Abstract

Research in incentives has focused on performance measures and pay-performance sensitivities but has largely ignored a third significant dimension: the performance standard. Performance standards generate important incentives whenever plan participants can influence the standard-setting process. I describe management bonus contracts and the role of performance standards, distinguishing between “internally determined” standards that are directly affected by management actions in the current or prior year, and “externally determined” standards that are less easily affected. I show that companies choose external standards when prior-year performance is a noisy estimate of contemporaneous performance. In addition, companies using budget-based and other internally determined performance standards have less-variable bonus payouts, and are more likely to smooth earnings from year to year, than companies using externally determined standards.
Performance Standards in Incentive Contracts

by

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1. Introduction

Annual bonuses are a ubiquitous component of managerial compensation in virtually every for-profit company. Theoretical and empirical research on the incentive consequences of bonus arrangements focuses on dysfunctional performance measures and on non-linearities in the pay-performance relation.¹ However, while many pronounced plan failures can be traced to non-linearities and inappropriate performance measures, the focus misses another salient and equally significant dimension of incentive plans: the choice of the performance standard.

Bonuses are usually not, in practice, based strictly on a performance measure, but rather on performance measured relative to a performance standard. Examples include net income measured relative to budgeted net income, EPS vs. last year’s EPS, cash flow vs. a charge for capital, performance measured relative to peer-group performance, or performance measured against financial or nonfinancial strategic “milestones.” Performance standards typically correspond to “expected performance” or, more precisely, the level of performance required to attain the executive’s “target bonus.”

¹ For example, the counter-productive consequences of choosing inappropriate measures is explored by Kerr (1975), and formalized by Holmstrom and Milgrom (1991) and Baker (1992). Similarly, the consequences of non-linearities in bonus plan payouts are analyzed empirically by Healy (1985) (who shows that floors and caps on bonus contracts provide incentives to shift reported earnings between periods) and Degeorge, Patel and Zeckhauser (1998) (who analyze incentives to achieve earnings thresholds), and formalized by
This paper documents the use of performance standards in executive bonus contracts and explores how the choice of standards affects company performance and realized compensation. I begin in Section 2 by analyzing the economics of performance standards, and exploring the costs and benefits of alternative standards. Section 3 describes executive bonus plans based on a proprietary survey of 177 plans collected by a large compensation consulting firm. The data show that most companies choose performance standards based on the companies’ business plan or budget, or on prior-year performance. I categorize these performance standards as “internally” determined, because the standards are based in large part on managerial actions or performance in the current or prior year. Internal standards are pervasive: only 11% of the surveyed companies rely heavily on externally determined performance standards.

Section 4 examines the choice of standards. In particular, I show that companies are more likely to choose external standards when prior-year performance is a noisy estimate of contemporaneous performance. Section 5 explores the implications of internally determined performance standards, based on a stylized model of the budgeting process suggested by Holthausen, Larcker, and Sloan (1995) and Leone, Rock, and Guidry (1998). Managers have incentives to take actions that increase current bonuses, but to avoid actions this year that might have an undesirable effect on next year’s standard. I show that managers under systems with internal standards will manage company earnings to meet but not exceed budgeted performance, resulting in income smoothing and realized bonuses that are close to target bonuses. In contrast, since external standards are not affected by managerial actions, Holmstrom and Milgrom (1987).
managers with external standards have no incentives to smooth earnings, and are expected to earn bonuses that deviate substantially from target.

Section 5 concludes with an empirical analysis of the effect of performance standards on income smoothing and executive bonuses. In particular, I show that income smoothing is prevalent in companies using internally determined standards, but not in companies using external standards. In addition, I document that executives in companies using internal standards have less variable bonuses than do executives in companies with external standards. These results are broadly consistent with the hypotheses developed, and suggest that the choice of performance standard is an important determinant of bonus-plan effectiveness. Section 6 summarizes and extends the results, and explores some normative implications of the analysis.

2. The Economics of Performance Standards

Performance standards arise from the desire to provide incentives while simultaneously paying competitive expected levels of compensation. As a simple example, suppose that accounting profit, $X$, depends on managerial effort, $e$, and on an idiosyncratic noise term with non-zero mean, $\epsilon$. Assuming linear incentive contracts of the form $w(X) = s + bX$, and defining $\tilde{b}$ as the slope or “pay-performance sensitivity” necessary to implement effort level $\tilde{e}$, the expected level of compensation at $\tilde{e}$ is $E[w] = s + \tilde{b} E[\epsilon] + \tilde{b} \tilde{e}$. If $E[\epsilon]$ were known with certainty, then salary $s$ could be chosen to satisfy the manager’s “participation constraint.” If $E[\epsilon]$ is routinely over-estimated, however, salaries will on average be set too low and the manager will become disillusioned and will eventually leave the firm. On the
other hand, under-estimating $E[\epsilon]$ implies setting excessive salaries, leading to over-paid managers and lower profits.

Estimating $E[\epsilon]$ effectively defines the performance standard, $\bar{X} = E[X] = \bar{e} + E[\epsilon]$, which in turn effectively redefines the compensation function as $w(X - \bar{X}) = s' + b(X - \bar{X})$. Following Milgrom and Roberts (1992; p.233), there are only “three reasonably objective ways to set performance standards.” First, standards can be based on past performance, $\bar{X}_t = X_{t-1}$. Second, standards can be based on the performance of executives in similar firms and industries, $\bar{X}_t = X_t^{\text{peers}}$. Finally, standards can be based on a theoretical determination of the difficulty of particular operations. For piece-rate production workers, this determination might be based on time-and-motion studies of individual tasks. For executives, this determination might be based on the board’s internal assessment of the company’s capabilities, or achieving an externally determined return on assets or capital.

The choice of performance standards depends primarily on trade-offs among three factors: (1) the costs of measuring $\bar{X}$; (2) the accuracy of the estimation of $E[\epsilon]$; and (3) the extent to which managers can influence the level of $\bar{X}$. The measurement-cost criterion favors standards based on past performance, because historical performance data are typically collected and analyzed for a variety of purposes independent of setting standards. In contrast, basing standards on peer-group performance involves selecting the peers and waiting until the end of the quarter or fiscal year to evaluate their performance. Similarly, basing standards on the company’s cost of capital involves difficult decisions related to underlying assumptions and the frequency of revisions.

The accuracy criterion suggests selecting performance standards based on their relative “informativeness” (Holmstrom, 1979). Intuitively, if $\bar{X}^a$ and $\bar{X}^b$ are candidate performance standards, and $\text{var}(X - \bar{X}^a) < \text{var}(X - \bar{X}^b)$, then contracts of the form $w(X - \bar{X}^a)$ will dominate contracts of the form $w(X - \bar{X}^b)$: both contracts yield similar effort incentives (i.e., the marginal benefit of incremental effort is $b$ in both cases), but $w(X - \bar{X}^a)$ does so with less
compensation risk. Since risk-averse managers demand higher expected levels of pay for assuming higher compensation risk, a company switching from \(w(X-a)\) to the less-risky \(w(X-b)\) contract could either maintain current pay-performance sensitivities while reducing the base salary, or could increase pay-performance sensitivities while keeping the executive at his original expected utility.²

Finally, the efficacy of alternative performance standards depends on the extent to which managers can influence the standard-setting process: managers can increase \(X-a\) either by taking actions that increase \(X\) or by taking actions that decrease \(X\). For example, when standards are based on prior-year performance, managers may avoid unusually positive performance outcomes, since good current performance is penalized in the next period through an increased standard. In contrast, managers cannot affect the performance of an industry peer group (ignoring, for the moment, the choice of peer groups). In the remainder of this paper, I distinguish between standards that are internally determined and hence influenced by plan participants, and externally determined standards that are not as easy influenced. The distinction between internal and external standards is one of degree, since even the external standards are manipulable to some extent when they are established initially and when major changes in company circumstances force a modification.

3. Performance Standards in Executive Bonus Contracts

Most descriptions of executive bonus plans in the literature are anecdotal, non-representative, or gleaned from voluntary (and non-random) disclosures in company proxy

² Of course, unless \(X-a\) is a sufficient statistic for \(X\) and \(X-b\), it may be optimal to base compensation on all three instruments. Banker and Datar (1988) show that, under certain distributional assumptions, the weights on each instrument will be inversely proportional to the variance of each instrument (adjusted for
statements.\textsuperscript{3} Since understanding the implications of performance standards requires at least a cursory understanding of actual bonus plans, I will attempt to categorize the features of bonus plans common across companies, based on a comprehensive survey of annual incentive plans conducted in 1996-1997 by Towers Perrin.\textsuperscript{4} The Towers Perrin study, based on responses to an extensive questionnaire augmented by an analysis of company plan documents, contains detailed bonus-plan data from 177 publicly traded U.S. corporations. The number of eligible participants in the sample plans varies from 1 to 25,000 (the median plan has 123 participants); coverage ranges from plans covering only the CEO to plans covering all company employees.

In spite of substantial heterogeneity across companies and industries, executive bonus plans can be categorized in terms of three basic components: performance measures, performance standards, and the relation between pay and performance. Figure 1 illustrates these basic components for a “typical” bonus plan. Under the typical plan, no bonus is paid until a threshold performance (usually expressed as a percentage of the performance standard) is achieved, and a “minimum bonus” (usually expressed as a percentage of the target bonus) is paid at the threshold performance. Target bonuses are paid for achieving the performance standard, and there is typically a “cap” on bonuses paid (again expressed as a percentage or multiple of the target bonus). The range between the threshold and cap is labeled the “incentive zone,” indicating the range of performance realizations where

\begin{itemize}
  \item \textsuperscript{3} Researchers utilizing proprietary data on bonus plans include Holthausen, Larcker, and Sloan (1995) and Bushman, Indjejikian, and Smith (1997). Important papers by Healy (1985) and Gaver, Gaver, and Austin (1995) have relied on voluntary disclosures published in company proxy statements.
  \item \textsuperscript{4} See Murphy (1999) for a more detailed description of executive bonus plans based on these data.
\end{itemize}
incremental improvement in performance corresponds to incremental improvement in bonuses.

**Performance Measures**

Table 1 describes the performance measures used in the 177 annual incentive plans for companies divided into three industry groups: utilities (SIC 4900-4999), financial companies (SIC 6000-6999), and industrials (all other SIC categories). Less than half of the companies use a single performance measure in their incentive plan; most companies use two or more measures. While companies use a variety of financial and non-financial performance measures, almost all companies rely on some measure of accounting profits. Table 1 shows that 63 of the 68 sample companies using a single performance measure use some measure of accounting profits, including revenues, net income, pre-tax income, operating profits (EBIT), or economic value added. Accounting profits also account for 189 of the 307 measures (62%) used by companies with multiple measures. In fact, 161 of the 177 sample firms (91%) explicitly use at least one measure of accounting profits in their annual bonus plans.

**Performance Standards**

Table 2 describes how performance standards are determined for each of the accounting-based performance measures in Table 1. For each performance measure used in the plan, respondents were asked which of several categories best describe the performance-standard determination process. “Budget” standards include plans based on performance

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5 The distribution of performance measures is consistent with that reported by Perry and Zenner (1997), who extracted measures from the compensation committee reports in recent proxy statements.

6 Bonuses are largely discretionary in the other 16 firms, but may of course be implicitly tied to accounting profits through the board’s subjective assessment of performance. In addition, I categorized companies using “balanced scorecards” (Kaplan and Norton, 1992) as discretionary, even though all scorecards
measured against the company’s annual budget goals (such as a budgeted-net-earnings objective). “Prior-Year” standards include plans based on year-to-year growth or improvement (such as growth in sales or EPS, or improvement in operating profits). “Discretionary” standards include plans where the performance targets are set subjectively by the board of directors following a review of the company’s business plan, prior-year performance, budgeted performance, and a subjective evaluation of the difficulty in achieving budgeted performance. “Peer Group” standards include plans based on performance measured relative to other companies in the industry or market. “Timeless Standards” include plans measuring performance relative to a fixed standard (such as a pre-specified return on assets). Finally, “Cost of Capital” refers to performance standards based on the company’s cost of capital (such as a plan based on economic value added, EVA®).

Most performance standards for accounting-profit performance measures are based on a single criterion. For example, as reported in Table 2, the 125 sample companies in the general industry use a total of 240 accounting-based measures. The performance standards for 164 (68%) of these measures are based on a single criteria, including budgets (54%), prior-year performance (14%), board discretion (8%), peer-group comparisons (14%), timeless standards (4%), and cost of capital (6%). The performance standards for the remaining 76 measures are based on a combination of criteria, including budgets (70%), prior-year performance (66%), board discretion (59%), peer-group comparisons (16%), timeless standards (9%), and cost of capital (7%). The percentages here sum to 227%, implying that, conditional on using multiple criteria, an average of 2.3 criteria are used in setting performance standards.

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include at least one financial performance measure.
The performance standards in Table 2 are grouped according to the degree of participant influence over the standard. Standards based on budgets, prior-year performance, or board discretion are categorized as “Internal” because participants can take actions that affect the standard in a current or future year. Standards based on the performance of external peer groups, timeless standards, and standards based explicitly on the company’s cost of capital are categorized as “External” standards because they are relatively unaffected by plan participants.

Finally, I grouped the 177 sample companies according to whether they use predominantly externally determined performance standards, predominantly internally determined performance standards, or a mixture of external and internal performance standards. Although usually straightforward, this categorization involved examining each plan individually, and analyzing the relative weights on the performance measure used in each plan. According to this categorization, 20 of the 177 companies (11%) use predominantly external performance standards, and another 22 (12%) use a mixture of measures. Clearly, most companies rely heavily on budgets, prior-year performance, or board discretion in setting performance standards in annual incentive plans.

Pay-Performance Relations

In Section 5 below, I will analyze the effects of performance standards on executive behavior and compensation. However, since incentives are influenced by pay-performance relations as well as by the choice of performance standard, it is useful to examine typical shapes of the bonus contracts for companies using internal and external standards. Table 3 documents the prevalence of various payout methods. Although the pay-performance relation depicted in Figure 1 is linear between the threshold and cap, the actual pay-performance
relation can be convex, linear, or concave. The top panel of Table 3 shows that the incentive zone is typically linear in plans with external performance standards, but is most often convex in plans with internally determined standards. The second panel shows that firms with internal performance standards typically pay positive bonuses at the performance threshold, while only 20% of firms with external standards pay positive bonuses at the threshold. Finally, the bottom panel shows that payout plans are capped in 80% of the plans with external standards, and 89% of the plans with internal standards.

Overall, Table 3 suggests that pay-performance relations in firms using external performance standards are different than the relations in firms using internal standards. In particular, firms with external standards have incentive zones that cover a broader range of performance outcomes than do firms with internal standards, and also have incentive zones that are more-often linear. These differences are statistically significant using t-tests of subsample averages. In addition, Table 3 suggests that firms with external standards are less likely to have capped bonus plans and to pay positive bonuses at the performance threshold; these differences are not, however, statistically significant, reflecting the small sample size of companies with external performance standards.

4. The Choice of Performance Standards

The analyses in Section 2 suggest that peer-group-based external performance standards will be favored over prior-year-based internal standards: (1) when the costs of measuring peer-group performance is relatively low, (2) when \( X_t - X_{t-1} \) is “noiser” than \( X_t - X_t^{peers} \), and (3) when dysfunctional incentives caused by prior-year standards are particularly problematic. Absent data on measurement costs and dysfunctional incentives, the
first and third predictions are not directly testable. The second prediction, however, is testable, and suggests the following hypothesis:

**H1.** *External standards should be adopted in companies where \( \text{var}(X_t - X_t^{\text{peers}}) \) is low relative to \( \text{var}(X_t - X_{t-1}) \).*

Hypothesis H1 is tested using net income plus interest ("Income") over the period 1988-1997. Industry Income is computed as \((\text{Assets}) \times (\text{ROA}_t^{\text{peers}})\) where Assets equals the sample company assets and \(\text{ROA}_t^{\text{peers}}\) is the cumulative income plus interest divided by cumulative assets for all Compustat companies in the same 2-digit industry; similar results are obtained using 3-digit and 4-digit industry definitions. Standard deviations of income minus prior-year income, and income minus industry income, are computed separately for each sample firm over the ten-year period.

Table 4 reports coefficients from linear probability regressions (columns (1) and (3)) and logistic regressions (columns (2) and (4)) predicting whether companies adopt external performance standards. The dependent variable is set equal to one for companies using external standards, and zero otherwise. The independent variables include dummy variables for industry group, a control for company size, and time-series and cross-sectional measures of earnings volatility. Hypothesis H1 predicts that the probability of adopting external standards should be increasing in \(\text{Std}(\text{Income}_t - \text{Income}_{t-1})\) and decreasing in \(\text{Std}(\text{Income}_t - \text{Industry Income})\).

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7 Table 2 shows that external standards are relatively more prevalent in financial companies (19%) than in industrials (10%) or utilities (10%). To the extent that the relative homogeneity of the financial-services industry lowers the cost of measuring peer-group performance, these results may offer limited support for the first prediction.

8 Shi (1999) provides a formal model of the choice of performance standard, showing that when the risk an agent faces is highly correlated with his peer group’s and not correlated with his past, the optimal contract rewards the agent based on his performance above his peer group.
Industry Income\(_t\)). The relevant coefficients in columns (1) and (2) have the sign as predicted by H1, but the coefficients are statistically insignificant.

Companies can have low year-to-year earnings volatility for two reasons. First, the company might be in a particularly stable industry. Second, managers might take discretionary accruals or time the realization of revenues or expenses to ensure smooth earnings. Hypothesis H2, developed in the next section, predicts that companies with internal standards will be more likely to smooth earnings than companies with external standards. If managers are manipulating earnings in this fashion, the explanatory variable Std(Income\(_t\) - Income\(_{t-1}\)) in Table 4 is endogenous. Columns (3) and (4) of Table 4 present results from instrumental variables regressions that attempt to control for this potential endogeneity. In particular, the median standard deviation of year-to-year changes in income in the 2-digit SIC industry is used as the instrument for Std(Income\(_t\) - Income\(_{t-1}\)).\(^9\) The coefficient on Std(Income\(_t\) - Income\(_{t-1}\)) in the linear-probability instrumental-variables regression in column (3) is positive and significant, while the coefficient on Std(Income\(_t\) - Industry Income\(_t\)) is negative and significant; these results lend support to Hypothesis H1. The coefficients on the logistic instrumental-variables regression in column (4) have the predicted signs but are not statistically significant.

As a robustness check, I recomputed the variables in Table 4 using alternative measures of earnings volatility, and obtained qualitatively similar results. I also re-estimated Table 4 after grouping “External” and “Mixed;” the signs on the relevant coefficients were

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\(^9\) Larger firms will naturally have higher year-to-year earnings volatilities than smaller firms. In order to account for scale, the instrument is defined as the median standard deviation of ROA changes in the 2-digit SIC Industry, multiplied by the sample-company average assets from 1988-1997.
unchanged but the significance level was generally lower. Overall, I interpret the results as providing consistent, but limited, evidence in support of Hypothesis H1.

5. The Effects of Performance Standards on Income Smoothing and Executive Compensation

The analysis in Section 3 shows that most companies rely heavily on budgets and/or prior-year performance in setting performance standards in annual incentive plans. These internally determined standards are predicted to affect managerial behavior, because managers understand that their actions this year will affect next year’s performance target. For example, when standards are based on prior-year performance, managers may avoid unusually positive performance outcomes, since good current performance is penalized in the next period. Similarly, budget-based performance standards create incentives to “sandbag” the budget process and to avoid actions this year that might have an undesirable effect on next year’s budget. Basing standards on budgets or prior-year performance have similar implications because current budgets will naturally depend in large part on prior performance.

The precise implications of internally determined standards depend on the budgeting process and how the standard is revised from year to year. Holthausen, Larcker, and Sloan (1995) describe the typical budgeting process as a ratcheted target: the budget goal is increased in years in which prior-year actual performance exceeds the prior-year performance standard, but is not decreased when actual performance falls short of the standard.\(^{10}\) Leone, Rock, and Guidry (1998) analyze longitudinal intra-firm budget data from

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\(^{10}\) As an example, the authors cite the budgeting process at the H. J. Heinz Company, in which budgeted
a large conglomerate and document evidence consistent with ratcheted budgets. In particular, they find that performance budgets are increased to a much greater extent when actual performance in the prior year exceeds budget than they are decreased when actual performance falls below budget.

Ratcheted budgets of the type suggested by Holthausen, Larcker, and Sloan and Leone, Rock, and Guidry yield incentives for managers to achieve, but not to surpass, the performance standard. Adizes (1989) describes similar budget processes, and concludes, “over time, people increasingly focus on how to minimize undesirable deviations from the budget.”

To illustrate the effects of internally vs. externally determined performance standards, assume again that managerial pay in period $t$ is determined by the formula $w_t = s' + b (X_t - \bar{X}_t)$. I assume that positive net present value (NPV) investment projects arrive randomly and are privately observed by management, who choose whether to accept or reject each project. The board of directors observes only annual performance, defined as the sum of the value of the accepted projects.

When performance standards are externally determined (for simplicity, think of $\bar{X}$ as fixed), managers maximize their bonuses by accepting all NPV>0 projects. But, when standards are internally determined by the process $\bar{X}_{t+1} = \max(X_t, \bar{X}_t)$, superior performance in year $t$ is rewarded through higher bonuses in year $t$, but penalized through higher performance standards in year $t+1$. The result is the familiar “ratchet effect,” introduced by Weitzman (1980) and analyzed by Freixas, Guesnerie, and Tirole (1985), performance was set at the greater of either 115% of prior-year performance or 115% of the prior year’s budgeted performance.
Lazear (1986), Gibbons (1987), and Kanemoto and MacLeod (1992), among others. Assuming sufficiently low discount rates and long-lived managers, managers maximize the present value of current and future bonuses by accepting favorable projects when $X_t \leq \bar{X}$, but by rejecting favorable projects when $X_t > \bar{X}$. Thus, managers facing ratcheted performance standards will smooth company income by accelerating earnings when year-to-date performance is low, and by depressing earnings when year-to-date performance is high. I therefore predict that income smoothing should be more prevalent in firms with internal (ratcheted) standards than in firms with external standards.

Incentives to smooth income are also provided by the non-linear bonus payout structure illustrated in Figure 1, independent of the budget-setting process. In particular, managers anticipating performance above the bonus cap will deflate earnings, while managers anticipating performance moderately below the threshold will inflate earnings (as long as there is any chance of reaching the threshold). The results in Table 3 show that companies with internally determined standards are more likely than companies with external standards to have narrow incentive zones, bonus caps, and discontinuities in bonus payments at threshold performance. Therefore, the observed payout structures also support the prediction that income smoothing should be more prevalent in firms with internal standards than in firms with external standards.

The tendency for managers to achieve, but not surpass, budgeted performance has direct implications for the variability of observed bonuses. In particular, since target bonuses are earned when budgeted performance is achieved, managers with internally determined performance standards should earn predictable bonuses with little year-to-year variation. In contrast, bonuses should be more variable in companies with external standards, because
managers have no compensation-based reason to manage company earnings to “hit” budgeted performance.

The preceding analyses suggest two testable implications that distinguish companies with internally and externally determined performance standards.

**H2. Income smoothing should be more prevalent in firms with internal standards than in firms with external standards.**

**H3. Year-to-year variability in bonuses should be lower in firms with internal standards than in firms with external standards.**

**Do Performance Standards Affect Income Smoothing?**

Although there is an extensive accounting literature on income smoothing, there has been little attempt to relate smoothing incentives to the form of the executive bonus contract. Indeed, Gaver, Gaver, and Austin (1995) treat smoothing and bonus incentives as independent hypotheses, and argue that Healy’s (1985) results on bonus incentives are better explained by pressures to smooth income than by the compensation system.¹¹ As discussed above, Holthausen, Larcker, and Sloan (1995) argue that bonuses based on ratcheted budgets can provide an incentive-based rationale for smoothing, but offer no direct tests of this argument. In this sub-section, I examine the effect of performance standards on income smoothing, providing direct evidence on the relation between income smoothing and

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¹¹ Healy (1985) assumed that bonuses were continuous at the performance threshold, and hypothesized that managers would take discretionary accruals (to shift earnings to a following period) whenever performance fell short of the threshold or exceeded the cap. Later work by Gaver, Gaver, and Austin (1995) and Holthausen, Larcker, and Sloan (1995) confirm that managers manipulate earnings downward when the cap is exceeded, but actually manipulate earnings upwards when below the threshold. The authors interpret these findings as rejecting the hypothesis that managers manipulate earnings in response to their bonus plans. However, these studies ignore the prevalence of the discontinuity in bonus payments at threshold illustrated in Figure 1, which provides strong bonus-based incentives to adopt income-increasing accruals when performance is moderately below the threshold.
managerial compensation by comparing smoothing behavior in companies that use smoothing-inducing internal performance standards to companies with external standards that should not induce smoothing.

Most studies of income smoothing in the accounting literature have focused on “discretionary accruals,” reflecting accounting choices managers can make to shift reported earnings from one period to another. The implicit rationale for this approach is that managers have more control over accounting phenomena than they have over the timing of the organization’s actual cash flows. Although resolving what may ultimately be an empirical issue is beyond the scope of this paper, I conjecture that focusing on accruals while ignoring direct manipulation of cash flows underestimates the resourcefulness of clever managers. Consequently, my tests of income smoothing focus on the timing of sales and costs. The approach is similar, at least in spirit, to important recent work by Oyer (1998), who documents a significant fourth-quarter effect in company revenues not attributable to business seasonality or calendar year-ends.

Quarterly performance data provide an intuitive way to test the smoothing hypothesis. In particular, the hypothesis predicts that fourth-quarter performance will depend, in part, on a comparison of the year-to-date performance over the first three quarters to the prior year’s performance measured over the same time period. When year-to-date performance is low, managers accelerate revenues and delay expenses to reach the performance standard, but when year-to-date performance is high managers delay revenues and accelerate expenses lest they substantially surpass the standard (leading to a higher standard in the subsequent period). Importantly, of course, I predict that the incentives to smooth earnings in this
manner will be more pronounced in companies with internally determined standards than in
companies with externally determined standards.

Table 5 reports regression results showing how fourth-quarter net income varies with
year-to-date performance (through three quarters), based on quarterly Compustat files from
1988-1997. The dependent variable in all regressions is the share of annual net income
earned in the final fiscal quarter. Independent variables include broad industry controls and a
dummy variable equal to one if year-to-date income over three quarters is running ahead of
prior-year year-to-date income. The regressions include interactions allowing the effect of
year-to-date performance to vary based on whether company uses externally or internally
determined performance measures. I exclude observations with negative fourth-quarter net
profit, and observations where fourth quarter’s share of net profit exceeds unity. This
restriction (which results in excluding about 19% of the sample observations) is obviously
problematic; I consider other approaches and analyze the robustness of the results below. The
asymptotic t-statistics for all regressions are based on White (1980) standard errors to control
for heteroskedasticity.

The intercept in column (1) of Table 5 is .333, while the coefficient on the favorable
year-to-date performance dummy (Good YTD Net Income) is -.046. As illustrated in Figure
2, these coefficients imply that companies in the general industry with internal standards
realize approximately 33.3% of their net income in the fourth quarter when YTD net income
is less than in the prior year, but realize only 28.7% of their income in the fourth quarter
when YTD net income is ahead of prior-year income. The external standard dummy and
interaction indicate that companies with external standards realize approximately 23.6%
(.333 - .097) of their net income in the fourth quarter when YTD results are poor, and realize
25.8% of their income in the fourth quarter when YTD results are favorable. Overall, these statistically significant results are consistent with income smoothing for companies with internally determined performance standards, but no smoothing for companies with external standards.

The regression in column (2) of Table 5 includes company fixed effects to control for seasonality and other factors that might systematically affect fourth-quarter results for a given firm. The coefficient on Good YTD Net Income in column (2) is again negative and highly significant, suggesting a widespread tendency among companies with internal standards to depress fourth-quarter profit when YTD profits are ahead of the prior-year YTD profits, and to inflate fourth-quarter profit when YTD profits are behind the prior year. However, the coefficient on the (Good YTD Net Income)*(External Standard) dummy variable is positive, significant, and approximately equal in (absolute) magnitude to the (Good YTD Net Income) coefficient; I therefore find no evidence that companies with external standards systematically smooth income.

The results in Table 5 for companies with internally determined standards are consistent with income smoothing, but are also consistent with “mean reversion” where abnormally high (or low) early performance is offset with abnormally low (or high) subsequent performance. In contrast, the results for companies with external standards are consistent with hypothesis H2, but inconsistent with mean reversion. However, as suggested by the results in Table 4, companies in industries characterized by low year-to-year earnings volatility are more likely to adopt internal rather than external performance standards. It is also possible (although not obvious) that mean reversion is more prevalent among companies in low-volatility industries, and that the “external” variable and interaction in Table 5 is
proxying for such industries. In order to check this potential alternative explanation for the results, columns (3) and (4) of Table 5 include industry earnings volatility, measured as the median standard deviation of ROA estimated for each company in the 2-digit industry, as an additional explanatory variable. The coefficients on the industry volatility variable, and its interaction with YTD profits, are insignificant in the OLS regression in column (3) and the fixed-effects regression in column (4); these results reject the mean-reversion hypothesis and lend additional support for hypothesis H2.

One interesting result suggested by Table 5 and Figure 2 is that, independent of YTD performance, companies with externally determined performance standards realize significantly less of their income in the fourth quarter than companies with internal standards. This result is not easily explained by industry composition or company size (Table 4 suggests the differences here are not significant), and is also not explained by differences in fiscal-year closings (companies with external standards are slightly more likely to have December closings). The result is partially explained by a handful of highly seasonal firms; omitting these companies from the sample strengthens the coefficient on the interaction variable in Table 5.\textsuperscript{12} One interpretation of this result, consistent with Oyer (1998), is that companies with internal standards routinely shift earnings towards the fourth quarter since it is easier to control fiscal-year performance after results from the first three quarters are tallied. In any case, the fixed-effects regressions (which allow firm-specific average fourth-quarter shares) and sensitivity analysis (omitting the outliers) indicates that the results are not driven by the lower fourth-quarter shares among firms with external standards.

\textsuperscript{12} In particular, I omitted the three outliers with the highest average fourth quarter earnings from 1987-1996: Toys R Us (average fourth-quarter share, 76%), Lands' End (66%), and Stein Mart (65%).
As noted above, using fourth-quarter’s share of net income as the dependent variable is problematic because income can be negative as well as a positive, and the quarterly shares are therefore not bounded by zero and unity. One approach to deal with this problem is to divide profit into its two primary components, revenues and costs, and compute the fourth-quarter revenue shares and cost shares, both of which are appropriately bounded. In addition to mitigating the problem of negative profits, this approach allows us to identify whether managers smooth income through revenues, costs, or both, and also to identify which components of costs are most susceptible to smoothing behavior.

Table 6 presents estimated coefficients from fixed-effects regressions of fourth-quarter shares of various definitions of revenues, costs, and earnings on year-to-date performance through the first three quarters. The regressions include between 73 and 171 firm fixed-effects; explanatory variables include the Good YTD Income dummy variable by itself and interacted with the dummy variable for External Standards (in regressions designated by “a”) or External or Mixed Standards (in regressions designated by “b”). Hypothesis H2 predicts a positive sign on the interactions in the revenue and earnings regressions (rows 1-3 and row 8) and a negative sign on the interactions in the cost regressions (rows 4-7). The coefficients on the External interaction is significantly positive only in the “Income before Extraordinary Items” regression (2a), while the “External or Mixed” interaction is significant for “Income before Extraordinary” (2b), “EBITDA” (3b), and “Q4 Revenue share less the Q4 Cost Share” (8b). Although the earnings results support hypothesis H2, the generally insignificant results in Table 6 suggest that the performance-standard-related income smoothing can not be neatly attributed to specific components of revenues or costs.
Taken in combination, I interpret the results in Tables 5 and 6 as providing substantial support for hypothesis H2. In particular, companies with budget- and prior-year-based performance standards exhibit income-smoothing behavior, while companies with externally performance standards show no tendencies to smooth income.

**Do Performance Standards Affect the Variability of Executive Bonuses?**

Hypothesis H3 predicts that the choice of performance standard will affect the variability of observed bonuses. Managers with internally determined standards are implicitly rewarded for achieving but not surpassing the performance standard, generating realized bonuses that are close to target bonuses. In contrast, managers facing externally determined standards have no compensation-based reason to manage company earnings to minimize deviations from the performance standard, and should therefore have more variable and less predictable bonuses.

In order to analyze the relation between performance standards and the variability of executive bonuses, I matched the 177 Annual Incentive Plan survey firms to 1992-1997 compensation data from Compustat’s ExecuComp database. Data for 24 sample companies were not available on ExecuComp and were dropped from the analysis. For the remaining 153 companies, I deleted executives serving for less than three consecutive years, and computed the standard deviation of individual bonuses for 150 chief executive officers (CEOs) and 911 other top executives.

Table 7 reports results from regressions showing how performance standards affect the variability of executive bonuses. The dependent variable is the standard deviation of 1992-1997 bonuses for 1,061 sample executives with usable data. Independent variables include
broad industry dummy variables, and the logarithm of 1995 company revenues to control for company size. The regression in columns (1) and (3) show that bonuses are significantly more variable for executives in companies with externally determined performance standards than in companies with internal standards.

Although the results in columns (1) and (3) of Table 7 are consistent with hypothesis H3, they are also consistent with the explanation, suggested by Table 4, that companies in industries with low earnings volatility choose internal standards based on prior-year performance and (naturally) have less volatile executive bonuses. In order to control for industry earnings volatility, columns (2) and (4) include industry earnings volatility (measured as the median standard deviation of 1992-1997 net income in the 2-digit industry). The industry-volatility coefficient is positive and significant for CEOs (column (2)) and other executives (column (4)), indicating that bonuses are indeed more variable in high-volatility industries. The coefficient on external standards, however, remains positive and significant, yielding strong support for the hypothesis that the choice of performance standard affects the year-to-year variability in realized bonuses.

6. Conclusion

Theoretical and empirical research in incentives has focused on two prominent dimensions of incentive contracts—performance measures and the pay-performance sensitivity—but has largely ignored a third equally significant dimension: the performance standard. Far from innocuous, performance standards generate important incentives whenever the participants in the incentive plan can influence the performance-standard or the
standard-setting process. Key examples include paying managers for performance measured relative to budget when the managers are instrumental participants in the budget-setting process, or paying employees on performance relative to prior-year performance, when participants understand that good current performance will be penalized through a high future standard.

In this paper, I distinguish between “internally determined” standards that are directly affected by management actions in the current or prior year, and “externally determined” standards that are less easily affected. I show that companies are more likely to choose external standards when prior-year performance is a noisy estimate of contemporaneous performance. Moreover, I show that the choice of performance standard has predictable implications for management compensation and company performance. In particular, the data support the theoretical predictions that companies using budget- and other internally determined performance standards have less-variable bonus payouts, and are more likely to smooth earnings from year to year, than companies using externally determined standards.

Although I show that internally determined performance standards have predictable consequences, I offer no systematic evidence that companies with internal standards either underperform or overperform companies with internal standards. Thus, while internal standards may affect income smoothing and bonus variability, these effects may be “neutral permutations” for overall company performance, reflecting board preferences for smooth and predictable company earnings, and managerial preferences for predictable bonuses with little year-to-year variation. Defining performance standards based on company budgets allows boards to control both the predictability and achievability of executive bonuses (Merchant
and Manzoni, 1989), and these advantages may explain why nearly 90% of the companies in my sample use internally determined performance standards.

However, there is ample anecdotal evidence that ratcheted standards based on prior-year performance are not value-neutral, but rather have unintended and dysfunctional consequences for organizations. For example, division managers at the H.J. Heinz Company received bonuses only if earnings increased from the prior year. The results were predictable and, ultimately, illegal: managers delivered consistent earnings growth by manipulating the timing of shipments to customers and by fraudulently prepaying for services not yet received (Post and Goldpaster, 1981). At Dun & Bradstreet, salespeople earned no commission unless the customer bought a larger subscription to the firm’s credit-report services than in the previous year. In 1989, the company faced millions of dollars in lawsuits following charges that its salespeople deceived customers into buying larger subscriptions by fraudulently overstating their historical usage (Roberts, 1989).

There is also ample evidence that basing standards on company budgets creates unproductive incentives to “sand-bag” the budgeting process. Adizes (1989), for example, describes the typical budget-negotiation process:

“People try to ensure that they never end up below budget by aiming low. Management could stretch it from the top down by not accepting low budgets, but that has other negative long-term repercussions. It creates a climate of distrust. Subordinates (on any level) aim low because they know superiors (on any level) will bargain to raise the target. Superiors bargain to raise goals for the budget because they automatically assume subordinates have aimed low. This begins a group dynamic of mutual deception. The budget that is finally approved does not reflect the real capabilities of the organization or the real opportunities of the marketplace. It is merely a reflection of the trust or mistrust between the different levels in the organizational hierarchy.”

Budgets are an important planning tool in most large organizations, and forming realistic and ultimately useful budgets requires a candid flow of information between
successive layers in the corporate hierarchy. Tying managerial bonuses to meeting the budget not only creates incentives to avoid current actions that affect future budgets, but also to provide biased and misleading information during the budget negotiation process.

Many recent innovations in organizational structures and incentive design mitigate potential problems with internal standards by effectively “externalizing” the performance standard (Stewart and Glassman, 1988). For example, in LBOs and other highly leveraged organizations, the objective of “making budget” is replaced by an objective of generating sufficient cash flow to service the debt (Baker and Wruck, 1989). Similarly, to the extent that budget-based internal control systems are a characteristic of large diversified corporations, the focus on making budget is reduced following spin-offs and divestitures. Relative performance incentive plans, increasingly popular in utilities and cyclical industries, replace “making budget” with “beating the industry.” Similarly, in companies or divisions measured by EVA, budget-based objectives are replaced by generating cash flows in excess of the cost of capital. Incentive plans with “timeless standards,” such as Disney’s defunct plan that paid its CEO 2% of income over a fixed threshold, also externalize the performance standard.
References


Figure 1

Components of a "Typical" Annual Incentive Plan

- Annual Bonus
  - Bonus "Cap"
  - Target Bonus

- Performance Measure
  - Performance Threshold
  - Performance Standard

The "Incentive Zone"

Pay/Performance Relation
### Table 1

**Performance Measures Used in Annual Incentive Plans in 177 Large U. S. Corporations**

<table>
<thead>
<tr>
<th>Firms with a Single Performance Measure</th>
<th>Industrials (n=125)</th>
<th>Finance &amp; Insurance (n=21)</th>
<th>Utilities (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td><strong>Performance Measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(Number of Firms)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earnings(^a)</td>
<td>(32)</td>
<td>Earnings(^a)</td>
<td>(8)</td>
</tr>
<tr>
<td>EBIT(^b)</td>
<td>(7)</td>
<td>EBIT(^b)</td>
<td>(2)</td>
</tr>
<tr>
<td>EVA(^c)</td>
<td>(5)</td>
<td>Discretionary</td>
<td>(1)</td>
</tr>
<tr>
<td>Discretionary</td>
<td>(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indiv. Perform</td>
<td>(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Financial</td>
<td>(2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Firms with Two or More Performance Measure | 75                  | 10                          | 24              |
| **Are Measures Additive?**                | Yes=83%             | Yes=70%                     | Yes=67%         |
| **Performance Measures**                 |                     |                             |                 |
| **(Number of Firms)**                     |                     |                             |                 |
| Earnings\(^a\)                           | (80)                | Earnings\(^a\)              | (19)            |
| EBIT\(^b\)                               | (32)                | Indiv. Perform              | (3)             |
| Indiv. Perform                           | (25)                | Sales                       | (1)             |
| Sales                                    | (21)                | Op. Objectives              | (1)             |
| Cust. Satisf.                            | (6)                 |                             |                 |
| Strategic Goals                          | (5)                 |                             |                 |
| Stock Price                              | (5)                 |                             |                 |
| Discretionary                            | (4)                 |                             |                 |
| Op. Objective                            | (4)                 |                             |                 |
| EVA\(^c\)                                | (3)                 |                             |                 |
| Other:                                   |                     |                             |                 |
| Financial                                | (11)                | Financial                   | (1)             |
| Non-Financial                            | (13)                | Non-Financial               | (0)             |

Source: Data extracted from Towers Perrin’s *Annual Incentive Plan Design Survey*, 1997.

\(^a\)Earnings includes net income, pre-tax net income, and returns on assets, equity, and capital.

\(^b\)EBIT (Earnings before Interest and Taxes) includes Operating Income, EBITDA, and other cash flow measures.

\(^c\)EVA (Economic Value Added) generally equals a measure of operating income less a charge for capital.
### Table 2
Performance Standards Used in Annual Incentive Plans in 177 Large U. S. Corporations

<table>
<thead>
<tr>
<th>Performance Standards Based on a Single Criterion</th>
<th>Industrials (n=125)</th>
<th>Finance &amp; Insurance (n=21)</th>
<th>Utilities (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Earnings-Based Measures</strong></td>
<td>164</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td><strong>Performance Standards (% of Measures)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td>54%</td>
<td>38%</td>
<td>35%</td>
</tr>
<tr>
<td>Prior Year</td>
<td>14%</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td>Discretionary</td>
<td>8%</td>
<td>4%</td>
<td>30%</td>
</tr>
<tr>
<td>External:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Group</td>
<td>14%</td>
<td>46%</td>
<td>26%</td>
</tr>
<tr>
<td>Timeless Std</td>
<td>4%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Cost of Capital</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

| Performance Standards Based on Multiple Criteria   |                     |                           |                 |
| **Number of Earnings-Based Measures**              | 76                  | 15                        | 23              |
| **Performance Standards (% of Measures)**          |                     |                           |                 |
| Internal:                                         |                     |                           |                 |
| Budget                                           | 70%                 | 87%                       | 70%             |
| Prior Year                                       | 66%                 | 47%                       | 48%             |
| Discretionary                                    | 59%                 | 47%                       | 74%             |
| External:                                        |                     |                           |                 |
| Ext. Peer Group                                  | 16%                 | 53%                       | 17%             |
| Timeless Std                                     | 9%                  | 0%                        | 9%              |
| Cost of Capital                                  | 7%                  | 0%                        | 9%              |

**Number of Companies:**

- Mostly External Standards: 13, 4, 3
- Mix of Internal/External: 15, 3, 4
- Mostly Internal Standards: 97, 14, 24

Source: Data extracted from Towers Perrin’s *Annual Incentive Plan Design Survey*, 1997. Earnings-based measures include sales, operating income, EVA, cash flow, EBIT, pre-tax income, and net income.
Table 3
Pay-Performance Relations and Performance Standards

<table>
<thead>
<tr>
<th>Shape of Payouts in “Incentive Zone”:</th>
<th>External Standard (n=20)</th>
<th>Mixed Standard (n=22)</th>
<th>Internal Standard (n=135)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convex</td>
<td>0%</td>
<td>14%</td>
<td>28%</td>
</tr>
<tr>
<td>Linear</td>
<td>45%</td>
<td>27%</td>
<td>13%</td>
</tr>
<tr>
<td>Concave</td>
<td>0%</td>
<td>5%</td>
<td>20%</td>
</tr>
<tr>
<td>Mixture (2+ Measures)</td>
<td>5%</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>n/a</td>
<td>50%</td>
<td>36%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Bonus Paid at “Threshold” Performance?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Standard</td>
<td>20%</td>
<td>5%</td>
<td>75%</td>
</tr>
<tr>
<td>Mixed Standard</td>
<td>41%</td>
<td>14%</td>
<td>46%</td>
</tr>
<tr>
<td>Internal Standard</td>
<td>63%</td>
<td>12%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Bonus Capped?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Standard</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Mixed Standard</td>
<td>82%</td>
<td>18%</td>
</tr>
<tr>
<td>Internal Standard</td>
<td>89%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Source: Data extracted from Towers Perrin’s Annual Incentive Plan Design Survey, 1997. Payout-shapes based on earnings-based performance measures, including sales, operating income, EVA, cash flow, EBIT, pre-tax income, and net income.
Table 4
Coefficients of Regressions Predicting Whether Company Uses External or Internal Performance Standards

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Linear</th>
<th>Logistic</th>
<th>Instrumental Variables</th>
<th>Linear</th>
<th>Logistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td></td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-.059</td>
<td>-4.02</td>
<td>-.054</td>
<td>-3.79</td>
<td></td>
</tr>
<tr>
<td>Finance (Dummy)</td>
<td>.086</td>
<td>.755</td>
<td>.096</td>
<td>.826</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.1)</td>
<td>(1.0)</td>
<td>(1.2)</td>
<td>(1.1)</td>
<td></td>
</tr>
<tr>
<td>Utility (Dummy)</td>
<td>.014</td>
<td>.178</td>
<td>.013</td>
<td>.181</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.2)</td>
<td>(0.3)</td>
<td>(0.2)</td>
<td>(0.3)</td>
<td></td>
</tr>
<tr>
<td>Ln(Avg. 92-96 Sales)</td>
<td>.020</td>
<td>.218</td>
<td>.020</td>
<td>.193</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.8)</td>
<td>(0.8)</td>
<td>(0.8)</td>
<td>(0.7)</td>
<td></td>
</tr>
<tr>
<td>Std(Income_t - Income_{t-1})</td>
<td>.0001</td>
<td>.00074</td>
<td>.00029</td>
<td>.0015</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.4)</td>
<td>(0.9)</td>
<td>(2.2)</td>
<td>(1.2)</td>
<td></td>
</tr>
<tr>
<td>Std(Income_t - Industry Income_t)</td>
<td>-.0002</td>
<td>-.0011</td>
<td>-.00047</td>
<td>-.0024</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.0)</td>
<td>(-0.6)</td>
<td>(-1.8)</td>
<td>(-1.0)</td>
<td></td>
</tr>
<tr>
<td>Significance of -2LogL</td>
<td>—</td>
<td>.525</td>
<td>—</td>
<td>.376</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.033</td>
<td>—</td>
<td>.047</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Asymptotic t-statistics in parentheses. Dependent variable equals one for companies with external performance standards, and zero otherwise. Sample size is 171 for all regressions. The median standard deviation of ROA changes in the 2-digit SIC Industry, multiplied by company average assets from 1988-1997 is used as the instrument for Std(Income_t - Income_{t-1}). The t-statistics in column (4) are based on the uncorrected asymptotic covariance matrix for the second-stage logistic regression and are therefore slightly overstated.
Table 5
Coefficients of OLS Regressions of Fourth Quarter’s Share of Net Income on Year-to-Date Income (relative to prior year), with Interactions for Externally Determined Standards

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable is Q4’s Share of Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Intercept</td>
<td>.333</td>
</tr>
<tr>
<td>Finance (Dummy)</td>
<td>-.027 (-3.1)</td>
</tr>
<tr>
<td>Utility (Dummy)</td>
<td>-.088 (-11.6)</td>
</tr>
<tr>
<td>Good YTD Net Income (Dummy)</td>
<td>-.046 (-4.6)</td>
</tr>
<tr>
<td>Industry Median Standard Deviation of ΔROA</td>
<td>—</td>
</tr>
<tr>
<td>Good YTD Net Income x(Industry Std(ΔROA))</td>
<td>—</td>
</tr>
<tr>
<td>External Standard (Dummy)</td>
<td>-.097 (-5.8)</td>
</tr>
<tr>
<td>Good YTD Net Income x(External Standard)</td>
<td>.068 (3.4)</td>
</tr>
<tr>
<td>R²</td>
<td>.0895</td>
</tr>
</tbody>
</table>

Notes: Asymptotic t-statistics based on White (1980) standard errors in parentheses. Sample size is 1,318 for all regressions. Performance-standard categories from Towers Perrin’s Annual Incentive Plan Design Survey, 1997. Good YTD Net Income is a dummy variable equal to 1 if current net income through three quarters exceeds prior-year net income through three quarters, based on quarterly data from 1988-1997 from Compustat Quarterly Files. Observations with fourth-quarter net income shares less than zero or exceeding unity are excluded. The industry median standard deviation of year-to-year changes in ROA is computed using annual 1988-1997 data for all Compustat firms in the same 2-digit industry.
Figure 2

Predicted fourth-quarter net income as a percentage of annual net income, based on regression coefficients from Table 5, Column 1

Firms with **Internal** Standards

- High YTD Income: 28.7%
- Low YTD Income: 33.3%

Firms with **External** Standards

- High YTD Income: 25.8%
- Low YTD Income: 23.6%
### Table 6

**Coefficients of Fixed-Effects Regressions of Fourth Quarter Shares on Year-to-Date Income (relative to prior year), with Interactions for Externally Determined Standards**

<table>
<thead>
<tr>
<th>Dependent Variable (Fraction Realized in 4th Qtr)</th>
<th>Good Year-to-Date Net Income Interacted with:</th>
<th>Sample Size (Firm Fixed Effects)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Interaction</td>
<td>External Standard</td>
</tr>
<tr>
<td>Revenues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a)</td>
<td>.0007 (0.6)</td>
<td>-.0010 (-0.5)</td>
</tr>
<tr>
<td>1b)</td>
<td>.0003 (0.3)</td>
<td>—</td>
</tr>
<tr>
<td>Income before Extraordinary Items &amp; Disc. Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a)</td>
<td>-.0283 (-3.9)</td>
<td>.0455 (2.2)</td>
</tr>
<tr>
<td>2b)</td>
<td>-.3250 (-4.1)</td>
<td>—</td>
</tr>
<tr>
<td>EBITDA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3a)</td>
<td>-.0052 (-1.3)</td>
<td>.0148 (1.5)</td>
</tr>
<tr>
<td>3b)</td>
<td>-.0070 (-1.7)</td>
<td>—</td>
</tr>
<tr>
<td>Costs of Goods Sold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a)</td>
<td>.0005 (0.3)</td>
<td>-.0059 (-0.9)</td>
</tr>
<tr>
<td>4b)</td>
<td>.0007 (0.3)</td>
<td>—</td>
</tr>
<tr>
<td>Selling, General, and Administrative Expenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a)</td>
<td>.0056 (1.9)</td>
<td>.0003 (0.0)</td>
</tr>
<tr>
<td>5b)</td>
<td>.0070 (2.2)</td>
<td>—</td>
</tr>
<tr>
<td>R&amp;D Expenditures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6a)</td>
<td>.0058 (0.5)</td>
<td>.0125 (0.7)</td>
</tr>
<tr>
<td>6b)</td>
<td>.0061 (0.5)</td>
<td>—</td>
</tr>
<tr>
<td>Total Costs (Revenue - Net Income)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7a)</td>
<td>.0033 (1.7)</td>
<td>-.0006 (-0.2)</td>
</tr>
<tr>
<td>7b)</td>
<td>.0047 (2.4)</td>
<td>—</td>
</tr>
<tr>
<td>Q4 Revenue share less Q4 Total Cost share</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8a)</td>
<td>-.0025 (-1.7)</td>
<td>-.0008 (-0.3)</td>
</tr>
<tr>
<td>8b)</td>
<td>-.0042 (-2.8)</td>
<td>—</td>
</tr>
</tbody>
</table>

Notes: Asymptotic t-statistics based on White (1980) standard errors in parentheses. Good YTD Net Income is a dummy variable equal to 1 if current net income through three quarters exceeds prior-year net income through three quarters, based on quarterly data from 1987-1996 from Compustat Quarterly Files. Total cost include taxes and is defined as revenues less net income.
Table 7

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Chief Executive Officers</th>
<th>Other Top Executives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-417.2</td>
<td>56.9</td>
</tr>
<tr>
<td>Finance (Dummy)</td>
<td>237.1 (2.6)</td>
<td>297.0 (3.5)</td>
</tr>
<tr>
<td>Utility (Dummy)</td>
<td>-131.6 (-1.7)</td>
<td>-111.0 (-1.5)</td>
</tr>
<tr>
<td>Log(1995 Sales)</td>
<td>83.2 (3.4)</td>
<td>15.8 (0.6)</td>
</tr>
<tr>
<td>Median StdDev(Income 92-97) in 2-Digit Industry</td>
<td>—</td>
<td>.889 (4.6)</td>
</tr>
<tr>
<td>External Standard (Dummy)</td>
<td>223.5 (2.6)</td>
<td>218.8 (2.7)</td>
</tr>
</tbody>
</table>

\[ R^2 \]

Sample Size 150 150 911 911

Notes: Performance-standard categories from Towers Perrin’s Annual Incentive Plan Design Survey, 1997. Compensation data are extracted from Compustat’s ExecuComp database. Standard deviations are computed for each executive, and include only executives with at least three years of available data.
Appendix

Companies in Annual Incentive Plan Sample

A. T. Cross Co.
ACX Technologies Inc.
ADC Telecommunications
Adolph Coors Company
Advanced Micro Devices
Air Products & Chemicals
Airborne Freight Corp.
Albemarle
AlliedSignal
Allmerica Financial
Alltel Corp.
American Brands
Ameritech Corporation
AMPorated
Ann Taylor Stores
Applied Power
Apria Healthcare Group
AT&T Corp.
Automatic Data Processing
Avery-Dennison
Avon Products
Bank of Boston Corp.
Bay Networks
Bell Atlantic Corp.
Best Buy Company
BetzDearborn
Bio-Rad Laboratories
Borg-Warner Security
Boston Edison Company
Boston Scientific Corp.
Briggs & Stratton
Bristol-Myers Squibb
Brunswick Corporation
Cabot Corporation
Campbell Soup Company
Cardinal Health Inc.
Carolina Power & Light
Centerior Energy Corporation
Central and South West
Champion International
Charles Schwab Corporation
Chubb & Son Inc.
Church & Dwight Co.
Cincinnati Milacron Inc.
Cinergy Corp.
Citicorp
CMS Energy Corporation
Colgate-Palmolive Company
Comerica Inc.
Comsat
Cowles Media
Cytec
Del Webb Corp.
Delmarva Power & Light
Deluxe Corporation
Detroit Edison
Dexter Corp.
Diamond Shamrock
Dravo Corp.
Air Products & Chemicals
Duke Power Company

Eastern Utilities Associates
Eastman Kodak Company
Ecolab Inc.
Eljer Industries
Enova Corporation
Fingerhut Companies
First Chicago NBD
First Mississippi Corp.
First Union Corp.
Ford Motor Company
Fort Howard Paper
Gap
Genentech
General Mills
General Signal Corporation
Georgia Gulf Corp.
Giant Industries
GPU
GTE
Gulf Power/Southern
Hercules Inc.
Honeywell
John Wiley & Sons
Johnson Controls
Kansas City Power & Light
KeyCorp
Lands’ End
Liz Claiborne
Louisiana Land & Exploration
LSI Logic Corp.
LTV Corporation
Marine Midland Bank
Marriott International
May Department Stores
McDonald’s Corp.
McDonnell Douglas
McGraw-Hill Companies
MCN Corporation
Media General
Medtronic
Merck & Co.
3M
Minnesota Power & Light
NACCO Industries
Nalco Chemical Company
National Semiconductor
National Service Industries
New England Electric System
Newell Co.
Nine West Group Inc.
Northeast Utilities
Northern States Power
Company
Northern Trust Corp.
Norwest Corp.
NYNEX Corporation
Ohio Edison Company
Oracle Corp.
Outboard Marine Corporation
Owens-Corning
PACCAR Inc.
Pacific Enterprises
PECO Energy Company
PepsiCo
Perini Corp.
Pinkertons Inc.
PPG Industries
Premark International
Progressive Corporation
Providence Journal
Providian Corporation
Puget Sound Power & Light
Quaker Oats Company
Quaker State Corp.
Questar Corporation
Reebok International, Ltd.
Robbins & Myers
SCCcorp/So. Cal. Edison
Schering-Plough Corp.
Sears, Roebuck and Company
Service Corp. International
Sherwin-Williams Company
ShopKo Stores
Signet Banking Corporation
Sonoco Products Co.
St. Joseph Light & Power
St. Paul Companies
Stanhope Inc.
Stein Mart Inc.
Stratus Computer
SunAmerica Inc.
Syncor Int’l
Texas Instruments Inc
Texas-New Mexico Power
Texton
Time Warner
Timken Company
Toro Company
Toys R Us
U S West Media Group
UGI Corporation
Union Camp Corporation
Union Carbide Corporation
Union Pacific Corp.
Unisys Corporation
United Airlines
United Illuminating Company
United Technologies Corp.
UNUM Corporation
USF&G Corporation
Valero Energy Corporation
Vermont Yankee Nuclear
Power
W. R. Grace & Co.
Wachovia Corporation
Westinghouse Electric Corp.
Westmoreland Coal
Wm. Wrigley Jr. Company