Performance Measures in CEO Annual Bonus Contracts*

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June 2013

Abstract

This paper investigates the compensation usefulness of accounting variables along several important dimensions (accruals-based vs. cash-flows based, non-return vs. return, and gross vs. net measures), as well as the time series variation of performance measures in CEO bonus plans, using a unique panel of manually collected CEO bonus determinants spanning fiscal years 2006 to 2011. We document that net accruals-based measures (e.g., earnings) are used as the primary measures, supplemented with gross (sales) and cash flows measures (e.g., operating cash flows). Consistent with agency theory, cash flows measures are more useful for firms with more liquidity concerns and longer CEO employment horizons; and accounting returns (sales) are less (more) useful for growth firms. We also document significant time series variation in the choice of performance measures. The time series variation is driven by accounting underperformance in the previous year, as well as changes in firm fundamentals and CEO.

Keywords: earnings, cash flows, accruals, CEO bonus plans, liquidity concerns, financial crisis, firm life cycle

JEL Classifications: G30, J33, J41, M41

* This paper was previously circulated under the title "Earnings and Cash Flows in CEO Annual Bonus Contracts." We thank Bin Li, Meng Li, Stan Markov, Ramachandran Natarajan, Yong Yu, and brownbag seminar participants at University of Texas at Dallas for very helpful discussions and comments. We acknowledge excellent research assistance by Ying Chen and Yun Lou. Ningzhong Li acknowledges the financial support of London Business School RAMD Fund. Jeff Ng acknowledges financial support from the CUHK professional development fund. All errors are our own.

1. Introduction

Motivating managers through accounting-based compensation contracts is an important demand for accounting numbers. Although the empirical accounting literature has successfully established the usefulness of accounting metrics in compensating executives (e.g., Lambert and Larcker [1987], Sloan [1993]), there are few studies on how specific accounting measures are used in compensation contracts. Consequently, a number of important questions remain unanswered: What is the role of accounting accruals in executive compensation contracts? What factors drives the use of specific accounting measures (e.g., sales, cash flows, earnings, and return on assets)? And, what triggers the time series adjustment of performance measures?

We attempt to answer these questions by investigating performance measures used in the annual bonus contracts of a large sample of 7,550 firm-years from 2006 to 2011. We investigate annual (short-term) incentive plans because they are more accounting-based (Murphy [1999]). In December 2006, the Securities and Exchange Commission (SEC) issued new rules for the disclosure of executive compensation, requiring firms to disclose the details of CEO compensation contracts, including types of performance measures and performance targets (SEC [2006], page 31). This regulation change allows us to collect the names and weights of performance measures in CEO annual bonus plans disclosed in firms' proxy statements.

Holmstrom's [1979] "Informativeness Principle" indicates that a signal is incrementally useful in the compensation contract as long as it provides additional information about managerial efforts. This condition suggests that compensation contracts could be rich and based on many variables (Lambert [2001]). Evaluating the usefulness of accounting variables in compensation contracts is fundamentally different from evaluating their value relevance. In

measuring value relevance, stock prices are arguably reliable measures of firm values. In contrast, in compensation contracting, researchers are interested in how certain accounting variable is informative about managerial effort (Holmstrom [1979]), which is typically unobservable. Since managerial effort is unobservable, the weights placed on various accounting variables in the observed contracts are probably the best measure of their relative usefulness.

We investigate three important dimensions of accounting performance measures: whether they are accruals-based or cash-flows-based (e.g., earnings vs. operating cash flows), whether they are in dollars or return measures (e.g., earnings vs. ROA), and whether they are net or gross measures (e.g., earnings vs. sales). These dimensions capture different aspects of managerial efforts in creating values for shareholders, and characterize important classifications of accounting numbers. One goal of this paper is to contribute to the accounting literature by showing the compensation usefulness of accounting variables along these dimensions. Distinguishing cash-flows-based measures from accruals-based measures is especially important for the accounting literature given the critical role of accruals in accounting.

We document the following picture of the general usefulness of accounting measures: net accruals-based measures (e.g., earnings, EPS, operating income, and ROA) are used as the primary measures, supplemented with gross (sales) and cash flows measures (e.g., operating cash flows and free cash flows). This conclusion is based on two observations. First, net accruals-based measures are used in most contracts (82%)[1], while sales (cash flows measures) are used in only 35% (16%) of the contracts. Second, conditional on the use of the measures, the average weights on sales and cash flows measures are much lower than those of net accruals-based measures; around half of the contracts employ net accruals-based

[1] This percentage increases to 92% if EBITDA is also treated as net accruals-based measures.

measures as the primary measure (weight greater than 50%), while sales and cash flows measures are rarely (1% for both) used as the primary measure. Our evidence is consistent with the argument that accrual accounting improves the usefulness of earnings for compensation contracting (Dechow [1994], Ball and Shivakumar [2006]).

After establishing the dominant role of net accruals-based measures in CEO bonus plans, we examine what factors drive the usefulness of cash flows measures (operating cash flows, free cash flows, and cash flows)[2], accounting returns (ROA, ROE, and ROIC), and sales. Based on contracting theory, we identify firm and industry life cycles, liquidity concerns, and CEO employment horizons as important economic drivers of the choice of performance measures. Although earnings are conceptually a better measure of firm performance, they provide little information about firm liquidity. We hypothesize that firms with more liquidity concerns are more likely to include cash flow measures in bonus plans to motivate managers to improve liquidity.

Recent literature examining the compensation usefulness of leading (e.g., earnings and stock price) and trailing (e.g., realized cash flows) indicators of managerial performance generally concludes that greater weights are placed on leading indicators when the manager's employment horizon is shorter (e.g., Dikolli [2001], Dutta and Reichelstien [2003, 2005]). In these models, the agent has a shorter time horizon and greater risk aversion than the principal, which leads to an additional agency problem, requiring the principal to provide the agent with incentives to undertake the appropriate level of investment. When the manger's employment horizon is shorter, the forward looking nature of accruals makes accruals-based measures more useful in reflecting managers' value creating efforts, even though accruals are noisy measures of future cash flows. Therefore we predict cash-flows-based measures are less useful when CEO's future employment horizon is shorter.

[2] Some bonus plans only specify "cash flows" as one performance measure, without more detailed information on how to define "cash flows."

Our empirical results are consistent with the prediction that cash flows measures are more useful in bonus plans when the firm has more liquidity concerns and when the CEO's future employment horizon is longer. Firms with higher leverage and bankruptcy risk, measured with Ohlson's [1980] O-Score, and firms whose CEO is further from retirement or is younger are more likely to use (place higher weights on) cash flows measures. Firms are also more likely to use (place higher weights on) cash flows measures during the financial crisis and post-crisis periods.[3] A one standard deviation increase in proxies of liquidity concerns increases the likelihood of including cash flows measures by around 3-4%. The likelihood of using cash flows measures decreases by around 4% when the CEO is close to retirement. Relative to the pre-crisis period, firms are more likely to use cash flows measures in the crisis and post-crisis periods by around 4%. These economic effects are nontrivial given that the average likelihood of using cash flows measures is 16%.

Firm and industry life cycles play an important role in firms' business strategy. Managerial efforts to explore growth opportunities and improve future profitability are more important in growth firms than in mature and declining ones, even though those efforts may not be reflected in current profitability. This notion has important implications for the usefulness of accounting returns and sales in compensation contracts. We hypothesize that accounting returns (sales) are less (more) useful in compensating managers in growth firms.

The key difference between accounting returns (e.g., ROA) and non-return profitability measures (e.g., earnings) is that non-return measures ignore the opportunity cost of the resources employed (Murphy and Jensen [2011]). Expanding the asset base could improve earnings but decrease ROA. This investment "inefficiency" reflected in the current ROA is more serious for mature and declining firms because future profitability is less likely to

[3] Although the financial crisis is generally believed to end in 2010, the frequency of using cash flows measures remains high until fiscal year 2011, which is likely to be driven by the macroeconomic uncertainty after the crisis.

improve given the limited growth potentials.[4] Similarly, although efforts to improve sales and market share may not improve current profitability of growth firms, they are valuable investment for future profitability. Using both firm and industry level measures of life cycles, we find consistent evidence that growth firms are less likely to use (place lower weights on) accounting returns, and more likely to use (place higher weights on) sales in CEO bonus plans. To put the economic effects in perspective, firms in growth industries are less likely to use accounting returns by around 6% and more likely to use sales by about 6% than firms in mature and declining industries.

We also examine the time series variation of performance measures in CEO bonus plans. Although the performance measures are generally sticky, we document significant time series variation. Around 47% of firms use performance measures that are not identical to those used in the previous year. 22% (11%) of firms use performance measures that are significantly (completely) different from those used in the previous year, where significant difference is defined as an aggregate weight shift of greater than 50%. Consistent with agency theory, we find to some extent the time series variation is driven by changes in firm fundamentals (size, investment opportunities, and bankruptcy risk) and CEO turnover. The strongest economic driver of the time series variation, however, is accounting underperformance in the previous year. A firm making losses in the previous year is more likely to significantly (completely) change the performance measures by 12% (6%) than one that earns positive profit. This evidence suggests that boards of directors adjust CEO bonus plans if the previous plans did not work well in terms of accounting performance. In contrast, we find no evidence that the change is driven by weak stock market performance.

This study makes several contributions. First, we contribute to the literature on the role of accounting accruals. We provide strong evidence that earnings are more useful than cash

[4] In other words, an ROA lower than cost of capital is a less serious problem in growth firms than in mature and declining firms because future profitability (given the same recourses employed) of growth firms are more likely to improve.

flows in compensation contracts, consistent with arguments in Dechow [1994] and Ball and Shivakumar [2006]. We also document that the usefulness of cash flows increases with firms' liquidity concerns and decreases with CEO employment horizon. Second, our study contributes to the literature on executive compensation by providing large sample evidence on the choice of specific performance measures along several important dimensions and documenting the time series variation. To the best of our knowledge, this paper is the first large sample study on the choice of accounting performance measures in CEO bonus plans and the first to examine the time series variation of performance measures. Finally, our study also contributes to the literature on the economic effects of the recent financial crisis by documenting more cash-flows-based performance measures in CEO bonus plans in the crisis and post-crisis periods.

Section 2 reviews the related literature. Section 3 provides theoretical background and develops the hypotheses. Section 4 describes the data and presents descriptive evidence. Section 5 presents multivariate analyses, and Section 6 provides additional analyses. Section 7 concludes.

2. Related Literature

This study relates to at least two lines of literature: the role of accounting accruals and the choice of performance measures in executive compensation contracts. The usefulness of accounting accruals has been explored extensively in the stock valuation setting. Prior studies show that earnings and cash flows have differential implications for firm valuation (e.g., Rayburn [1986], Ali [1994], Sloan [1996]), and that earnings are more value relevant than cash flows (Dechow [1994]). The incremental value relevance of earnings relative to cash flows varies with the time interval over which performance is measured, the volatility of the

firm's working capital requirements, and the length of the firm's operating cycle (Dechow [1994], Dechow, Kothari, and Watts [1998]).

The superior value relevance of earnings relative to cash flows by no means implies a superior stewardship role of earnings relative to cash flows. Gjesdal [1981] points out that the ways signals are used for valuation purposes is generally different from the way it is used in compensation contracts. Several theoretical studies have attempted to establish the stewardship role of accruals. Wagenhofer [2003] develops an agency model in which accrual accounting emerges as superior when the principal can only commit to short-term contracts. Reichelstein [2000] and Dutta and Reichelstein [2002] show that it is preferable to generate investment incentives by using performance measures based on depreciation charges versus performance measures based only on cash flows.[5] Recent literature examines settings in which leading indicators of managerial performance, including accrual accounting numbers, convey information about managerial actions and decisions (e.g., investment policy) at an early stage, and the actual results (e.g., realized cash flows from an investment) can be used as a performance measure at a later stage (e.g., Dikolli [2001], Dutta and Reichelstein [2003, 2005]).

Empirical studies on the use of accounting numbers in compensation contracts typically assume earnings are a natural accounting-based performance measure for manager compensation (e.g., Lambert and Larcker [1987], Sloan [1993], Bushman, Engel, and Smith [2006]). Several studies investigate the incremental compensation usefulness of cash flows by regressing the level or change of executive cash compensation on the level or change of earnings and cash flows, finding mixed results (Kumar, Ghicas, and Pastena [1993],

[5] It seems that the theoretical compensation literature regarding the usefulness of accruals has not been well developed. As Lambert [2001] points out, most agency models are single-period models, in which cash flows are equivalent to net income. A multi-period model is necessary for a meaningful discussion of the role of accrual accounting in contracting.

Natarajan [1996], Nwaeze, Yang, and Yin [2006], and Banker, Huang, and Natarajan [2009]).

Utilizing pooled cross-sectional regressions with data from a single year, Kumar, Ghicas, and Pastena [1993] find that the inclusion of changes in cash flow from operations (CFO) does not add to the explanatory power of models that include earnings changes to explain change in executive cash compensation. Natarajan [1996] regresses cash compensation on earnings and cash flow measures at the firm level for 311 firms, and finds that earnings and cash flow measures together have a better association with CEO cash compensation than earnings alone, whereas the coefficient on CFO is at most marginally significant. Employing annual cross-sectional regressions for the sample period 1992-2001, Nwaeze, Yang, and Yin [2006] document that the weight on CFO changes in the compensation model is positive and significant in the presence of returns and earnings changes. They also find that the weight on CFO is positively related to the quality of CFO relative to that of earnings and the need for CFO as a financing source.

Inferring the usefulness of accounting variables in compensation contracts from the estimated pay-sensitivity measure is not satisfactory for several reasons. First, this indirect approach only captures the extent to which certain accounting variable is associated with the realized compensation amount, not the extent to which the variable is used in the compensation contract. If one can regress managerial efforts on earnings, the "effort relevance" of earnings could be measured with the R-square from the regression. The usefulness of accounting variables in compensation contracts should ideally be measured with the "effort relevance", not the pay-sensitivity estimates. Second, the pay-sensitivity measure is likely to capture the risk-incentive trade-off in the optimal contract, rather than the usefulness of accounting variables.[6] Third, the correlations among accounting variables make

[6] Consider a hypothetical world where every CEO' cash compensation is a linear function of earnings. The cross-sectional variation of pay-earnings sensitivity solely captures the slope of earnings in the compensation

it difficult to interpret the pay-sensitivity estimates when multiple accounting variables are included in the regressions. Finally, the regression approach does not allow the investigation of the time series variation of the use of and the weights on performance measures at the firm level.

Several prior studies examine performance measures in CEO bonus plans using real bonus plan data (e.g., Ittner, Larcker, and Rajan [1997], Bushman, Indjejikian, and Smith [1996]). Using proprietary compensation data, Bushman, Indjejikian, and Smith [1996] investigate use of individual performance evaluation in CEO bonus plans. Individual performance evaluation may involve discretion and subjectivity, as well as nonfinancial and financial performance criteria. They find evidence that individual performance evaluation increases with growth opportunities and product time horizon. Ittner, Larcker, and Rajan [1997] examines the factors influencing the relative weights placed on financial and non-financial measures. They find that the use of non-financial measures increases with the level of regulation, the extent to which the firm follows an innovation-oriented strategy, the adoption of strategic quality initiatives, and the noise in financial measures.

3. Theory and Hypothesis Development

3.1 Usefulness of Accruals-Based and Cash-Flows-Based Measures

Holmstrom's [1979] informativeness condition indicates that a signal is incrementally useful in the compensation contract as long as it provides additional information about managerial effort. This condition suggests that compensation contracts could be rich and based on many variables (Lambert [2001]). Although the superiority of earnings relative to cash flows in stock valuation is well established (e.g., Dechow [1994], Dechow, Kothari, and Watts [1998]), the agency literature has not been successful in showing that earnings are a

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contracts. It does not capture the differential usefulness of earnings across firms, since earnings are equally useful for all firms.

better measure of managerial actions. For example, several theoretical studies (e.g., Dikolli [2001] and Dutta and Reicheltein [2003, 2005]) compare the contracting usefulness of leading indicators of managerial performance (e.g., stock price and accrual accounting numbers) and the trailing performance measures (e.g., realized cash flows) and find that both types of performance measures have advantages.

Conventional arguments in support of the stewardship role of accruals basically extend the valuation role of accruals to the compensation setting (e.g., Dechow [1994], Ball and Shivakumar [2006]). Ball and Shivakumar [2006] argue that accounting accruals improve the usefulness of earnings in stock valuation and contracting with creditors and managers by ameliorating transitory changes in operating cash flows and free cash flows (the sum of operating and investing cash flows). In other words, the "smoothing" role of accruals makes earnings more informative about future cash flows than current cash flows, and thus more value relevant and more useful for contracting. Given the findings in recent theoretical (e.g., Drymiotes and Hemmer [2012]) and empirical literature (e.g., Bushman, Engel, and Smith [2006], Banker, Huang, and Natarajan [2009]) that the stewardship and valuation roles of accounting numbers are likely to be positively associated, our hypothesis development relies on both the agency theory and the conventional wisdom on the usefulness of accruals (e.g., Dechow [1994], Ball and Shivakumar [2006]).

First, following Ball and Shivakumar [2006] and Dechow [1994], we predict that accounting performance measures in CEO bonus plans are more accruals-based than cash-flows-based. Second, based on the agency theory we predict that firm with more liquidity concerns will place higher weights on cash-flows-based measures in CEO bonus plans. Although earnings are conceptually a better measure of firm performance, they provide little information about firm liquidity. We hypothesize that firms with more liquidity concerns are more likely to include cash-flows-based measures in bonus plans to motivate managers to

improve liquidity. Gilson and Vetsuypens [1993] find that compensation policy is often an important part of a firm's overall strategy for dealing with financial distress. In such situations, CEO bonuses are often tied to short-term outcomes related to bringing the firm out of the liquidity problem, such as increasing cash flows and other financial indicators of firm viability. Consistent with this argument, Nwaeze, Yang, and Yin [2006] find that the sensitivity of CEO cash compensation to cash flow from operations is positively associated with proxies for firms' need for cash flows.

H1a: CEO annual bonus plans are more cash-flows-based when the firms have more liquidity concerns.

Hypothesis 1a is not obvious because managers have incentives to avoid financial distress due to career concerns. Gilson [1989] shows that managers experience large personal costs when their firms default. He documents that in any given year during the sample period, 52% of sample firms experience management turnover if they are either in default on their debt, bankrupt, or privately restructuring their debt to avoid bankruptcy. Following their resignation from these firms, managers are not subsequently employed by another exchange-listed firm for at least three years. Relative to incentives from career concerns, the incentive provided through cash-flows-based measures in CEO bonus plans are likely to be fairly small.

Following similar logic underlying Hypothesis 1a, we also predict that CEO bonus plans are more cash-flows-based during the recent financial crisis and post-crisis periods relative to the pre-crisis period. In 2008, a series of bank and insurance company failures triggered a financial crisis that effectively halted the global credit market and economy. Liquidity management became critical during the financial crisis. Campello, Graham, and Harvey [2010] survey 1,050 chief financial officers around the world in December 2008 and find around half of the firms are financially constrained. We predict firms responded to the

increased macroeconomic uncertainty and tightened credit market by placing greater weights on cash-flows-based measures in CEO bonus plans to motivate liquidity management. We expect this effect to remain in our post-crisis sample period due to the remaining macroeconomic uncertainty.

Some firms explicitly state in the proxy statements that they increase weights on cash flow measures in response to the financial crisis. For example, Avery Dennison Corporation states in its 2009 proxy statement:

"*Given the uncertain economic and business outlook at the beginning of 2009, the Compensation Committee added free cash flow (FCF) as a metric in determining the financial modifier, with a weighting equal to the weighting given to EPS.* For 2009, the Compensation Committee established annual bonus award funding gates to focus participants on the importance of generating profits and managing cash. Before any annual bonus awards could be made, the Company needed to achieve either the EPS or the FCF target (100% payout level)."

H1b: CEO annual bonus plans are more cash-flows-based during the financial crisis and post-crisis periods relative to the pre-crisis period.

Recent literature examining the compensation usefulness of leading (e.g., earnings and stock price) and trailing (e.g., realized cash flows) indicators of managerial performance generally concludes that greater weights are placed on leading indicators when the manager's employment horizon is shorter (e.g., Dikolli [2001], Dutta and Reichelstien [2003, 2005]). In these models, the agent has a shorter time horizon and greater risk aversion than the principal, which leads to an additional agency problem, requiring the principal to provide the agent with incentives to undertake the appropriate level of investment. When the manger's employment horizon is shorter, the forward looking nature of accruals makes accruals-based measures more useful in reflecting managers' value creating efforts, even though accruals are noisy

measures of future cash flows. Therefore we predict cash-flows-based measures are less useful when CEO's future employment horizon is shorter.

H1c: CEO annual bonus plans are less cash-flows-based when CEO's future employment horizon is shorter.

3.2 Usefulness of Accounting Returns and Sales

Although net accounting profit is conceptually an appealing measure of the manager's value creation relative to other accounting variable, it is problematic in several aspects (Murphy and Jensen [2011]). First, although accounting profits take into account both revenues and expenses, they ignore the opportunity costs of capital employed. As Murphy and Jensen [2011] point out, use of accounting profits "provides incentives to invest in any project that earns positive accounting profits (not just those that earn more than the cost of capital), and provides no incentives to abandon projects earnings positive accounting profits that are less than those required to cover their cost of capital" (page 30). Second, some of a CEO's value creating efforts will not show up in current accounting profit or even make it worse. For example, efforts in increasing market share and R&D investment could improve future profits but not current profits or even reduce current profits.

Using accounting returns and sales in CEO bonus plans can potentially address these problems.[7] The usefulness of accounting returns and sales, however, varies across firms at different stage of life cycle. We hypothesize that accounting returns are more useful for firms at the mature and declining stages or industries, while sales are more useful for growth firms or firms in growth industries. With limited or even declining growth opportunities in mature and declining firms or industries, current accounting returns lower than costs of capital

[7] Jensen and Murphy [2011] also point out using accounting returns creates another problem by providing managers with incentive to only invest in projects with highest returns and opportunities to manipulate the measures by opportunistically changing the denominators of the measures. These disadvantages of accounting returns probably explain the low frequency of their use in compensation contracts.

employed are more likely to indicate inefficient investments. In contrast, in growth firms or industries, profitability is more likely to improve in the future even though current accounting returns are lower than costs of capital. Therefore accounting returns are more useful in providing managers with incentives to only invest in positive NPV projects in mature and declining firms and industries. Conversely, improving sales and market shares are more important for long-run profitability in growth firms and industries.

H2: Accounting returns are more useful in CEO bonus plans of mature and declining firms and industries relative to growth firms and industries.

H3: Sales are more useful in CEO bonus plans of growth firms and industries relative to mature and declining firms and industries.

3.3 Time Series Variation of Performance Measures

According to the agency theory (e.g., Holmstrom [1979]), the compensation usefulness of a performance measure depends on the firm's production function, CEO's utility function, and the mapping between managerial efforts and the accounting variable. Any change in these factors could lead to a change in performance measures in CEO bonus plans. For example, increase in bankruptcy risk could shift more weight to cash-flows-based measures; a change in investment opportunity set may change weights on sales, accounting returns, and individual performance evaluation (Bushman, Indjejikian, and Smith. [1996]). The optimal weights on various performance measures are also likely to be adjusted due to different agent utility functions if the CEO changes.

H4a: The time series variation of performance measures in CEO bonus plans is positively associated with change in firm fundamentals (e.g., size, investment opportunity set, and bankruptcy risk).

H4b: The time series variation of performance measures in CEO bonus plans is positively associated with CEO change.

Hypotheses 4a and 4b are based on the assumption that CEO bonus plans are set up optimally in each year. It is also likely that the board improves the efficiency of compensation contracts over time by learning from experience. If this learning-by-doing assumption is true, we conjecture that the board is more likely to adjust CEO bonus plans, including performance measures, if the firm underperformed in the previous year.

H4c: The time series variation of performance measures in CEO bonus plans is positively associated with firm underperformance in the previous year.

4. Data, Summary Statistics, and Descriptive Evidence

4.1 Data and Summary Statistics

We obtain a comprehensive sample of CEO bonus plans from proxy statements filed with the SEC for the sample period 2006-2011. We begin with the sample of non-financial firms in ExecuComp with non-missing assets and earnings. We then search SEC filings for proxy statements (Form DEF 14A) for these firms. We extract 8,231 proxy statements from SEC filings, among which 77 are not readable due to messy codes. Among the remaining 8,154 proxy statements, we are able to collect the names of performance measures in CEO bonus plans from 7,550 (93%) plans, and weights from 4,334 (53%) plans. Our final sample consists of 7,550 bonus plans for 1,626 firms. All analyses related to weights are restricted to the 4,334 plans with weights available.

Panels A and B of Table 1 report the year and industry distribution of the sample. The sample is distributed fairly evenly cross years. The sample is most (least) concentrated in the business equipment (telephone and television transmissions) industry. Relative to the industry distribution of all Compustat non-financial firms in the same sample period, the

manufacturing industry and the wholesale, retail, and services industry are over-represented, while the oil, gas, and extraction industry and the healthcare industry are under-represented (untabulated). Panel C of Table 1 summarizes the main firm characteristics. The median firm has assets of 1,754 million and return on assets of 5%. The firms in the sample are larger and more profitable than the universe of Compustat non-financial firms in the same period (untabulated), which is not surprising because ExecuComp only covers large firms.

4.2 Frequencies and Weights of Performance Measures

All performance measures and their average weights in CEO bonus plans are presented in Panel A of Table 2. We classify performance measures into 22 groups based on the coding of a random sample of 100 plans. Within these 22 groups, we further classify EPS, Operating Income, Net Income, Pre-Tax Income, and EBIT as "earnings-based measures", Free Cash Flows, Operating Cash Flows, and Cash Flows as "cash-flows-based measures" (or "cash flows measures"), and ROIC, ROE, and ROA as "accounting returns."

Panel A of Table 2 indicates the following picture of the general usefulness of accounting measures: net accruals-based measures (including earnings-based measures, accounting returns, and margins) are used as the primary measures, supplemented with gross (sales) and cash flows. This conclusion is based on two observations. First, net accruals-based measures are used in most contracts (82%), while sales (cash flows measures) are used in only 35% (16%) of the contracts. Second, conditional on the use of the measures, the average weights on sales and cash flows measures are much lower than those of net accruals-based measures. For example, the conditional average weight on sales is only 32%, compared to 71% for earnings-based measures. Around half of the contracts employ net accruals-based measures as the primary measure (weight greater than 50%), while sales and cash flows measures are rarely (1% for both) used as the primary measure. Our evidence is consistent

with the argument that accrual accounting improves the usefulness of earnings for compensation contracting (Dechow [1994], Ball and Shivakumar [2006]).

Among the net accruals-based measures, accounting returns are less useful than non-return earnings-based measures in terms of both frequency and the conditional weight, which is probably due to the costs of using accounting returns as suggested by Murphy and Jensen [2011]. A significant portion of firms use non-financial measures (17%) or individual performance objectives (26%) to evaluate CEOs, consistent with Ittner, Larcker, and Rajan [1997] and Bushman, Indjejikian, and Smith [1996]. Since EBITDA is a measure between cash flows and earnings, we report it separately. EBITDA is used in 14% of contracts, with the average conditional weight of 70%. The use of EBITDA in bonus plans indicates long-term accruals (depreciation and amortization expenses) are likely to be less useful thanworking capital accruals, consistent with findings in studies on stock valuation and debt contracting (e.g., Dechow [1994], Li [2012]). Panel B of Table 2 indicates that the use of EBITDA is highly negatively correlated with the use of earnings-based measures (with correlation -0.50), while the use of cash flows measures is uncorrelated with the use of earnings-based measures. There is an obvious substitution between EBITDA and earnings-based measures, consistent with EBITDA being earnings-based to some extent.

We are not the first ones to report performance measures in CEO bonus plans. Our descriptive evidence is consistent with prior studies (e.g., Murphy [1999]; Ittner, Larcker, and Rajan [1997]; Huang, Marquardt, and Zhang [2010]), but our sample size is much larger and our evidence is sufficiently detailed for assessing the usefulness of accounting numbers along important dimensions. The sample sizes of these three studies are 177, 312, and 165, respectively. None of these studies report conditional weights. They also aggregate

performance measures in a way that do not allow investigation of the dimensions we examine. [8]

5. What Drives the Usefulness of Cash Flows Measures, Accounting Returns, and Sales?

5.1 Cash Flows Measures

We investigate both the likelihoods and weights of cash flows measures, using Probit and Tobit models respectively. Specifically, we estimate the following model:

$$Use\ or\ Weight_t = \propto_1 + \propto_2 Liquidity\ Concern_{t-1} + CEO\ horizon_t + \propto_3 Crisis_t + \propto_4 Firm\ Controls_{t-1} + \propto_5 Industry\ FE. \quad (1)$$

In the Tobit models, the weight of cash flows measures is set to zero (one) if the right hand side of equation (1) is below zero (above one). Given that the distribution of the weight is left censored at zero, Tobit regressions are more appropriate than ordinary least square regressions. We measure firms' liquidity concerns with leverage ratio (*Leverage*), defined as total long-term debt (including current portion) scaled by total assets, and Ohlson's [1980] O-Score (*O-Score*). Both the leverage ratio and O-Score are positively associated with firms' liquidity concerns. These variables are measured at the end of the previous fiscal year because the bonus plan is set up when the current fiscal year starts. *Crisis* is an indicator variable for the crisis and post-crisis periods. We classify fiscal years starting after September 15, 2008 (the collapse of Lehman Brothers) as the financial crisis and post-crisis periods. Consistent with prior studies, we measure CEO employment horizon with CEO's age (*CEO Age*) and a dummy variable for CEO's age greater than 63 (*Retiring CEO*) (e.g., Bryan, Hwang, and Lilien [2000]; Cheng [2004]).

[8] For example, Murphy [1999] aggregate accounting returns into earnings measure, and EBITDA and cash flows measures in to "EBIT"; both Ittner, Larcker, and Rajan [1997] and Huang, Marquardt, and Zhang [2010] classify EBITDA as an earnings measure.

We control for firm characteristics that are commonly used in prior studies examining sensitivities of CEO pay to accounting performance measures in the cross-section (e.g., Banker, Huang, and Natarajan [2009]). Specifically, we control for firm size (*Size*), investment opportunity set (*IOS*), volatility and persistence of operating cash flows (*Cash Flow Volatility* and *Cash Flow Persistence*), and trade cycle (*Trade Cycle*). Growth opportunities reduce the pay-for-performance sensitivities of accounting performance measures (Smith and Watts [1992], Gaver and Gaver [1993]). Prior studies show that performance measure noise is negatively related to the compensation weights on performance measures (e.g., Banker and Datar [1989], Lambert and Larcker [1987]). Baber, Kang, and Kumar [1998] document that earnings persistence is positively related to the reliance of CEO compensation on earnings. Longer trading cycles decrease the incremental stewardship value of cash flows (Dechow [1994], Natarajan [1996]).

Following Banker, Huang, and Natarajan [2009], we measure *IOS* with the first principal component of the following three measures of growth opportunities: the ratio of market to book value of equity, the ratio of the market value of equity plus book value of debt to the book value of assets, and the ratio of market value of equity plus book value of debt to gross plant, property, and equipment. *Cash Flow Volatility* is calculated as the time-series standard deviation of the operating cash flows scaled by assets, using the previous 10 years data. *Cash Flows Persistence* is the estimated coefficient of an AR(1) process of operating cash flows scaled by assets, using the previous 10 years data. Following Dechow [1994], we measure the trade cycle with

$$Trade\ Cycle_t = \frac{(AR_t + AR_{t-1})/2}{\frac{Sales_t}{360}} + \frac{(Inv_t + Inv_{t-1})/2}{\frac{COGS_t}{360}} - \frac{(AP_t + AP_{t-1})/2}{\frac{Purchases_t}{360}}, \qquad (2)$$

where AR_t, Inv_t, $COGS_t$, AP_t, and $Purchases_t$ are accounts receivable, inventory, costs of goods sold, accounts payable, and purchases of inventory, respectively.

Figure 1 plots the frequencies of earnings-based measures, sales, cash flows measures, accounting returns, and EBITDA in CEO bonus plans from 2006 to 2011. Consistent with Hypothesis 1b, the frequency and earnings-based measures decrease over time, while the frequency of cash flows measures increase over time. We plot the frequency of cash flows measures conditional on the use of earnings-based measures in Figure 2 and observe a similar trend: the frequency of cash flows measures is higher in 2009-2011 than in 2006-2008. Panel A of Table 3 indicates that the frequency of cash flows measures increases by 4% during the crisis and post-crisis periods, while the frequency of earnings-based measures decrease by 3%. Panels B and C of Table 3 report the frequencies of major performance measures by the level of leverage ratios and O-Score. Consistent with Hypothesis 1a, firms with leverage ratio above the sample median are more (less) likely to use cash flows measures (earnings-based measures) by 9% (5%); firms with O-Score above the sample median are more (less) likely to use cash flows measures (earnings-based measures) by 5% (7%).

Table 4 presents the multivariate results of the determinants of the usefulness of cash flows measures. Panel A reports the results of Probit models. To facilitate interpretation, we report the average marginal effects, instead of estimated coefficients. We separately include *Leverage* and *O-Score*, and *CEO Age* and *Retiring CEO* into the regressions to mitigate multicollinearity. Consistent with Hypotheses 1a and 1b, the marginal effects of *Leverage*, *O-Score*, and *Crisis* are all significantly positive. Relative to the pre-crisis period, the likelihood of using cash flows measures increases by around 4% in the crisis and post-crisis periods. A one standard deviation increase in proxies of liquidity concerns (*Leverage* and *O-Score*) increases the likelihood of including cash flows measures by around 3-4%. Consistent with Hypothesis 1c, the likelihood of using cash flows measures is significantly and negatively related to *CEO Age* and *Retiring CEO*.[9] On average the likelihood decreases by

[9] Our results are robust to defining *Retiring CEO* as CEO age greater than 60, 61, and 62.

0.3% when the CEO is one year older, and by around 4% when the CEO is close to retirement. These economic effects are nontrivial given that the average likelihood of using cash flows measures is 16%. The effects of *Cash Flow Volatility* are significantly negative, consistent with the notion that performance measure noise is negatively related to the compensation weights on performance measures (e.g., Banker and Datar [1989], Lambert and Larcker [1987]).

Panel B of Table 4 presents the results of Tobit models using the weight of cash flows measures as the dependent variable. The analyses are conditional on the sub-sample of bonus plans with the weights on performance measures available. The reported numbers are estimated coefficients, which can be interpreted as the marginal effects on the latent dependent variable. The results of Tobit models are consistent with the results in Panel A: the weight on cash flows measures increases with *O-Score*, *Leverage*, and *Crisis*, and decreases with *CEO Age* and *Retiring CEO*. To put the economic effects in perspective, the marginal effects of *Crisis* (*Retiring CEO*) on the weight of cash flows measure is 1% (-1%); a one standard deviation increase in proxies of liquidity concerns (*Leverage* and *O-Score*) will increase the weight of cash flows measures by around 1%. There marginal effects are not trivial relative to the average weight of cash flow measures in the sample (4%).

5.2 Accounting Returns and Sales

We employ similar research designs as in Section 5.1 to examine the usefulness of accounting returns and sales. Firm life cycle is measured with firm size (*Size*), firm age (*Firm Age*) and investment opportunity set (*IOS*). Smaller firms, younger firms and firms with more investment opportunities are more likely to be growth firms. We measure industry life cycle with indicator variables for growth industry (*Growth Industry*) and mature industry (*Mature*

Industry) constructed from industry reported provided by *IBISWorld*, and with value weighted Tobin's Q at three-digit NAICS industries (*Industry Q*).[10]

IBISWorld is an independent publisher of U.S. and international industry research. Its U.S. annual reports cover over 700 different five-digit NAICS industries.[11] Each report provides quantitative and qualitative information about an industry's market characteristics (e.g., size and competitors within the industry), product segments (e.g., products and geographic spread), industry conditions (e.g., life cycle, regulation, competition level, and cost structure), supply chain (e.g., supplier and customer industries), and other information. The reports classify industry life cycle into three categories: growth, mature, and declining industries. The advantage of *IBISWorld* industry life cycle information is that it clearly gives the stage of each industry. We manually collect the industry life cycle information from reports whose issue dates are closest to December 2008 (the midpoint of our sample period) for 6,565 firm-years (87% of the sample), assuming that industry life cycles are stable over the sample period. The average *Industry Q* is 2.19, 1.82, and 1.75 in growth, mature, and declining industries, indicating the two measures of industry life cycles are consistent.

Figure 3 plots the frequency of using accounting returns and sales in CEO bonus plans along *IBISWorld* industry life cycle. There is a clear pattern that accounting returns become more useful and sales become less useful as an industry evolves from the growth stage to the declining stage, consistent with Hypotheses 2 and 3. Panel D of Table 3 indicates that accounting returns are used in the CEO bonus plans by 5% of firms in growth industries, 14% in mature industries, and 15% in declining industries; sales are used by 44% of firms in growth industries, 34% in mature industries, and 31% in declining industries.

[10] We use NAICS industries to calculate *Industry Q* to be consistent with the industry system in *IBISWorld* industry reports.

[11] *IBISWorld* industry reports have been used in academic research. For example, Hui, Klasa, and Yeung [2012] utilize the supply chain information to construct measures of supplier and customer bargaining powers.

Table 5 presents the multivariate results of the determinants of the usefulness of accounting returns. Panel A reports the results of Probit models with the dummy of using accounting returns as the dependent variable; Panel B presents the results of Tobit regression using the weight of accounting returns as the dependent variable. Since accounting returns are accruals-based measures, we control for O-Score (*O-Score*) and the indicator of financial crisis and post-crisis periods (*Crisis*). We also control for the volatility (*Earnings Volatility)* and persistence (*Earnings Persistence*) of ROA (Banker and Datar [1989], Lambert and Larcker [1987], Baber, Kang, and Kumar [1998]). The calculation of *Earnings Volatility* and *Earnings Persistence* is similar to that of *Cash Flow Volatility* and *Cash Flow Persistence* as described in Section 5.1. We exclude the industry fixed effects from the regressions when the dummy variables for industry life cycles (*Growth Industry* and *Mature Industry*) are included.

The results in Panels A and B of Tale 5 consistently show that accounting returns are less useful for growth firms and industries, consistent with Hypothesis 2. The effects of *IOS*, *Industry Q*, and *Growth Industry* are significantly negative, while the effects of *Firm Age* are significantly positive. Relative to the declining industries, firms in the growth industries are less likely to employ accounting returns in CEO bonus plans by 7% (Regression 1 in Panel A); relative to the mature and declining industries, firms in the growth industries are less likely to use accounting returns by 6% (Regression 2 in Panel A).[12] Untabulated marginal effects of Regressions 1 and 2 in Panel B indicate that on average the weight of accounting returns is lower by 2.9% (2.2%) in growth industries relative to declining industries (declining relative to mature industries)[13]. Regression 1 of Panel also indicates that the weight of accounting returns is lower in the mature industries relative to declining industries (the

[12]We also try an alternative specification of Regression 2 of Panel A by only including firms in growth and mature industries. We find that relative to mature industries, firms in growth industries are less likely to use accounting returns by 5%. The results are significant at 1% level.

[13] Relative to the mature industries, the weight of accounting returns are lower by 1.6% in the growth industries.

marginal effect is 1.8%). These economic effects are large relative to the average frequency (13%) and weight (4.7%) of accounting returns. The effects of O-Score and Crisis tend to be negative in both panels of Table 5, consistent with accruals-based measures being less useful when a firm has more liquidity concerns. The effects of Earnings Volatility (Earnings Persistence) are significantly negative (positive), consistent with finding in prior studies (e.g., Banker and Datar [1989], Lambert and Larcker [1987], Baber, Kang, and Kumar [1998]).

Table 6 presents the multivariate results of the determinants of the usefulness of sales. We employ similar research designs and explanatory variables as in Table 5, expect that *Earnings Volatility* and *Earnings Persistence* are replaced with *Sales Volatility* and *Sales Persistence*.[14] Consistent with Hypothesis 3, the likelihood of using sales in CEO bonus plans increases with *IOS*, *Industry Q*, and *Growth Industry*, and decreases with *Firm Age* (Panel A). Relative to declining industries, firms in growth industries are more likely to employ sales in CEO bonus plans by 9% (Regression 1 in Panel A); relative to the mature and declining industries, firms in the growth industries are more likely to use accounting returns by 6% (Regression 2 in Panel A). A one standard deviation increase in *Industry Q* will increase the likelihood of using sales by 6-11%. Consistent with Baber, Kang, and Kumar [1998], the likelihood of using sales increases with *Sale Persistence.* The results of Tobit regressions in Panel B are qualitatively consistent with those in Panel B, but weaker. [15]

6. Time Series Variation of Performance Measures

Our unique panel data also allow us to examine the time series variation of performance measures in CEO bonus plans. Panel A of Table 7 presents the time series correlation of using major categories of performance measures. The choice of performance measures is sticky over time, which is not surprising. On average the serial correlation of the choice of

[14] We calculate *Sales Volatility* and *Sales Persistence* by using sales scaled by average assets.
[15] Given the insignificant results of *Growth Industry* in Regression 1 of Panel, We drop the specification in which *Mature Industry* is excluded.

performance measures is 72%. Although a serial correlation of 72% is high, it indicates that firms still adjust performance measures over time. To measure how performance measures change over time generally at the firm level, we calculate the total change (*Change*) in weights on performance measures from years *t-1* to *t* as follows:

$$Change_t = \frac{1}{2}\sum_{i=1}^{22}\left|W_t^i - W_{t-1}^i\right|, \quad (3)$$

where W_t^i is the weight on measure *i* (one of the 22 measures reported in Panel A of Table 2) in year *t*. We divide the total change across all measures ($\sum_{i=1}^{21}\left|W_t^i - W_{t-1}^i\right|$) by 2 because each weight shift is implicitly counted twice due to the fact that the total weight in each year equals to 1. The variable *Change* measures the total weight shifted to other performance measures from the previous to current year. By construction the value of *Change* ranges between 0 and 1.[16]

We also defined three dummy variables (*Any Change*, *Significant Change*, and *Complete Change*) based on the value of the variable *Change. Any Change* is a dummy for whether *Change* is positive*; Significant Change* is a dummy for whether *Change* is greater than 50%; *Complete Change* is a dummy for whether *Change* is equal to one. Panel B of Table 7 presents the summary statistics of *Change, No Change*, *Significant Change,* and *Complete Change*, calculated for firms with performance weights available in both the current and previous years. On average the weight shift is 24%. 47% of firms use performance measures that are not identical to the previous year. 22% (11%) of firms use performance measures that are significantly (completely) different from those used in the previous year.

To examine the economic factors driving the time series variation of performance measures, we regress *Change*, *Any Change*, *Significant Change,* and *Complete Change* on

[16] Due to the grouping of performance measures in Panel A of Table 2 (e.g., "Other financial measures" and "Non-financial measures" include multiple measures), the variable Change may underestimate the actual weight shift.

measures of changes in firms fundamentals (*Size Change*, *IOS Change*, and *O-Score Change*) and CEO (*CEO Change*), and measures of firms performance in the previous year (*Stock Return*, *ROA*, and *Loss*). *Size Change*, *IOS Change*, and *O-Score Change* are the absolute values of changes in *Size*, *IOS*, and *O-Score*, calculated at the end of the previous year. *CEO Change* is a dummy variable equal to one if the CEO is a new CEO, and zero otherwise. *Stock Return* and *ROA* are annual stock return and returns on assets in the previous year. *Loss* is a dummy variable for the firm making losses in the previous year.

Table 8 presents the regression results for the time series variation of performance measures. We estimate Tobit models (left censored at 0 and right censored at 1) when *Change* is the dependent variable, and Probit models when *Any Chagne*, *Significant Change*, and *Complete Change* are the dependent variables. All regressions include firms and year fixed effects. We report estimated coefficients for Tobit models and marginal effects for Probit models. There is some evidence that the time series variation is driven by changes in firm fundamentals (Hypothesis 4a), but the results are inconsistent across regressions. For example, *O-Score Change* is significantly and positively associated with *Change*, *Any Change*, and *Significant Change*, but not *Complete Change*. The effects of *IOS Change* are only significantly positive when Significant Change is the dependent variable. *Size Change* is only significantly and positively associated with *Complete Change*.

We also find some evidence that firms adjust performance measures in CEO bonus plans when the CEO is changed (Hypothesis 4b). The effects of *CEO Change* on *Change* and *Any Change* are significantly positive. Changing CEO increases the likelihood of changing performance measures by around 10%. The average weight shift due to CEO Change is 5% (untabulated marginal effects of the Tobit models). Changing CEO, however, is not associated with the likelihood of significant or complete change in performance measures.

Consistent with Hypothesis 4c, we find strong evidence that accounting underperformance in the previous year drives the change in performance measures in CEO bonus plans. The effects of *ROA* (*Loss*) are consistently significant and negative (positive) in all regressions. To put the economic effects in perspective, the average weight shift driven by making losses in the previous year is around 10% (untabulated marginal effects of Regression 2); a firm making losses is more likely to change or significantly change performance measures by 12%, and to completely change performance measures by 6%, than a firm making positive profits. In contrast, stock market performance is not associated with the change of performance measures. These results suggest that boards of directors adjust CEO bonus plans if the previous plans did not work well in terms of accounting performance.

7. Additional Analyses

7.1 The Usefulness of EBITDA

EBITDA includes working capital accruals but exclude long-term accruals (depreciation and amortization expenses), therefore, it is cash-flows-based to some extent. Our analysis of cash flows measures in Section 5.1 does not include EBITDA. In this section, we separately examine the use of EBITDA. Panels A to C of Table 3 indicate that the effects of liquidity concerns on EBITDA are very similar to those on cash flows measures. For example, firms are more likely to use EBITDA in CEO bonus plans by 5% during the crisis and post-crisis periods than in the pre-crisis period; firms with leverage ratios (O-Score) above the sample median are more likely to use EBITDA by 7% (8%) than firms below the sample median.

We replicate Table 4 using the use and weight of EBITDA as the dependent variables and replacing *Cash Flow Volatility* (*Cash Flow Persistence*) with *EBITDA Volatility* (*EBITDA Persistence*). The results are reported in Table 9. The effects of *Leverage*, *O-Score*,

and *Crisis* are similar to those in Table 4, indicating that firms with more liquidity concerns are more likely to use EBITDA. The effects of *Retiring CEO*, however, are insignificant, which is consistent with the fact EBITDA is more forward-looking than cash flows measures.[17] The effects of *EBITDA Volatility* are significantly positive, inconsistent with theoretical prediction. Overall, Table 9 provides additional support for Hypotheses 1a-1c.

7.2 Alternative Measure of Time Series Variation

In the calculation of the variable *Change* in Equation (2) some conceptually similar performance measures are treated as different, such as operating income and EBIT, while some performance measures are grouped as the same, such as non-financial measures. To partially address this problem, we recalculate the variables *Change*, *Any Change*, *Significant Change*, and *Complete Change* by all earnings-based measures, cash flows measures, and accounting return measures as the same. This adjustment reduces the means of *Change*, *Any Change*, *Significant Change*, and *Complete Change* to 18.6%, 42.3%, 16.3%, and 6.8%, respectively, compared to 23.6%, 46.7%, 21.9%, and 10.6% in Panel B of Table 7. We replicate Table 8 using the recalculated dependent variables and find qualitatively similar results.

8. Conclusion

This paper investigates the compensation usefulness of accounting variables along several important dimensions (accruals-based vs. cash-flows based, non-return vs. return, and gross vs. net measures), as well as the time series variation of performance measures in CEO bonus plans, using a unique panel of manually collected CEO bonus determinants spanning fiscal years 2006 to 2011. Our goal is to shed light on how accounting variables are utilized in executive compensation, especially the role of accounting accruals. We document the following picture of the general usefulness of accounting variables: net accruals-based

[17] The forward-looking nature of accruals is primarily due to the fact that working capital accruals incorporate expectation of future cash flows. Long-term accruals are generally not forward-looking.

measures (e.g., earnings) are used as the primary measures, supplemented with gross (sales) and cash flows measures (e.g., operating cash flows).

Our multivariate analyses indicate that cash flows measures are more useful for firms with more liquidity concerns and longer CEO employment horizons; and accounting returns (sales) are less (more) useful for growth firms. We also document significant time series variation in the choice of performance measures. We find that the time series variation is driven by accounting underperformance in the previous year, as well as changes in firm fundamentals and CEO. Accounting underperformance is the strongest driver of the time series variation of performance measures, suggesting that boards of directors adjust CEO bonus plans if the previous plans did not work well in terms of accounting performance.

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Appendix A: Variable Definitions

Variable	Description
Any Change	A dummy variable equal to 1 if *Change* >0, and 0 otherwise.
Cash Flow Persistence	The estimate of θ for the following AR(1) process using the previous 10 years data: $X_t = u_t\theta X_{t-1} + u_t$, where X_t is the ratio of operating cash flows to average assets in year *t*.
Cash Flow Volatility	The time-series standard deviation of the ratio of operating cash flows to average assets, calculated using the previous 10 years data.
CEO Age	The age of the CEO at the end of the fiscal year.
CEO Change	A dummy variable for CEO change.
Change	The total change in weights on performance measures, calculated as $Change_t = \frac{1}{2}\sum_{i=1}^{22}\left\|W_t^i - W_{t-1}^i\right\|$, where W_t^i is the weight on measure *i* (one of the 22 measures reported in Panel A of Table 2) in year *t*.
Complete Change	A dummy variable equal to 1 if *Change* = 1, and 0 otherwise.
Crisis	An indicator variable equal to 1 if the fiscal year starts after September 15, 2008, and 0 otherwise.
Earnings Persistence	The estimate of θ for the following AR(1) process using the previous 10 years data: $X_t = u_t\theta X_{t-1} + u_t$, where X_t is the ratio of income before extraordinary items to average assets in year *t*.
Earnings Volatility	The time-series standard deviation of income before extraordinary items scaled by average assets, calculated using the previous 10 years data.
EBITDA Persistence	The estimate of θ for the following AR(1) process using the previous 10 years data: $X_t = u_t\theta X_{t-1} + u_t$, where X_t is the ratio of EBITDA to average assets in year *t*.
EBITDA Volatility	The time-series standard deviation of EBITDA scaled by average assets, calculated using the previous 10 years data.
Firm Age	The number of years since a firm was first recorded in Compustat.
Growth Industry	Indicator variable for growth industries based on the *IBISWorld* industry reports.

Variable	Description
Industry Q	The value weighted Tobin's Q for each three-digit NAICS industry, where Tobin's Q is calculated as The ratio of market value of equity plus book value of liabilities to the book value of assets.
IOS	The first principal component of the following three measures of growth opportunities: the ratio of market to book value of equity, the ratio of the market value of equity plus book value of debt to the book value of assets, and the ratio of market value of equity plus book value of debt to gross plant, property, and equipment.
IOS Change	The absolute value of change in *IOS*, measured at the end of the previous fiscal year.
Leverage	The ratio of long-term debt (including current portions) to total assets.
Loss	A dummy variable for a firm making losses in the previous fiscal year.
Mature Industry	Indicator variable for mature industries based on the *IBISWorld* industry reports.
O-Score	Olsson's (1980) score: *O-Score* = –1.32 – 0.407×log(total assets/GNP price-level index) + 6.03× (total liabilities/total assets) – 1.43× (working capital/total assets) + 0.076× (current liabilities/current assets) – 1.72× (1 if total liabilities > total assets, else 0) – 2.37×(net income/total assets) – 1.83× (funds from operations/total liabilities) + 0.285× (1 if net loss for the last two years, else 0) – 0.521× (net income – lag net income)/ (|net income| + |lag net income|).
O-Score Change	The absolute value of change in O-Score, measured as the end of the previous fiscal year.
Retiring CEO	A dummy variable equal to 1 if a CEO is age 62 or greater at the end of the fiscal year.
ROA	Return on assets computed as the ratio of net income before extraordinary items to average assets.
Sales	Total sales during the fiscal year.
Sales Persistence	The estimate of θ for the following AR(1) process using the previous 10 years data: $X_t = u_t \theta X_{t-1} + u_t$, where X_t is the ratio of sales to average assets in year *t*.

Variable	Description
Sales Volatility	The time-series standard deviation of sales scaled by average assets, calculated using the previous 10 years data.
Significant Change	A dummy variable equal to 1 if *Change* is greater than 0.5, and 0 otherwise.
Size	The natural log of total assets.
Size Change	The absolute value of change in size, measured at the end of the previous fiscal year.
Stock Return	The annual stock returns of the previous fiscal year.
Total Assets	Total assets at the end of the fiscal year.
Trade Cycle	$\frac{(AR_t+AR_{t-1})/2}{\frac{Sales_t}{360}} + \frac{(Inv_t+Inv_{t-1})/2}{\frac{COGS_t}{360}} - \frac{(AP_t+AP_{t-1})/2}{\frac{Purchases_t}{360}}$, where AR_t, Inv_t, $COGS_t$, AP_t, and $Purchases_t$ are accounts receivable, inventory, costs of goods sold, accounts payable, and purchases of inventory, respectively.

Figure 1 Use of Performance Measures Over Time

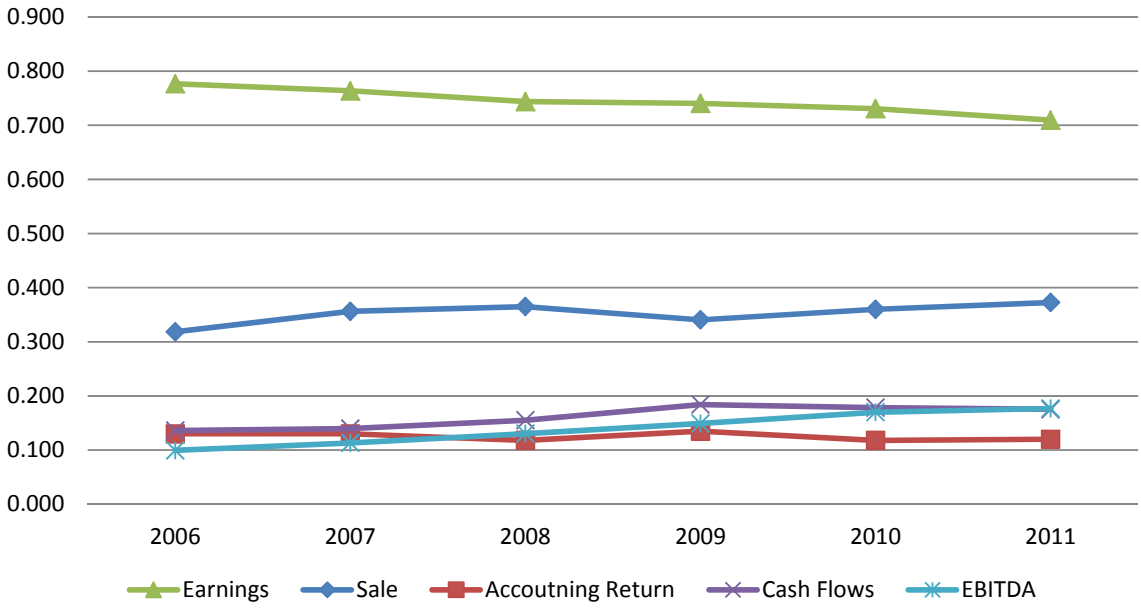

Figure 2 Use of Cash Flows Measures Conditional on Use of Earnings-Based Measures

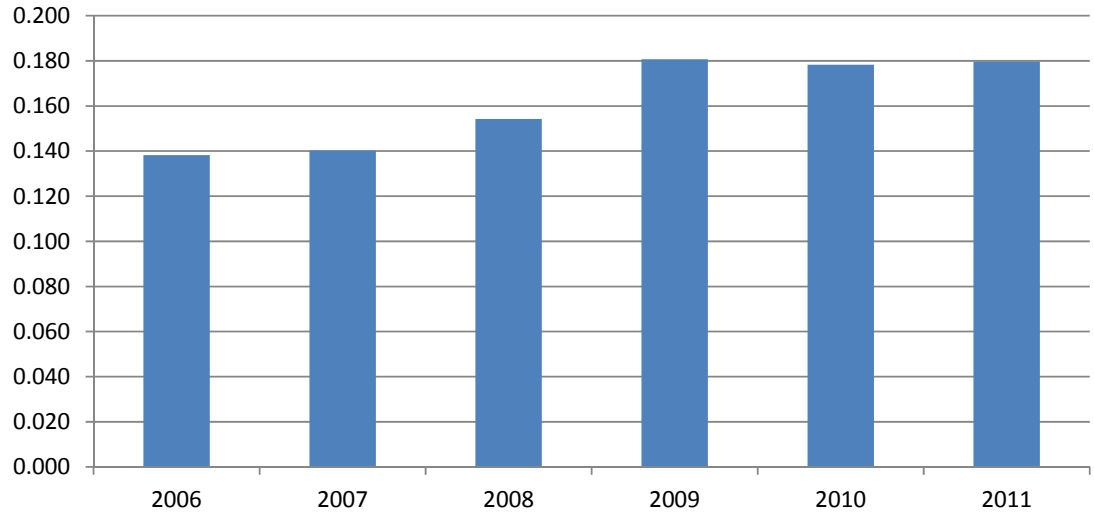

Figure 3 Use of Performance Measures Along Industry Life Cycle

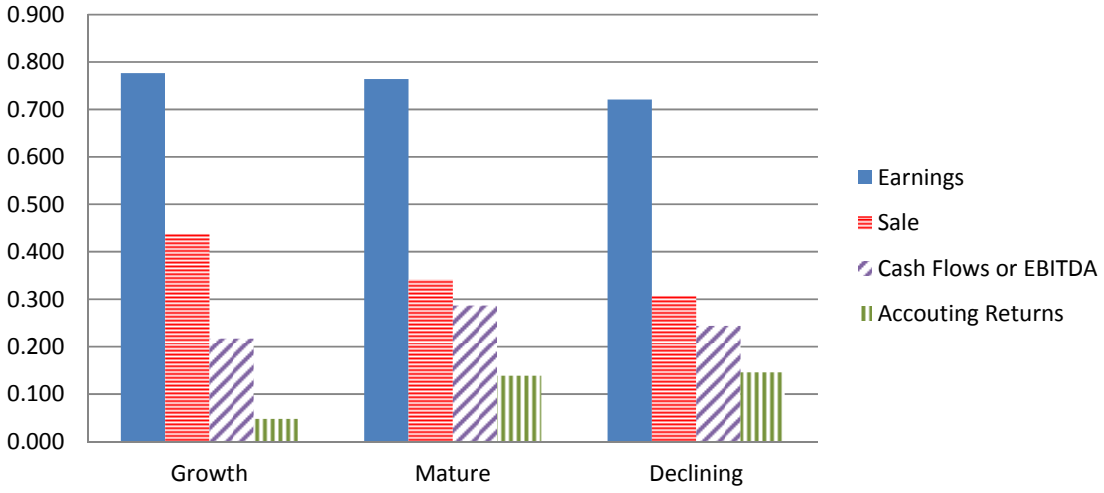

Table 1 Year and Industry Distributions and Summary Statistics

This table presents the year and industry distributions and main firm characteristics for the sample of 7,550 firm-years from non-financial firms in Execucomp for the fiscal years 2006-2011. Industry classification follows Fama-French 12 industries. Variable definitions are in Appendix A.

Panel A : Year Distribution		
	No. of Observations	Percentage
2006	1,146	15.2
2007	1,316	17.4
2008	1,334	17.7
2009	1,233	16.3
2010	1,289	17.1
2011	1,232	16.3
Total	7,550	100

Panel B: Industry Distribution (Fama-French 12 industries)		
	No. of Observations	Percentage
Consumer Non-Durables	548	7.26
Consumer Durables	233	3.09
Manufacturing	1,083	14.34
Oil, Gas, and Coal Extraction and Products	348	4.61
Chemicals and Allied Products	266	3.52
Business Equipment	1,629	21.58
Telephone and Television Transmission	212	2.81
Utilities	432	5.73
Wholesale, Retail, and Some Services	1,075	14.24
Healthcare, Medical Equipment, and Drugs	686	9.09
Other	1,038	13.77
Total	7,566	100

Panel C: Summary Statistics				
	Mean	Median	Std	N
Total Assets	6,762.72	1,754.23	14,788.38	7,550
Sales	5864.07	1,611.60	12,982.68	7,550
Market to Book	1.80	1.49	1.01	7,538
ROA	0.05	0.05	0.10	7,549
Leverage	0.21	0.20	0.18	7,533
O-Score	-5.28	-5.13	1.84	7,359
Crisis	0.48	0.00	0.50	7,550
CEO Age	55.35	55.00	6.70	7,472
Retiring CEO	0.14	0.00	0.35	7,472
Growth Industry	0.14	0.00	0.35	6,565
Mature Industry	0.60	1.00	0.49	6,565
Industry Q	1.86	1.80	0.72	7,544
Firm Age	29.73	23.00	17.31	7,550
Annual Return	0.14	0.08	0.54	7,225
Loss	0.17	0.00	0.37	7,545
Size	7.50	7.41	1.57	7,549
IOS	-0.08	-0.16	0.28	7,146
Size Change	0.14	0.09	0.17	7,549
IOS Change	0.10	0.05	0.15	7,146
O-Score Change	0.81	0.54	0.81	7,359
Cash Flow Volatility	0.07	0.06	0.05	7,155
Cash Flow Persistence	0.28	0.30	0.33	7,070
EBITDA Volatility	0.09	0.07	0.08	7,149
EBITDA Persistence	0.47	0.50	0.30	7,063
Trade Cycle	69.37	60.15	73.47	7,200
Earnings Volatility	0.08	0.05	0.08	7,156
Earnings Persistence	0.44	0.47	0.30	7,071
Sales Volatility	0.27	0.23	0.19	7,286
Sales Persistence	0.65	0.70	0.26	7,186

Table 2 Performance Measures in CEO Bonus Plans

This table reports the performance measures used in the CEO annual incentive plans for the sample of 7,550 firm-years for fiscal years 2006-2011. Panel A reports the frequencies and weights of all measures. Panel B presents the correlations between the uses of major performance measures. Panel C reports the number of performance measures used in bonus plans. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels.

Panel A: Frequencies and Weights of Performance Measures

	Frequency (%)			Average Weight Conditional on Use (N=4,334)
	Any Use (N=7,550)	Use as Single Measure (N=7,550)	Use as Major Measure (>50%, N=4,334)	
Earnings-Based Measure	74.4	17.2	45.5	71.2
EPS	32.5	5.9	16.6	65.3
Operating income	21.2	4.3	11.2	67.7
Net Income	14.7	2.7	6.7	68.0
Pre-tax income	7.9	3.3	7.0	84.2
EBIT	5.0	1.1	2.7	66.0
Sales	35.3	0.2	1.1	32.4
Cash-Flows-Based Measure	16.2	0.3	1.0	31.7
Free Cash Flows	6.7	0.1	0.2	29.8
Operating cash flows	4.8	0.2	0.6	34.4
Cash Flows	4.8	0.1	0.2	31.1
EBITDA	14.0	3.7	9.1	69.9
Accounting Return	12.5	1.3	3.1	48.2
ROIC	8.0	0.5	1.4	42.4
ROE	2.8	0.4	0.9	60.9
ROA	2.4	0.3	0.8	51.6
Margins	7.3	0.3	1.0	40.4
Operating Efficiency	3.4	0.0	0.0	19.0
EVA	2.9	1.2	2.4	82.9
Shareholder return	1.5	0.0	0.1	37.4
Expense reduction	1.9	0.0	0.0	18.6
Gross Profit	0.5	0.0	0.0	25.1
Other financial measures	17.4	0.7	2.7	36.4
Non-financial measures	21.0	0.3	2.2	32.7
Individual objective	25.5	0.3	0.7	30.4

Panel B: Correlations between Use of Performance Measures (N=7,550)

	CF-Based	Sale	EBITDA	Accounting Return	Non-Financial	Individual
Earnings-Based	-0.000	0.034**	-0.503***	-0.068***	-0.046***	-0.009
CF-Based		0.075***	-0.0300***	-0.019*	0.060***	0.006
Sale			-0.026**	-0.080***	0.024**	0.051***
EBITDA				-0.044***	-0.004	-0.000
Accounting Return					0.004	-0.037***
Non-Financial						-0.085***

Panel C: Number of Performance Measures

No. of Measures	Frequency	Percentage
1	1,944	25.69
2	2,432	32.14
3	1,960	25.91
4	839	11.09
5	272	3.60
6	94	1.24
>6	25	0.32
Total	7,550	100

	N	Mean	STD	P25	P50	P75
N-Measures	7,550	2.41	1.21	1.00	2.00	3.00

Table 3 Performance Measures in CEO Bonus Plans: Univariate Results

This table reports the frequencies of performance measures across subsamples based on financial crisis period (Panel A), leverage (Panel B), Ohlson's (1980) O-Score (Panel C), and industry life cycle (Panel D). Fiscal years that start before the collapse of Lehman Brothers (September 15, 2008) are classified as pre-crisis period. *** denote statistical significance at 1% level. *Earnings* include EPS, net income, pre-tax income, operating income, and EBIT. *Cash Flows* include cash flows, operating cash flows, and free cash flows. *Accounting Return* include profit margins, ROIC, ROA, and ROE. Other variables are defined in Appendix A.

Panel A: Sample Partition Based on Financial Crisis

	Pre-Crisis Period	Crisis and Post-Crisis Periods	Difference
Earnings	0.760	0.726	0.034***
Sale	0.350	0.356	-0.006
Cash Flows	0.144	0.181	-0.037***
EBITDA	0.116	0.167	-0.051***
Accounting Return	0.128	0.123	0.005

Panel B: Sample Partition Based on Leverage

	Below Median	Above Median	Difference
Earnings	0.769	0.719	0.050***
Sale	0.415	0.291	0.123***
Cash Flows	0.117	0.207	-0.089***
EBITDA	0.103	0.177	-0.074***
Accounting Return	0.114	0.136	-0.022***

Panel C: Sample Partition Based on O-Score

	Below Median	Above Median	Difference
Earnings	0.778	0.711	0.067***
Sale	0.419	0.296	0.124***
Cash Flows	0.136	0.190	-0.054***
EBITDA	0.101	0.181	-0.081***
Accounting Return	0.113	0.129	-0.0157**

Panel D: Sample Partition Based on Industry Life Cycle

	Growth	Mature	Declining	Difference (Growth-Declining)	Difference (Growth-Mature)
Earnings	0.777	0.764	0.721	0.056***	0.012
Sale	0.439	0.341	0.308	0.131***	0.098***
Cash Flows	0.084	0.167	0.161	-0.077***	-0.083***
EBITDA	0.143	0.138	0.099	0.044***	0.005
Accounting Return	0.048	0.138	0.146	-0.097***	-0.090***

Table 4 Use of Cash Flows in CEO Bonus Plans

This table reports multivariate results for the determinants of using cash flows in CEO bonus plans. Panel A presents the results of probit regressions, using as the dependent variable the dummy of whether cash flows (cash flows, operating cash flows, and free cash flows) are used in the bonus plans. The reported numbers are marginal effects and z-statistics for testing zero marginal effects. Panel B presents the results for Tobit regressions, using as the dependent variable the weight of cash flows in the bonus plans for the subsample of firms with performance measure weights available. The reported numbers are estimated coefficients and t-statistic for testing zero coefficients. Standard errors are clustered at the firm level in both panels. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Panel A: Use of Cash Flows

	Dependent Variable: Use of Cash Flows {0,1}			
	(1)	(2)	(3)	(4)
O-Score	0.020***	0.020***		
	(5.03)	(5.07)		
Leverage			0.142***	0.144***
			(3.04)	(3.08)
Crisis	0.037***	0.036***	0.038***	0.038***
	(4.14)	(4.09)	(4.34)	(4.29)
CEO Age	-0.003***		-0.003***	
	(-2.97)		(-2.89)	
Retiring CEO		-0.038**		-0.038**
		(-2.20)		(-2.18)
Size	0.038***	0.036***	0.031***	0.030***
	(6.64)	(6.32)	(5.54)	(5.23)
IOS	-0.025	-0.021	-0.039	-0.036
	(-0.76)	(-0.64)	(-1.16)	(-1.05)
Cash Flow Volatility	-0.544***	-0.533**	-0.547***	-0.538***
	(-2.59)	(-2.51)	(-2.66)	(-2.60)
Cash Flow Persistence	0.005	0.005	0.004	0.005
	(0.21)	(0.21)	(0.19)	(0.21)
Trade Cycle	0.006	0.007	0.002	0.002
	(1.60)	(1.49)	(0.71)	(0.61)
R-Square	0.116	0.114	0.107	0.105
No of Obs.	6,512	6,512	6,621	6,621
No of Firms	1,427	1,427	1,448	1,448
Industry Fixed Effects	Yes	Yes	Yes	Yes

Panel B: Weight of Cash Flows

	Dependent Variable: Weight of Cash Flows			
	(1)	(2)	(3)	(4)
O-Score	0.049***	0.050***		
	(3.72)	(3.80)		
Leverage			0.369***	0.378***
			(2.67)	(2.73)
Crisis	0.075***	0.073***	0.078***	0.076***
	(2.57)	(2.52)	(2.66)	(2.61)
CEO Age	-0.010***		-0.011***	
	(-3.66)		(-3.56)	
Retiring CEO		-0.161***		-0.153**
		(-2.64)		(-2.53)
Size	0.108***	0.103***	0.086***	0.081***
	(6.35)	(5.93)	(5.23)	(4.85)
IOS	-0.240*	-0.217	-0.273*	-0.251*
	(-1.73)	(-1.53)	(-1.84)	(-1.66)
Cash Flow Volatility	-1.053*	-1.039*	-1.129**	-1.128**
	(-1.87)	(-1.84)	(-2.02)	(-2.00)
Cash Flow Persistence	0.045	0.046	0.042	0.043
	(0.68)	(0.70)	(0.65)	(0.67)
Trade Cycle	0.013	0.011	0.000	-0.001
	(1.26)	(1.14)	(0.04)	(-0.06)
Intercept	-0.445*	-0.939	-0.584**	-1.132***
	(-1.87)	(-5.56)	(-2.53)	(-6.44)
R-Square	0.152	0.148	0.141	0.138
No of Obs.	3,735	3,735	3,795	3,795
No of Firms	1,209	1,209	1,228	1,228
Industry Fixed Effects	Yes	Yes	Yes	Yes

Table 5 Use of Accounting Returns in CEO Bonus Plans

This table reports multivariate results for the determinants of using accounting returns (ROA, ROE, and ROIC) in CEO bonus plans. Panel A presents the results of probit regressions, using as the dependent variable the dummy of whether accounting returns are used in the bonus plans. The reported numbers are marginal effects and z-statistics for testing zero marginal effects. Panel B presents the results for Tobit regressions, using as the dependent variable the weight of accounting returns in the bonus plans for the subsample of firms with performance measure weights available. The reported numbers are estimated coefficients and t-statistic for testing zero coefficients. Standard errors are clustered at the firm level in both panels. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Panel A: Use of Accounting Returns

	Dependent Variable: Use of Accounting Returns {0,1}			
	(1)	(2)	(3)	(4)
IOS	-0.097***	-0.103***	-0.065**	-0.058**
	(-3.33)	(-3.17)	(-2.29)	(-2.09)
Industry Q			-0.044***	-0.041***
			(-4.01)	(-3.71)
Growth Industry	-0.068***	-0.059***		
	(-3.33)	(-3.08)		
Mature Industry	-0.021			
	(-1.24)			
Size	0.007	0.007	0.005	0.004
	(1.30)	(1.35)	(0.11)	(0.85)
Firm Age	0.002***	0.002***	0.002***	0.002***
	(3.65)	(3.60)	(4.25)	(4.18)
O-Score	-0.005***	-0.005	-0.007**	-0.006*
	(-1.28)	(-1.42)	(-2.06)	(-1.77)
Crisis	-0.009	-0.010	-0.024***	-0.023***
	(-1.30)	(-1.35)	(-3.07)	(-2.94)
Earnings Volatility	-0.768***	-0.736***	-0.571***	-0.480***
	(-4.05)	(-4.11)	(-3.62)	(-2.94)
Earnings Persistence	0.047**	0.046**	0.043**	0.031
	(2.13)	(2.09)	(2.01)	(1.55)
R-Square	0.086	0.085	0.081	0.120
No of Obs.	5,945	5,945	6,694	6,694
No of Firms	1,286	1,286	1,449	1,449
Industry Fixed Effects	No	No	No	Yes

Panel B: Weight of Accounting Returns				
	Dependent Variable: Weight of Accounting Returns			
	(1)	(2)	(3)	(4)
IOS	-0.564***	-0.615***	-0.448**	-0.426**
	(-2.95)	(-3.04)	(-2.55)	(-2.25)
Industry Q			-0.165**	-0.129*
			(-2.54)	(-1.83)
Growth Industry	-0.488***	-0.351**		
	(-2.97)	(-2.43)		
Mature Industry	-0.189*			
	(-1.84)			
Size	0.015	0.014	-0.0165	0.011
	(0.47)	(0.44)	(-0.56)	(0.36)
Firm Age	0.010***	0.010***	0.010***	0.009
	(3.26)	(3.23)	(3.67)	(3.52)
O-Score	-0.058**	-0.062**	-0.061***	-0.052**
	(-2.37)	(-2.12)	(-2.60)	(-2.27)
Crisis	-0.096***	-0.093*	-0.133***	-0.111**
	(-3.26)	(-1.82)	(-2.64)	(-2.18)
Earnings Volatility	-4.087***	-3.834***	-3.178***	-3.174***
	(-3.65)	(-3.67)	(-3.51)	(-2.91)
Earnings Persistence	0.418***	0.403***	0.355***	0.288**
	(3.02)	(-2.91)	(0.008)	(2.25)
Intercept	-1.651***	-1.836***	-1.36***	-1.732***
	(-5.24)	(-5.86)	(-4.66)	(-4.98)
R-Square	0.089	0.084	0.078	0.126
No of Obs.	3,406	3,406	3,840	3,840
No of Firms	1,088	1,088	1,228	1,228
Industry Fixed Effects	No	No	No	Yes

Table 6 Use of Sales in CEO Bonus Plans

This table reports multivariate results for the determinants of using Sales in CEO bonus plans. Panel A presents the results of probit regressions, using as the dependent variable the dummy of whether sales are used in the bonus plans. The reported numbers are marginal effects and z-statistics for testing zero marginal effects. Panel B presents the results for Tobit regressions, using as the dependent variable the weight of sales in the bonus plans for the subsample of firms with performance measure weights available. The reported numbers are estimated coefficients and t-statistic for testing zero coefficients. Standard errors are clustered at the firm level in both panels. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Panel A: Use of Sales

	Dependent Variable: Use of Sales {0,1}			
	(1)	(2)	(3)	(4)
IOS	0.174***	0.181***	0.100***	0.064*
	(4.49)	(4.65)	(2.67)	(1.80)
Industry Q			0.153***	0.081***
			(8.41)	(4.35)
Growth Industry	0.093**	0.064*		
	(2.26)	(1.77)		
Mature Industry	0.040			
	(0.154)			
Size	-0.011	-0.012	-0.007	0.004
	(-1.27)	(-1.31)	(0.421)	(0.54)
Firm Age	-0.002***	-0.002**	-0.002***	-0.000
	(-2.63)	(-2.54)	(-2.59)	(-0.16)
O-Score	-0.033***	-0.032***	-0.024***	-0.010*
	(-5.53)	(-5.43)	(-4.21)	(-1.78)
Crisis	0.033***	0.033***	0.098***	0.062***
	(2.90)	(2.92)	(7.40)	(4.55)
Sales Volatility	-0.009	-0.015	-0.084	-0.095
	(-0.13)	(-0.22)	(-1.29)	(-1.44)
Sales Persistence	0.137***	0.137***	0.119**	0.044
	(2.72)	(2.72)	(2.55)	(0.92)
R-Square	0.040	0.039	0.068	0.141
No of Obs.	5,945	5,945	6,693	6,693
No of Firms	1,286	1,286	1,448	1,448
Industry Fixed Effects	No	No	No	Yes

Panel B: Weight of Sales			
	Dependent Variable: Weight of Sales {0,1}		
	(1)	(2)	(3)
IOS	0.160***	0.077	0.046
	(2.64)	(1.36)	(0.90)
Industry Q		0.145***	0.073***
		(7.30)	(3.54)
Growth Industry	0.061		
	(0.99)		
Mature Industry	0.026		
	(0.61)		
Size	-0.013	-0.014	-0.001
	(-0.90)	(-1.12)	(-0.04)
Firm Age	-0.002*	-0.002	0.001
	(-1.94)	(-1.51)	(0.55)
O-Score	-0.031***	-0.024***	-0.003
	(-3.36)	(-2.83)	(-0.41)
Crisis	0.062***	0.129***	0.088***
	(3.05)	(6.59)	(4.66)
Sales Volatility	-0.112	-0.171*	-0.161*
	(-1.02)	(-1.79)	(-1.65)
Sales Persistence	0.147*	0.106	0.022
	(1.92)	(1.58)	(0.35)
Intercept	-0.413***	-0.607***	-0.477***
	(-3.23)	(-5.05)	(-3.88)
R-Square	0.029	0.057	0.153
No of Obs.	3,406	3,839	3,839
No of Firms	1,088	1,227	1,227
Industry Fixed Effects	No	No	Yes

Table 7 Descriptive Evidence on Time Series Variation of Performance Measures

This table reports the time series variation of performance measures in the CEO bonus plans of the sample of 7,550 firm-years for fiscal years 2006-2011. Panel A presents the serial correlations of the use of major accounting-based performance measures. Panel B reports changes in weights on all performance measures in Panel A of Table 2 from Year *t-1* to Year *t*. The numbers are based on 2,352 firm-years with weights of performance measures available in both the current and previous years. *Change* is the total change in weights on performance measures. *Any Change* is a dummy variable equal to 1 if *Change* is greater than 0, and 0 otherwise. *Significant Change* is a dummy variable equal to 1 if *Change* is greater than 0.5, and 0 otherwise. *Complete Change* is a dummy variable equal to 1 if *Change* equals 1, and 0 otherwise.

Panel A: Serial Correlation of Use of Major Accounting Performance Measures			
	Use in Year *t-1*	Use in Year *t-2*	Use in Year *t-3*
Use of Earnings-Based Measure in Year *t*	0.689	0.598	0.553
Use of Cash-flows-based Measure in Year *t*	0.715	0.599	0.553
Use of EBITDA in Year *t*	0.766	0.661	0.611
Use of Sale in Year *t*	0.727	0.657	0.630
Use of Accounting Return in Year *t*	0.705	0.611	0.546
Average	0.720	0.625	0.579

Panel B: Change in Weights of Performance Measures				
	Change	*Any Change*	*Significant Change*	*Complete Change*
Mean	0.236	0.467	0.219	0.106
Median	0.000	0.000	0.000	0.000
STD	0.337	0.499	0.414	0.308
N	2,352	2,352	2,352	2,352

Table 8 Determinants of Time Series Variation of Performance Measures

This table reports multivariate results for the determinants of change of performance measures in CEO bonus plans. The variable *Change* measures the weight shifted to other measures from the previous year to the current year. *Any Change* is dummy variable equal to 1 if *Change* is greater than 0, and 0 otherwise. *Significant Change* is dummy variable equal to 1 if *Change* is greater than 0.5, and 0 otherwise. *Complete Change* is dummy variable equal to 1 if *Change* is equal to 1, and 0 otherwise. Tobit models are used when *Change* is the dependent variable. Probit models are used when *Any Change*, *Significant Change*, and *Complete Change* are the dependent variables. In the Tobit models (Regressions 1 and 2), the reported numbers are estimated coefficients and *t*-statistics for testing zero coefficients. Intercepts of Tobit models are not reported. In Probit models (Regressions 3-8), the reported numbers are estimated marginal effects and *z*-statistics for testing zero marginal effects. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level in both panels. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

	Dependent Variable							
	Change		*Any Change* {0,1}		*Significant Change* {0,1}		*Complete Change* {0,1}	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size Change	0.114	0.123	0.032	0.036	0.069	0.072	0.074**	0.074**
	(0.92)	(1.01)	(0.46)	(0.51)	(1.24)	(1.13)	(1.97)	(2.00)
IOS Change	0.231	0.171	0.093	0.046	0.179***	0.159**	0.056	0.054
	(1.52)	(1.09)	(1.02)	(0.51)	(2.63)	(2.32)	(1.29)	(1.21)
O-Score Change	0.059**	0.069**	0.036**	0.042**	0.029**	0.032**	0.014	0.014
	(2.10)	(2.51)	(2.14)	(2.56)	(2.20)	(2.46)	(1.54)	(1.50)
CEO Change	0.123*	0.128*	0.099**	0.103**	0.036	0.038	0.010	0.010
	(1.72)	(1.77)	(0.038)	(0.028)	(0.93)	(0.98)	(0.38)	(0.37)
Stock Return	-0.024	-0.040	-0.019	-0.031	-0.001	-0.006	-0.003	-0.004
	(-0.59)	(-1.00)	(-0.87)	(-1.36)	(-0.03)	(-0.32)	(-0.24)	(-0.28)
ROA	-1.293***		-0.773***		-0.525***		-0.192**	
	(4.55)		(-4.49)		(-4.24)		(-2.11)	
Loss		0.231***		0.119***		0.119***		0.063***
		(3.96)		(3.47)		(4.17)		(2.85)
R-Square	0.018	0.021	0.027	0.021	0.034	0.032	0.038	0.041
No of Obs.	2,091	2,091	2,091	2.091	2,091	2,091	2,091	2,091
No of Firms	868	868	868	868	868	868	868	868
Model	Tobit	Tobit	Probit	Probit	Probit	Probit	Probit	Probit

Table 9 Use of Cash Flows in CEO Bonus Plans

This table reports multivariate results for the determinants of using EBITDA in CEO bonus plans. Panel A presents the results of probit regressions, using as the dependent variable the dummy of whether EBITDA is used in the bonus plans. The reported numbers are marginal effects and z-statistics for testing zero marginal effects. Panel B presents the results for Tobit regressions, using as the dependent variable the weight of EBITDA in the bonus plans for the subsample of firms with performance measure weights available. The reported numbers are estimated coefficients and t-statistic for testing zero coefficients. Standard errors are clustered at the firm level in both panels. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Panel A: Use of EBITDA

	Dependent Variable: Use of EBITDA {0,1}			
	(1)	(2)	(3)	(4)
O-Score	0.025***	0.025***		
	(5.14)	(6.18)		
Leverage			0.352***	0.354***
			(8.38)	(8.43)
Crisis	0.038***	0.037***	0.038***	0.038***
	(5.09)	(5.06)	(5.17)	(5.13)
CEO Age	-0.002*		-0.002**	
	(-1.81)		(-2.21)	
Retiring CEO		-0.018		-0.022
		(-1.13)		(-1.40)
Size	-0.020***	-0.021***	-0.034***	-0.035***
	(-3.88)	(-3.99)	(-6.25)	(-6.40)
IOS	-0.064**	-0.063**	-0.080***	-0.078***
	(-2.37)	(-2.31)	(-2.86)	(-2.79)
EBITDA Volatility	0.202**	0.211**	0.186**	0.197**
	(2.02)	(2.13)	(1.96)	(2.08)
EBITDA Persistence	0.022	0.021	0.027	0.026
	(0.95)	(0.88)	(1.22)	(1.14)
Trade Cycle	-0.008**	-0.008**	-0.010***	-0.011***
	(-2.34)	(-2.43)	(-3.34)	(-3.44)
R-Square	0.089	0.088	0.109	0.108
No of Obs.	6,511	6,511	6,620	6,620
No of Firms	1,426	1,426	1,448	1,448
Industry Fixed Effects	Yes	Yes	Yes	Yes

Panel B: Weight of EBITDA				
	Dependent Variable: Weight of EBITDA			
	(1)	(2)	(3)	(4)
O-Score	0.250***	0.253***		
	(4.81)	(4.85)		
Leverage			3.658***	3.667***
			(6.72)	(6.73)
Crisis	0.384***	0.379***	0.385***	0.381***
	(3.93)	(3.91)	(4.07)	(4.05)
CEO Age	-0.022*		-0.023*	
	(-1.74)		(-1.91)	
Retiring CEO		-0.273		-0.281
		(-1.33)		(-1.44)
Size	-0.189***	-0.194***	-0.346***	-0.351***
	(-2.97)	(-3.06)	(-4.84)	(-4.94)
IOS	-0.525	-0.504	-0.677*	-0.656*
	(-1.61)	(-1.56)	(-1.94)	(-1.89)
EBITDA Volatility	3.003***	3.090***	2.865**	2.955***
	(2.57)	(2.66)	(2.53)	(2.62)
EBITDA Persistence	0.171	0.151	0.275	0.258
	(0.60)	(0.53)	(0.99)	(0.92)
Trade Cycle	-0.070*	-0.074*	-0.102***	-0.106***
	(-1.71)	(-1.81)	(-2.67)	(-2.78)
Intercept	1.406	0.298	0.527	-0.647
	(1.63)	(0.44)	(0.65)	(-1.01)
R-Square	0.076	0.075	0.094	0.093
No of Obs.	3,734	3,734	3,794	3,794
No of Firms	1,208	1,208	1,227	1,227
Industry Fixed Effects	Yes	Yes	Yes	Yes