average coefficient on DA×ΔE is negative and significant across the board, suggesting that high discretionary accruals reduce the weight of earnings in the compensation contract, due to the increased uncertainty contained in discretionary accruals. The positive and significant coefficients on DA×ΔCF in two of the three discretionary accruals measures confirm that compensation committees shift weight to operating cash flows when high discretionary accruals are presented.

In Panel B we examine the relative importance of returns, earnings, and cash flows in the two portfolios separately containing high and low discretionary accruals. Results show that the average R^2 of the returns model is significantly higher for the portfolio containing high discretionary accruals than for the portfolio containing low discretionary accruals. The results for the cash flow model are similar, although not as significant. In firms with high discretionary accruals, cash flows explain more for change in cash compensation, especially for the Healy Model. In contrast, the portfolio containing high discretionary accruals on average has lower R^2 for the earnings model, indicating that the importance of earnings decreases when the magnitude of discretionary accruals increases.

In summary, Table 3 reveals that high magnitude of discretionary accruals significantly decreases the incentive weight and the explanatory power of accounting earnings and increases those of returns and operating cash flows. The uncertain and unpredictable nature of discretionary accruals decreases the role of accounting earnings and increases those of returns and cash flows in the compensation contract. This is consistent with H_2 and H_3.

[Insert Table 3 about here]

Table 4 examines the effect of the signs of discretionary accruals (positive versus negative) on the roles of different performance measures. DA takes a value of 1 if discretionary accruals are negative and 0 otherwise. Panel A suggests that earnings carry less weight, as shown by the significant and negative coefficients on DA $\times\Delta$E, in the modified Jones model and the DeAngelo model, when negative discretionary accruals are presented. In contrast, the average coefficients on DA $\times$ RET and DA $\times\Delta$CF are positive, indicating that the weights on returns and cash flows are generally increased in negative discretionary accruals. In Panel B, we run models (1)-(3) using the two portfolios containing separately negative and positive discretionary accruals and evaluate the relative importance of each performance measure. The R^2s for the returns models and cash flows models are higher for the negative discretionary accruals portfolio, consistent with H_2 and H_3. The difference in R^2s for the earnings models between the negative and positive discretionary accruals portfolios is significant only for the Healy model, and the sign is opposite to the expectation. The R^2 of the earnings model is lower for the negative discretionary accruals portfolio for the modified Jones measure, thought the difference is not significant. Overall the results in Table 4 support H_2 and H_3 that the information uncertainty resulted from negative discretionary accruals relative to positive discretionary accruals improves the roles of returns and cash flows and decreases that of earnings in compensation contracts.

[Insert Table 4 about here]

Table 5 presents the combined effect of the signs and magnitudes of discretionary accruals on the relative importance of returns, earnings and operating cash flows in determining cash compensation. We assign discretionary accruals to four portfolios based on magnitudes and signs: Positive High, Positive Low, Negative Low, and Negative High, and assess the relative importance of the three performance measures in each portfolio. Note that in Table 2 we find that returns have the highest stewardship value, followed by earnings and cash flows. Core, Guay and Verrecchia (2000) find that the weight placed on stock returns is six to nine times greater than that of accounting earnings in cash compensation. In Table 5, we find that this order of importance holds for the portfolios containing discretionary accruals of high magnitude. For example, the average explanatory power of returns is significantly higher than that of earnings (9.1, $t = 3.54$; 4.0, $t=2.22$; 9.3, $t = 5.02$; for the modified Jones model, the Healy model, and the DeAngelo model, respectively) in the Negative High portfolio. The average explanatory power of earnings is higher than that of cash flows.

For the two portfolios containing discretionary accruals of low magnitude, we find that after controlling for the magnitude, earnings and stock returns are almost equally important. For example, in the Negative Low portfolio where discretionary accruals are estimated by the modified Jones model, while stock returns explain 11.5% of variations in change in cash compensation, earnings are able to explain 11.0%, and the difference is not significant. Under the DeAngelo model, earnings provide even higher explanatory power than stock returns in cash compensation. Contrary to prior research, we find that accounting earnings are equally important as returns in the compensation contract, when the magnitude of discretionary accruals is controlled.

Results in Table 5 suggest that the relative importance of earnings, to that of alternative measures, is influenced by the uncertainty induced by discretionary accruals embedded in earnings. We interpret this result as compensation committees assigning less weight to earnings of low quality and more weights to alternative performance measures such as returns and operating cash flows.

[Insert Table 5 about here]

5. Conclusion

The principal-agent theory suggests that when performance signals are used in compensation contracts, the relative weight of each signal reflects its precision (e.g., Banker and Datar, 1989; Feltham and Xie, 1994; Natarajan 1996). In this paper we use discretionary accruals as a proxy for uncertainty contained in earnings. We first predict and test that the relative weights placed on performance measures are associated with the size of the information impounded in each performance measure. We then predict and test that when compensation committees encounter uncertain signals embedded in discretionary accruals, they substitute away the incentive weight of earnings to alternative measures such as returns and operating cash flows. Results overall confirm our predictions.

Our study suggests that compensation committees consider the mixed messages and uncertain outcomes conveyed in discretionary accruals. When the difficulty to interpret managerial efforts as a result of discretionary accruals increases, compensation committees take the nature of reported earnings and the context into consideration and adjust the weights on return-based and earnings-based performance measures accordingly.

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Endnotes:

1. We follow the prior research avenue that examines the relation between the agent's actions and their impact on contractible performance measures (e.g., Holmstrom 1979; Banker and Datar 1989; Feltham and Xie 1994). The incentive weight refers to the slope coefficient or explanatory power (adjusted R^2) of a performance measure in the compensation model (Bushman and Smith 2001).

2. The relative weights on performance measures in executive compensation have been examined in many studies (e.g., Lambert and Larcker 1987; Janakirman, Lamber and Larcker 1992; Sloan 1993; Bushman, Indjejikian, and Smith 1996; Ittner, Larcker and Rajan 1997; Ittner, Larcker, and Meyer 2003; and among others).

3. Equations (A3) implicitly assume that the managerial efforts, e_1, e_2 and e_3, are independent of each other. While this assumption seems restrictive, we use these equations to illustrate the relative size of the information.

4. Market-adjusted returns and abnormal returns estimated from the market model yield quantitatively and statistically similar results.

5. Prior period's base salary is used as a scalar to control for size-related factor and to minimize the effect of period t-1 performance on the compensation metric.

6. The problems of measurement errors in estimating discretionary accruals are mitigated because of the use of three alternative estimation models and the use of dummy variables to indicate the degree of information uncertainty in earnings. Actual values of discretionary accrual are not used because we are interested in the relative uncertainty conveyed in discretionary accruals, not a dollar-to-dollar linear relation between discretionary accruals and change in cash compensation.

7. Core, Guay, and Verrecchia (2000) report mean (median) cash compensation of $1,210,000 ($880,000) using a sample similar to ours.

8. We also run regressions using pooled observations over time and across firms and results are similar.

9. Vuong's Z-statistic tests whether the adjusted R^2 is significantly greater for one model than the other.

TABLE 1

Descriptive Statistics and Correlation Results

Panel A: Descriptive Statistics

Variable	Mean	25%	Median	75%
Cash Compensation				
Cash Compensation, *COMP*, (in thousands)	1,017	500	783	1,223
ΔCash Compensation, *ΔCOMP (%)*	0.174	-0.023	0.122	0.371
Performance Measures				
ΔEarnings, *ΔE*	0.022	-0.017	0.023	0.064
ΔCash Flows, *ΔCF*	0.033	-0.045	0.028	0.109
Stock Returns, *RET*	0.161	-0.094	0.111	0.351
Discretionary Accruals (DA)				
Modified Jones	0.029	-0.034	0.019	0.086
Healy Total Accruals	-0.047	-0.083	-0.046	-0.011
DeAngelo	0.095	-0.037	-0.001	0.036

Panel B: Correlations Results

B1: Pearson Correlations between Change in Cash Compensation and Performance Measures

Variable	ΔE	ΔCF	RET
ΔComp	0.264*	0.142*	0.313*

B2: Pearson (above) and Spearman (below) Correlations of Independent Variables

Variable	ΔE	ΔCF	RET	DA - Modified Jones	DA-Healy Total Accruals	DA - DeAngelo
ΔE		0.252*	0.280*	0.189*	0.272*	0.369*
ΔCF	0.283*		0.166*	-0.291*	-0.418*	-0.564*
RET	0.373*	0.163*		-0.071*	0.026*	0.068*
DA - Modified Jones	0.102*	-0.306*	-0.064*		0.553*	0.351*
DA - Healy Total Accruals	0.171*	-0.421*	0.012*	0.503*		0.465*
DA - DeAngelo	0.311*	-0.627*	0.072*	0.348*	0.448*	

Total number of observations is 6,924 firm-years. The top and bottom 1% of each variable are deleted to reduce the influence of outliers on results. In Panel B2, the numbers above the diagonal represent Pearson correlations, and those below represent Spearman correlations.

Variable definitions:

COMP = salary + bonus;

ΔCOMP(%) = change in cash compensation (salary + bonus) deflated by lagged salary;

ΔE = change in earnings deflated by book value of equity at the beginning of year t;

ΔCF = change in cash flows from operations deflated by book value of equity at the beginning of year t;

RET = raw returns;

DA = discretionary accruals, estimated alternatively by the modified Jones model (Dechow et al. 1995), Healy total accruals (Healy 1985), and the DeAngelo model (DeAngelo 1986); and

Total accruals = net income - cash flows from operations, deflated by total assets at the beginning of the year.

* indicates a significant level of $p<0.1$.

TABLE 2
Relative Informativeness of Returns, Change in Earnings and Change in Cash Flows in Explaining Change in CEO Cash Compensation

Returns Model:	$\Delta COMP_{it} = b_0 + b_1 RET_{it} + \varepsilon_{it}$	*(1)*
Earnings Model:	$\Delta COMP_{it} = b_0 + b_2 \Delta E_{it} + \varepsilon_{it}$	*(2)*
Cash Flows Model:	$\Delta COMP_{it} = b_0 + b_3 \Delta CF_{it} + \varepsilon_{it}$	*(3)*
Full Model:	$\Delta COMP_{it} = b_0 + b_1 RET_{it} + b_2 \Delta E_{it} + b_3 \Delta CF_{it} + \varepsilon_{it}$	*(4)*

	b_0	b_1	b_2	b_3	Adj. R^2 (%)
1. Returns Model					
	0.108	0.442			10.1
	(5.34)***	(13.08)***			
2. Earnings Model					
	0.150		1.020		7.3
	(7.81)***		(14.69)***		
3. Cash Flows Model					
	0.158			0.443	2.1
	(9.35)***			(7.13)***	
4. Full Model					
	0.101	0.355	0.686	0.164	13.9
	(5.92)***	(10.13)***	(9.49)***	(2.56)**	
Standardized	0.051	0.254	0.180	0.054	13.9
	(18.63)***	(21.66)***	(15.05)***	(4.65)***	

Tests of Differences in Coefficients and Vuong Test

	Differences in Standardized Coefficients in the full model	*Vuong's z - statistic*
Returns vs. Earnings	0.074***	3.19***
Earnings vs. Cash Flows	0.126***	6.72***
Returns vs. Cash Flows	0.200***	9.75***

Total number of observations is 6,924 firm-years.
Reported coefficients and adjusted R^2s are the means of year-by-year estimates from 1993 to 1998. The numbers in parentheses are t-statistics.
***, ** indicate significance levels of $p<0.01$ and $p<0.05$, one-tailed.
Vuong's Z-statistic tests whether the adjusted R^2 is significantly greater for one model than the other.

Variable definitions:
ΔCOMP = change in cash compensation (salary + bonus), deflated by lagged salary;
RET = raw returns;
ΔE = change in earnings, deflated by book value of equity at the beginning of year t; and
ΔCF = change in cash flows from operations, deflated by book value of equity at the beginning of year t.

TABLE 3
The Effect of High/Low Discretionary Accruals on Performance Measures

Model: $\Delta COMP_{it} = c_0 + c_1 RET_{it} + c_2 \Delta E_{it} + c_3 \Delta CF_{it} + c_4 DA_{it} \times RET_{it} + c_5 DA_{it} \times \Delta E_{it} + c_6 DA_{it} \times \Delta CF_{it} + \varepsilon_{it}$ (5)

Panel A: The Relative Weights on Performance Measures

	Modified Jones		Healy Total Accruals		DeAngelo	
Intercept (c_0)	0.101	(5.85)***	0.095	(5.53)***	0.099	(6.24)***
RET (c_1)	0.347	(10.97)***	0.342	(7.14)***	0.264	(6.67)***
ΔE (c_2)	0.996	(8.88)***	0.958	(11.78)***	1.464	(6.21)***
ΔCF (c_3)	0.058	(0.78)	0.038	(0.43)	0.089	(0.47)
DA× RET (c_4)	0.022	(0.91)	0.023	(0.69)	0.120	(2.21)**
DA× ΔE (c_5)	-0.472	(-5.37)***	-0.396	(-3.04)**	-0.912	(-3.86)***
DA× ΔCF (c_6)	0.156	(2.04)**	0.185	(2.61)**	0.009	(0.05)
Average Adj. R^2 (%)	14.1		14.1		14.6	
n	6,882		6,882		6,324	

Panel B: Adjusted R^2s of Univariate Models

Returns Model: $\Delta COMP_{it} = b_0 + b_1 RET_{it} + \varepsilon_{it}$

Earnings Model: $\Delta COMP_{it} = b_0 + b_2 \Delta E_{it} + \varepsilon_{it}$

Cash Flows Model: $\Delta COMP_{it} = b_0 + b_3 \Delta CF_{it} + \varepsilon_{it}$

	Modified Jones		Healy Total Accruals		DeAngelo	
	Low	High	Low	High	Low	High
Returns Model	9.7%	10.3%	8.6%	11.5%	7.3%	12.5%
Earnings Model	9.1%	6.2%	8.9%	6.6%	10.3%	7.3%
Cash Flows Model	1.9%	2.0%	1.3%	2.5%	3.4%	3.7%

T-tests of differences in Adjusted R^2s (t statistic in parentheses)

	Difference	*Difference*	*Difference*
Returns (high vs. low)	0.6% (0.41)	2.9% (2.15)**	5.3% (3.62)***
Earnings (high vs. low)	-2.9% (-2.31)**	-2.2% (-1.78)*	-2.9% (-1.48)*
Cash Flows (high vs. low)	0.1% (0.19)	1.1% (2.27)**	0.3% (0.11)

Reported coefficients and adjusted R^2s are the means of year-by-year estimates from 1993 to 1998. The numbers in parentheses are t-statistics.

Variable definitions:
ΔCOMP = change in cash compensation (salary + bonus), deflated by lagged salary;
RET = raw returns;
ΔE = change in earnings, deflated by book value of equity at the beginning of year t; and
ΔCF = change in cash flows from operations, deflated by book value of equity at the beginning of year t.
DA = 1 if the absolute value of discretionary accruals for firm *i* in year *t* is higher than the yearly cross-sectional sample median (High DA), and 0 otherwise (Low DA).

***, **, * indicate significance levels of p<0.01, p<0.05 and p<0.10, one-tailed.

TABLE 4
The Effect of Positive/Negative Discretionary Accruals on Performance Measures

Model: $\Delta COMP_{it} = c_0 + c_1 RETt_{it} + c_2\Delta E_{it} + c_3\Delta CF_{it} + c_4 DA_{it}\times RETt_{it} + c_5 DA_{it}\times \Delta E_{it} + c_6 DA_{it}\times \Delta CF_{it} + \varepsilon_{it}$ *(5)*

Panel A: The Relative Weights on Different Performance Measures

	Modified Jones		Healy Total Accruals		DeAngelo	
Intercept (c_0)	0.096	(6.21)***	0.095	(5.77)***	0.095	(4.78)***
RET (c_1)	0.347	(7.04)***	0.340	(7.25)***	0.310	(7.63)***
ΔE (c_2)	0.797	(9.79)***	0.656	(8.16)***	0.777	(7.31)***
ΔCF (c_3)	0.110	(0.88)	0.038	(0.34)	0.105	(2.41)**
DA× RET (c_4)	0.085	(1.33)	0.017	(0.86)	0.084	(1.62)*
DA× ΔE (c_5)	-0.365	(-1.59)*	0.042	(0.38)	-0.174	(-1.81)*
DA× ΔCF (c_6)	0.051	(0.40)	0.274	(2.96)**	0.099	(1.65)*
Average Adj. R^2 (%)	14.4		14.0		14.0	
n	6,882		6,882		6,324	

Panel B: Adjusted R^2s of Univariate Models

Returns Model: $\Delta COMP_{it} = b_0 + b_1 RET_{it} + \varepsilon_{it}$

Earnings Model: $\Delta COMP_{it} = b_0 + b_2\Delta E_{it} + \varepsilon_{it}$

Cash Flows Model: $\Delta COMP_{it} = b_0 + b_3\Delta CF_{it} + \varepsilon_{it}$

	Modified Jones		Healy Total Accruals		DeAngelo	
	Positive	Negative	Positive	Negative	Positive	Negative
Returns Model	8.5%	13.4%	9.5%	10.3%	7.5%	12.3%
Earnings Model	6.9%	6.7%	5.3%	8.1%	7.2%	7.3%
Cash Flows Model	2.1%	2.8%	0.9%	4.2%	2.5%	4.4%

T-tests of differences in Adjusted R^2s (t statistic in parentheses)

	Difference	*Difference*	*Difference*
Returns (negative vs. positive)	4.9% (2.78)**	0.8% (1.57)*	4.8 %(3.12)**
Earnings (negative vs. positive)	-0.3% (-0.12)	2.9 %(2.40)**	0.1 %(0.11)
Cash Flows (negative vs. positive)	0.7% (0.59)	3.3% (4.29)***	1.9% (2.34)**

Reported coefficients and adjusted R^2s are the means of year-by-year estimates from 1993 to 1998. The numbers in parentheses are t-statistics.

Variable definitions:
ΔCOMP = change in cash compensation (salary + bonus), deflated by lagged salary;
RET = raw returns;
ΔE = change in earnings, deflated by book value of equity at the beginning of year t; and
ΔCF = change in cash flows from operations, deflated by book value of equity at the beginning of year t.
DA = 1 if the discretionary accruals for firm *i* in year *t* is negative (Negative DA), and 0 otherwise (Positive DA).

***, **, * indicate significance levels of $p<0.01$, $p<0.05$ and $p<0.10$, one-tailed.

TABLE 5
The Effect of Positive/Negative and High/Low Discretionary Accruals on Performance Measures

Returns Model: $\Delta COMP_{it} = b_0 + b_1 RET_{it} + \varepsilon_{it}$ (1)
Earnings Model: $\Delta COMP_{it} = b_0 + b_2 \Delta E_{it} + \varepsilon_{it}$ (2)
Cash Flows Model: $\Delta COMP_{it} = b_0 + b_3 \Delta CF_{it} + \varepsilon_{it}$ (3)

	Modified Jones			Healy Total Accruals			DeAngelo		
	Adj. R^2 (%)	Difference in adjusted R^2s		Adj. R^2 (%)	Difference in adjusted R^2s		Adj. R^2 (%)	Difference in adjusted R^2s	
		RET vs. ΔE	ΔE vs. ΔCF		RET vs. ΔE	ΔE vs. ΔCF		Ret vs. ΔE	ΔE vs. ΔCF
Positive High (1)									
Return Model	8.9%			10.9%			8.1%		
Earnings Model	6.9%	2.0%	4.9%	5.1%	5.8%	4.5%	6.2%	1.9%	4.3%
Cash Flows Model	2.1%	(2.03)**	(4.63)***	0.6%	(3.22)***	(5.50)***	1.9%	(1.00)	(3.83)***
Positive Low (2)									
Return Model	7.9%			9.2%			6.6%		
Earnings Model	7.7%	0.2%	5.8%	5.2%	4.0%	4.0%	10.9%	-4.3%	4.6%
Cash Flows Model	2.0%	(0.12)	(3.59)***	1.1%	(1.29)	(2.16)**	6.3%	(-1.77)*	(3.44)***
Negative Low (3)									
Return Model	11.5%			7.8%			8.0%		
Earnings Model	11.0%	0.6%	7.1%	8.8%	-1.0%	6.2%	9.5%	-1.5%	2.0%
Cash Flows Model	2.9%	(0.19)	(5.57)***	2.5%	(-0.84)	(7.99)***	7.5%	(-0.88)	(2.89)**
Negative High (4)									
Return Model	14.1%			12.4%			16.5%		
Earnings Model	5.0%	9.1%	3.6%	8.4%	4.0%	4.8%	7.2%	9.3%	2.6%
Cash Flows Model	1.4%	(3.54)***	(2.52)**	3.7%	(2.22)**	(3.91)***	4.5%	(5.02)***	(1.84)*

Reported adjusted R^2s are the means of year-by-year estimates from 1993 to 1998. Positive/Negative portfolios are based on whether accruals are positive or negative; High/Low discretionary accruals are assigned based on yearly comparisons with cross-sectional median. The numbers in parentheses are t-statistics.

***, **, * indicate significance levels of $p<0.01$, $p<0.05$ and $p<0.10$, respectively, one-tailed.