

**Dividing the Pie:
Do Managers Fully Incorporate Non-Contracted Information into Full and
Partial Discretionary Bonus Allocations?**

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Data Availability: Contact the authors

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Research indicates that bonus plans can provide effective incentives when managers use discretion to incorporate non-contracted information into performance evaluations. The use of managerial discretion, however, draws concern about whether non-contracted information is used appropriately in performance evaluations (Baiman and Rajan 1995; Fisher et al. 2005). This paper provides experimental evidence regarding the decision processes through which managers apply discretion in allocating bonus pools. Additionally, we investigate whether the design of the bonus plan affects managers' bonus allocations. Our theory and evidence suggest that managers rely on an anchoring and adjustment heuristic to allocate bonus pools and that the bonus plan type (i.e., whether managers have full or partial discretion) influences managers' choice of anchor information. Regardless of anchor information, managers' subsequent adjustment is insufficient, resulting in a failure to fully incorporate non-contracted information. Even for those managers who do not rely on an anchoring and adjustment heuristic but instead attempt to perform comprehensive calculations, only those with full discretion fully incorporate non-contracted information.

Keywords: *discretionary bonus plans, anchoring and adjustment, non-contracted information, subjective performance evaluation*

I. INTRODUCTION

An essential role of management is organizational control, or the process of “ensuring that the organization operates in the intended manner and achieves its goals” (Hilton 1994, p. 5). Accountants support managers in this role by providing information that forms the basis of performance evaluation and incentive-based contracting. However, managers also have available to them other relevant information on employees’ performance – that is, information not explicitly contracted on because it represents unforeseen circumstances, cannot be jointly verified, or requires some level of interpretation or judgment. To incorporate this “non-contracted” information into incentive compensation systems, firms often allow managers some degree of discretion in determining their subordinates’ compensation. This paper investigates the processes by which managers apply their discretion and the degree to which they incorporate non-contracted information into their compensation decisions.¹

It is important to understand the use of discretion in evaluation and compensation decisions, because while discretion allows for the inclusion of more information, it can create problems. For example, a large body of research examines the effects of favoritism, which can undermine cooperation, trust, and ultimately performance (e.g., Prendergast and Topel 1993). Further, even if managers are unbiased in their evaluations, cognitive limitations may prevent managers from appropriately considering non-contracted information. Only by understanding concerns such as these can firms balance the costs and benefits of discretion and arrive at optimal compensation policies.

We examine discretion as it applies to the allocation of bonus pools, a compensation tool commonly used for employees at various levels of organizations. Although the size of the bonus

¹ Although we state this research question in terms of firm managers evaluating employees, the same question applies to compensation committees who evaluate the performance of CEOs and other executive level employees.

pool (in dollars) is typically based on some pre-determined formula, firms usually allow for some discretion in the allocation of the pool among participants (Murphy and Oyer 2003). In addition to investigating the process by which discretion is applied, we investigate whether the design of the bonus plan affects managers' allocations. Specifically, some plans allow managers full discretion in allocating the bonus pool, whereas other plans allow discretion over only a portion of the pool, with the remainder contractually allocated by formula. This study examines whether the design of the bonus plan (i.e., full vs. partial discretion) influences managers' use of non-contracted information in making allocation decisions and, thus, the degree to which bonus allocations appropriately reward performance.

We investigate our research questions using a 2 x 2 between-subjects experimental design, which we replicate across two contextual settings. Graduate business student participants take the role of a firm president who must allocate a bonus pool between two division managers, based on performance information. We manipulate overall division performance (overstated, understated) by varying the valence of a subset of non-contracted information, and examine the degree to which this non-contracted information influences discretionary bonus allocations. We also manipulate the bonus plan type (full discretion, partial discretion) such that participants with full discretion allocate the entire bonus pool and participants with partial discretion allocate half the bonus pool, with the remainder allocated based on division profit. The two contextual settings address two different sources of non-contracted information – an opportunity cost and an idiosyncratic environmental shock.

Across both contextual settings, we find that while participants recognize the importance of the non-contracted information, they have difficulty fully incorporating that information into their bonus allocations. This difficulty arises from two sources. First, most participants rely on an

anchoring and adjustment heuristic to allocate discretionary bonus pools, as opposed to more formally integrating relevant information via comprehensive calculations. That is, participants rely on either divisional profit or an equal split of the bonus pool as a “starting point,” and then adjust for other relevant information. Because the adjustment tends to be insufficient, the result is that this other (non-contracted) information is not fully incorporated into bonus pool allocations. Second, while a small percentage of participants *attempt* to perform comprehensive calculations, only those with full discretion succeed in fully incorporating non-contracted information. Those with partial discretion fail to fully incorporate all relevant non-contracted information into bonus allocations, because incorporating this information is a more complex task with partial than with full discretion. Notably, these results hold even when participants have explicit incentives to thoroughly analyze performance and appropriately allocate the bonus pool.

Our study contributes to the growing literature on subjective performance evaluation and, more specifically, to the literature considering the benefits and costs of discretionary bonus pools (e.g., Baiman and Rajan 1995; Ittner et al. 2003; Fisher et al. 2005). In particular, by examining managers’ failure to fully incorporate non-contracted information into discretionary bonus pool allocations, we develop an understanding of potential obstacles and costs of managerial discretion. Beyond developing academics’ understanding of such influential factors, our study is important to managers and accountants developing and implementing incentive systems using discretionary bonus pools. Our research sheds light on factors that preclude full incorporation of relevant non-contracted information, ultimately circumventing intended benefits of managerial discretion. In addition, we contribute to recent anchoring and adjustment psychology literature (Epley and Gilovich 2004, 2006), specifically documenting managers’ propensity to anchor and insufficiently

adjust despite employing a scenario outside the traditional anchoring and adjustment research paradigm.

The remainder of this paper is organized as follows. The next section reviews the relevant literature and develops our hypotheses. The third section describes the experimental method while the fourth section reports results. The last section discusses implications for research and practice.

II. THEORY AND HYPOTHESES

Discretionary Bonus Plans

The purpose of *discretionary bonus plans* – compensation systems that endow managers decision rights over bonus allocations to employees – is to mitigate costs associated with incomplete contracts. Contracts are often incomplete as they exclude information that is not verifiable, is subjective and too costly to convert to contractible form, or reflects unforeseen circumstances. A discretionary bonus plan allows managers to incorporate such relevant non-contracted information into bonus pool allocation decisions. Managerial discretion thus creates the opportunity for more informed bonus pool allocations (Murphy and Oyer 2003).

Research in subjective performance evaluation has begun to investigate the benefits and costs of discretionary bonus plans (e.g., Murphy and Oyer 2003; Ittner et al. 2003; Gibbs et al. 2004; Fisher et al. 2005; Rajan and Reichelstein 2006). Benefits of discretionary bonus plans include improved employee motivation (Baiman and Rajan 1995) and a reduction in free-riding (Fisher et al. 2005). On the other hand, potential costs of discretion include undesirable behavior on the part of both managers (e.g., opportunism as discussed in Fisher et al. 2005) and employees (e.g., propensity to “game” the evaluation process as discussed in Prendergrast 1999). Ittner et al. (2003) describe a field study in which managers with discretion inappropriately applied relative

weights to performance measures and inconsistently established and evaluated performance criteria. The firm ultimately eliminated discretion and adopted a purely formulaic bonus plan. Examples such as this one demonstrate the importance of understanding the determinants of discretionary bonus plans' effectiveness. This effectiveness depends on the process by and the degree to which managers incorporate non-contracted information into their bonus pool allocations.

To examine the allocation process, consider a setting where a manager has either full or partial discretion in allocating a bonus pool. In assessing employees' performance and allocating the bonus pool, the manager has available to her various forms of information. We characterize information as *contracted* if it is contractually specified as a basis for allocating a non-discretionary portion of the bonus pool. We characterize all other relevant information as *non-contracted* information. Integrating all relevant (i.e., both contracted and non-contracted) information creates a comprehensive assessment of actual performance. However, integrating this information to arrive at a comprehensive measure of performance can be cognitively difficult for two reasons. First, while attributes of contracted information are often common across employees, some non-contracted information is asymmetrically available across employees (e.g., a manager might know more about the environmental conditions affecting one employee than those affecting another). In such scenarios, individuals tend to focus more on common as opposed to unique attributes, implying that managers may fail to attend to some non-contracted information (Slovic and MacPhillamy 1974; Lipe and Salterio 2000). Second, the scale on which different information cues are measured often differs. For example, while contracted information is often quantitative, some non-contracted information is qualitative or subjective.

When facing cognitively difficult tasks, individuals tend to (consciously or unconsciously) employ an anchoring and adjustment heuristic to reduce cognitive strain (Tversky and Kahneman 1974). In essence, individuals rely on readily accessible information as a “starting point,” and subsequently adjust to estimate a true value (Hastie and Dawes 2001). A generally robust finding is that individuals adjust insufficiently, resulting in final estimates biased in the direction of the anchor value (Hastie and Dawes 2001).² This theory has important implications for managers’ discretionary bonus pool allocations. Specifically, when a subset of managers’ available information serves as an anchor and mitigates integration of other relevant information, the resulting bonus pool allocation over-weights anchor information and thereby under-weights all other relevant information.

Because anchor information, by serving as a starting point, tends to be over-weighted, it is important to understand managers’ choice of anchor information. We expect most managers to anchor on one of two possible values. The first value is a disaggregation of whatever information is used to fund the bonus pool. For example, assuming that a pool shared by multiple division heads is funded as a percentage of corporate profit, managers may use each division’s profit as a starting point for the bonus pool allocation. The second possible value is an equal (50-50) split of the bonus pool. In the next section, we discuss the potential influence of the bonus plan design (i.e., full or partial discretion) on anchor choice.

Full vs. Partial Discretion – Anchoring and Adjustment

When managers have full discretion over the bonus pool allocation, it is difficult to predict the information on which they will anchor. One possibility is for managers to anchor on a

² This finding is generally robust to incentives to expend effort, as well as a variety of other factors (see Hastie and Dawes (2001, 100-102) for discussion).

disaggregation of the information used to fund the bonus pool. It is reasonable to expect managers to anchor on this information for two reasons. First, because it is used formulaically in funding the bonus pool, this information is likely readily available and perceived to be a reasonable representation of employees' contribution to the bonus pool. Second, we expect managers to perceive this information – especially when represented by financial accounting information – as sufficiently verifiable or precise.

Another possibility is for managers to anchor on an equal split of the bonus pool. A body of literature from such areas as economics, psychology, and sociology suggests that individuals have strong preferences for equity (e.g., Kahneman, Knetsch, and Thaler, 1986). Even in business settings, in which strong profit motives are often presumed to prevail, equity preferences influence behavior. For example, recent evidence in accounting suggests that negotiated transfer prices tend to deviate away from the outside market price in the direction of a price that would equalize divisional profit (Luft and Libby 1997, Kachelmeier and Towry 2002). In summary, managers with full discretion are expected to primarily anchor either on a disaggregation of the information used to fund the bonus pool or on an equal split of the bonus pool, with no *ex ante* prediction of which anchor will be more common.³

When the manager is allowed only partial discretion, the presence of a non-discretionary bonus pool likely influences the choice of anchor. We assume that the non-discretionary portion of the bonus pool is allocated based on a disaggregation of whatever information is used to fund the bonus pool (i.e., this disaggregation is the contracted information).⁴ Because this contracted information is automatically considered in the non-discretionary allocation, managers may feel

³ Other anchors potentially exist (e.g., prior year bonus allocations, 100% for one employee, etc.). However, we focus on the two we expect to be most prevalent.

⁴ As such, the non-discretionary pool is analogous to a setting in which the firm does not explicitly fund a bonus pool, but instead calculates formula-based bonuses by individual. Our assumption is consistent with Murphy and Oyer (2003) who treat the aggregation of these individual bonus arrangements as an implicit bonus pool.

that using this same information as a starting point for the discretionary allocation may overstate the importance of such information. For example, if the bonus pool is funded as a percentage of corporate profit and the non-discretionary portion of the pool is allocated based on division profit, managers likely will intentionally avoid using division profit as an anchor in determining the discretionary bonus pool allocation. Thus, when endowed with partial discretion, managers are more likely to anchor on an equal split of the discretionary bonus pool.

Importantly, regardless of the anchor, we expect managers to insufficiently adjust for all other relevant information. The result is that non-contracted information (other than that serving as the anchor) will not be fully incorporated into discretionary bonus pool allocations. Below, we present the first three hypotheses, related to the use of an anchoring and adjustment heuristic for the allocation of discretionary bonus pools

- H1: Managers will use an anchoring and adjustment heuristic to arrive at bonus pool allocations.
- H2: Managers are more likely to anchor on an equal-split when they have partial discretion than when they have full discretion.
- H3: Managers who anchor and adjust will not fully incorporate relevant non-contracted information in bonus pool allocations.

It is not altogether clear that Hypotheses 1 through 3 will be supported. Issues noted in recent psychology literature have implications for the application of anchoring and adjustment theory to our setting (Epley 2004; Epley and Gilovich 2004, 2006). One, a majority of prior anchoring and adjustment literature employs a standard design in which participants first consider a comparative assessment (e.g., “is the population of Chicago greater or lesser than 200,000?”), and then provide an absolute estimate of an unknown quantity (e.g., “what is the population of Chicago?”). The task of interest in our scenario does not necessarily reflect these steps. Two,

Epley and Gilovich (2006) suggest the propensity to adjust from an anchor increases when participants self-generate or choose anchor information (as opposed to being provided one or “forced” to make a comparative assessment). It is unclear whether managers will react to the two anchors we expect in this setting as if they are provided or self-generated. For both of these reasons, the empirical question remains whether theory developed from “standard” anchoring and adjustment literature generalizes to a more decision-oriented bonus allocation scenario. In the following section, we describe an alternate decision process that may be used by managers.

Influence of Bonus Plan Design on Comprehensive Calculations

Rather than relying on anchoring and adjustment, managers could attempt a more formal information integration process. While our primary theory rests on the prediction that most managers will *not* engage in more formal integration processes, we acknowledge that some managers will do so. One method by which managers can more formally integrate information is via a comprehensive calculation of a single measure of actual performance. For example, assume that the bonus pool is funded based on corporate profit, and division profit and other relevant non-contracted information is available. The manager can perform a comprehensive calculation by quantifying additional relevant non-contracted information and combining it with division profit to arrive at a revised division profit, a comprehensive measure of *actual performance*.⁵

⁵ It is important to note two issues. One, we assume that all relevant information can and will be translated into division-specific profit, the assumed comprehensive measure of actual performance (i.e., non-contracted information) is quantifiable. This assumption is discussed further in Sections 3 and 4 of the paper. Two, the comprehensive calculation process is different than “anchoring” on division profit and “adjusting” for other relevant non-contracted information. In theory, a comprehensive calculation integrates all relevant information before applying any information to a bonus pool allocation, whereas, an anchoring and adjustment strategy is represented by an application of the anchor to the bonus pool (e.g., 60% of the bonus pool is allocated to Control Devices), followed by an adjustment for additional non-contracted information (e.g., add on an additional 5% for the unforeseen cost fluctuation).

While managers with full discretion need only allocate the total bonus pool according to the comprehensive measure of actual performance, managers with partial discretion must perform an additional step to fully incorporate all relevant information. Recall that when managers have only partial discretion, part of the bonus pool is allocated formulaically. To allocate the *total* bonus pool based on actual performance, managers with partial discretion must take into account the amounts allocated formulaically from the non-discretionary bonus pool. Thus, managers with partial discretion must determine the allocation of the discretionary bonus pool that, when combined with the contractually-determined non-discretionary bonus pool allocation, yields a total bonus pool allocation reflecting actual performance.

The additional complexity that managers with partial discretion face when performing comprehensive calculations may prevent them from fully incorporating non-contracted information. First, the salience of the discretionary portion of the bonus pool is greater than that of the non-discretionary portion. Thus, managers may focus their attention on the discretionary portion of the bonus pool, ultimately ignoring the non-discretionary portion and the need to consider it in the calculation. Second, managers may perceive that the non-discretionary bonus pool is “untouchable.” That is, managers may intentionally avoid “reversing” the non-discretionary bonus allocation.⁶ Thus, despite attempts to perform comprehensive calculations, managers with partial discretion are less likely than managers with full discretion to fully incorporate non-contracted information.

H4: Of those managers who attempt comprehensive calculations to allocate bonus pools, managers with full discretion are more likely than managers with partial discretion to fully incorporate relevant non-contracted information.

⁶ It is interesting to note that managers’ intentional disregard of the non-discretionary bonus potentially occurs despite their inability to actually reduce the non-discretionary bonus.

III. METHOD

Participants and Experimental Design

We recruited graduate students from two business schools at universities in the southeast U.S. to participate in our study. One hundred seventy participants with an average of four years of work experience and five accounting and finance courses completed the experiment.⁷ Sixty-one percent of the participants were male. Given the average work experience and the relevant coursework, these participants are a reasonable proxy for managers who routinely evaluate employee performance. Participants were randomly assigned to experimental conditions.

We use a 2 x 2 experimental design with bonus plan type (partial discretion, full discretion) and division actual performance (overstated, understated) as between-subject factors. Participants were instructed to assume the role of a firm president, review performance information, and allocate a bonus pool between two division managers. Participants were informed that the company had two divisions – Control Devices, which contributed 60% of the annual corporate profit, and Electronics, which contributed 40%. The bonus pool was funded at 1% of annual corporate profit. In the full discretion condition, participants were informed they would distribute the entire bonus pool. In the partial discretion condition, participants were informed they were to distribute 50%, while the remaining 50% was distributed based on division profit (i.e., 60% to Control Devices and 40% to Electronics) (see Appendix 1 for materials).

Manipulation of Actual Performance

We conduct the experiment using two settings. We use these two settings to test the robustness of our theory in different contexts rather than to test different sets of hypotheses. Each

⁷ Five participants were dropped from the final sample. Three participants failed to complete the materials and two participants inadvertently switched the divisions when answering the questions.

setting represents one of two different sources of non-contracted information: opportunity costs and idiosyncratic environmental shocks.⁸

In Setting 1, we manipulate *actual performance* by describing a scenario in which reported division profit, which did not vary by condition, overstated or understated the division's actual performance due to the presence of an opportunity cost. The experimental case contained information indicating that one of the divisions (Control Devices) produced a component that was used in the other division (Electronics). While company policy required that the component be sourced internally and that the transfer price be set at 150% of Control Device's direct manufacturing costs, the case also provided information on the outside market for the transferred component. In the understated-performance condition, the outside market price was above the internal transfer price. That is, the Control Devices' profit was *lower* than it would have been if the division had been trading in the outside market. The difference between the outside market price and the internal transfer price represents an opportunity cost to Control Devices, and this opportunity cost is not captured in the division's profit. Thus, division profit understates the actual performance of Control Devices. Similarly, in the overstated-performance condition, the outside market price was below the internal transfer price, and so division profit overstates actual performance.

In Setting 2, division profit overstated or understated actual performance as a result of cost fluctuations due to unforeseen environmental shocks. In the overstated (understated) performance condition, Control Devices' summary report explained that the division faced an uncontrollable decrease (increase) in the price of copper, a key raw material. Similarly, in the overstated (understated) performance condition, Electronics' summary report explained that the division

⁸ Both settings were based loosely on a case entitled *Bay Industries* (Allen, Brownlee, Haskins, and Lynch, 2005).

faced an uncontrollable increase (decrease) in shipping costs, a key success factor. The reasons for the cost fluctuations were independent across divisions.⁹

A difficulty in empirically investigating issues related to subjective performance evaluation is the inherent lack of normative criteria against which participants' judgments and decisions can be compared (see Lipe and Salterio (2000, 295-296) for a related discussion). We mitigate this potential obstacle via three specific aspects of our actual performance manipulation. First, we vary only a subset of the available non-contracted information; all other available case information is held constant across experimental conditions. Second, we have purposefully developed a scenario in which a comprehensive measure of actual performance can be created (i.e., the manipulated non-contracted information can be quantified and incorporated with division profit to arrive at revised division profit).¹⁰ Third, we have intentionally excluded previous period financial information, current period budgets, and forward-looking measures to increase the salience of (revised) division profit as an appropriate comprehensive measure on which to base bonus pool allocations. We compare the difference in participants' actual bonus allocations across experimental conditions to differences in this comprehensive measure of actual performance, in order to determine the extent to which they incorporate the manipulated non-contracted information.

⁹ Note that in both settings, whenever Control Devices' profit is overstated, Electronics' profit is understated, and vice versa.

¹⁰ Whereas in real-world settings it is often difficult to quantify non-contracted information, in our two settings, it is possible to fully quantify the manipulated non-contracted information. Thus, observation of participants failing to fully incorporate non-contracted information is a strong test of our theory. Note further that while this information is *quantifiable*, it is not *quantified*, and therefore, does not serve as a natural anchor for allocations.

Benchmarks

We develop several benchmarks to evaluate participants' allocation decisions. In developing these benchmarks, we focus on the percentage allocated to Control Devices. Participants are required to allocate the entire bonus pool to the two divisions, and so the Electronics allocation is a complement to the Control Devices allocation. Thus, no information is lost by focusing only on one division. Also note that for comparability, in the partial discretion condition we calculate the percentage allocation as the total percentage awarded the Control Devices employee from both the discretionary and non-discretionary portions of the bonus pool.

We first calculate a benchmark assuming that the bonus pool allocation is based on the revised division profit (i.e., the manipulated non-contracted information is fully incorporated to arrive at revised division profit, the comprehensive measure of actual performance). We refer to this benchmark as the Fully Incorporated Benchmark (see Appendix 2 for calculations). In Setting 1, when non-contracted information is fully incorporated in the understated (overstated) performance condition, the resulting bonus pool proportion allocated to the Control Devices employee is higher – 72.2% (lower – 47.8%) than the proportion based on division profit (i.e., 60% of corporate profit). The result of this calculation is depicted in Figure 1 as a sloped line connecting the Fully Incorporated Benchmark for Control Devices in each performance condition.¹¹ We can assess whether our participants have fully incorporated the manipulated non-contracted information by comparing the slope of this line (i.e., Fully Incorporated Benchmark) to the slope of the line connecting participants' *actual* Control Devices bonus allocations across experimental conditions. If the actual line is positively sloped, this indicates that participants in

¹¹ The experimental materials were developed to ensure that this Fully Incorporated Benchmark allocation could be achieved in both the full and partial discretion conditions. Specifically, in the partial condition, the non-discretionary portion was never allocated such that one of the division employees received more than he should receive for the total bonus pool if the manager were to fully incorporate the non-contracted information.

the overstated condition are allocating a lower amount to Control Devices than participants in the understated condition, which implies that participants are attending to the manipulated non-contracted information that differed across experimental conditions. A slope equal to that of the Fully Incorporated Benchmark indicates that participants have fully incorporated that information.

In Setting 2, we again develop a Fully Incorporated Benchmark which represents a full incorporation of non-contracted information. Recall that the manipulated non-contracted information in Setting 2 is due to idiosyncratic environmental shocks, resulting in uncontrollable cost fluctuations. Because participants may not view cost fluctuations as completely uncontrollable, we further adjust the Fully Incorporated Benchmark to include participant controllability assessments. Participants were asked to assess on a scale of 0 (not at all) to 100 (a great deal) the extent to which cost fluctuations were under the manager's control. We incorporated these assessments by adjusting the Fully Incorporated Benchmark for these controllability assessments. As calculated in Appendix 2 and depicted in Figure 1, adjusting for controllability assessments in the understated (overstated) performance condition, the Fully Incorporated Benchmark is higher – 68.4% (lower – 44.8%) than the proportion based on division profit (i.e., 60% of corporate profit).

Note that the Fully Incorporated Benchmark varies slightly across the two contextual settings. This difference occurs because the adjustment required to calculate revised division profit is symmetric across the two divisions in Setting 1 and asymmetric in Setting 2. The symmetry of Setting 1 is inherent to the transfer pricing setting. For Setting 2, it would have been possible to create a scenario in which the environmental shocks facing the two divisions were symmetric, but this would have detracted significantly from the scenario's realism.

In addition to the Fully Incorporated Benchmark, we develop three anchor-based benchmarks, which assume participants use an anchoring and adjustment heuristic in allocating discretionary bonus pools (see Figure 1). If the slope of the line connecting the actual allocations across conditions is zero, then participants' bonus allocations are not influenced by non-contracted information that varies across experimental conditions. That is, they base their allocations on anchor information, and do not adjust at all. For instance, a horizontal line connecting a 60% allocation to Control Devices in both overstated and understated conditions represents anchoring on division profit proportion and not adjusting at all for other non-contracted information. Similarly, a horizontal line connecting 50% allocations in both performance conditions represents anchoring on an equal split and not adjusting at all. A final benchmark anchor applies only to the partial discretion condition. Recall that in the partial discretion condition, the non-discretionary bonus pool is formulaically allocated based on division profit. Therefore, if a participant anchors on an equal split for the discretionary bonus pool, the total bonus pool allocation would reflect both an equal split (50%) and division profit (60%). To capture this behavior, we calculate an additional benchmark, resulting in a "mixed" anchor (55% allocation to Control Devices).

- Insert Figure 1 about here -

IV. RESULTS

Overall ANOVA

To test for overall differences, an ANOVA was performed using the percentage of the bonus pool allocated to the Control Devices employee as the dependent measure. Setting (setting 1, setting 2), bonus plan type (full discretion, partial discretion) and actual performance (overstated, understated) are the independent factors.

As reported in Table 1 and depicted in Figure 2, the ANOVA results indicate that neither the main effect for setting ($F = 3.00, p = 0.09$) nor any of the interactions (*lowest* $p = 0.70$) are significant at conventional levels. These results indicate that results do not vary across the two contextual settings.¹² Accordingly, the remainder of our analysis will be based on the combined data from both settings. As would be predicted by the result of this ANOVA, results are inferentially identical if we analyze each setting separately.¹³

- Insert Table 1 and Figure 2 about here -

The ANOVA results indicate significant main effects for actual performance ($F = 38.70, p < 0.01$) and bonus plan ($F = 8.84, p < 0.01$). The main effect for actual performance indicates that participants incorporate non-contracted information into bonus plan allocations to some degree. Specifically, participants allocated a greater portion of the bonus pool to Control Devices when performance was understated (overall marginal mean = 58.1%) than when performance was overstated (overall marginal mean = 51.0%). The main effect for bonus plan indicates that participants incorporate non-contracted information into bonus plan allocations differently depending on the amount of discretion allowed. Participants allocated a greater portion of the total bonus pool to Control Devices with partial discretion (overall marginal mean = 56.2%) than with full discretion (overall marginal mean = 52.8%). We next turn to direct tests of our hypotheses, which provide further insights into these overall effects.

¹² We acknowledge a marginal main effect for setting ($F = 3.00, p = 0.09$). This result is unsurprising, given the slightly different benchmarks in the two settings. This difference biases against getting significant results for Hypotheses 3 and 4, the tests of which are based on a weighted average benchmark, as will be described.

¹³ One exception relates to H2, which examines not the actual allocations, but the difference in anchors across bonus plan design. While the pattern of results is similar in both settings, the difference is significant only in Setting 2.

Tests of Hypotheses

Hypothesis 1

H1 predicts that managers will use an anchoring and adjustment heuristic to incorporate non-contracted information into bonus allocations. Because the bonus allocations do not allow us to make strong conclusions regarding the processes by which managers arrived at these allocations, we test this hypothesis by examining participants' descriptions of their decision processes. As part of the experimental task, participants were asked to describe the thought processes and reasoning behind their bonus allocation decisions. Two of the authors read and classified participant descriptions as one of the following: (1) comprehensive calculation – a decision process that bases allocations on a revised division profit number, calculated by quantifying the effect of the opportunity cost (Setting 1) or idiosyncratic environment shocks (Setting 2), (2) anchoring and adjustment – a decision process that starts at an explicit or implicit anchor and adjusts upward or downward for other information, or (3) did not sufficiently describe a decision process.¹⁴ This coding resulted in an inter-rater reliability score, as measured by Cohen's Kappa, of 0.82. Importantly, to prevent researcher bias from affecting the results, we also validated the authors' coding by comparing it to that of an independent coder. This coding resulted in an inter-rater reliability score of 0.82. Given that a Cohen's Kappa at or above 0.80 generally represents a high degree of agreement (Stokes et al. 2000), we expect the coded classifications to be a reasonable proxy for participants' decision processes.

As reported in Panel A of Table 2, 100 of 170 participants (58.8%) described an anchor-based decision process, 40 of 170 participants (23.5%) described a bonus allocation process based on comprehensive calculation and 30 of 170 participants (17.7%) did not sufficiently describe a

¹⁴ While coding, all coders remained blind to experimental condition and independent coders were blind to hypotheses.

decision process. Ignoring the participants who did not sufficiently describe a decision process, the number of participants anchoring is significantly higher ($\chi^2 = 25.7, p < 0.01$) than the number of participants making comprehensive calculations. These results support H1.

- Insert Table 2 about here -

Hypothesis 2

H2 predicts that managers will use different anchors depending on the bonus plan type (full or partial discretion). Specifically, we predict that managers are more likely to anchor on an equal split when they have partial discretion than when they have full discretion. Again, because bonus allocations do not allow us to make strong conclusions regarding the processes by which managers allocated the bonus pool, we test this hypothesis by examining the process descriptions of those participants identified as using an anchoring and adjustment heuristic.¹⁵

As reported above, 100 participants described an anchor-based decision process. Panel B of Table 2 indicates that 35 of those 100 participants (35.0%) described a division profit anchor while 55 (55.0%) described an equal split anchor.¹⁶ In the full discretion condition, 48.1% (25 of 52) of participants anchored on division profit, whereas 44.2% (23 of 52) anchored on an equal split. Figure 3 provides graphical validation of the coding. Note that the actual allocations in both performance conditions are between the two horizontal lines that represent anchoring on division profit and an equal split. The placement of this line is consistent with roughly half of the participants anchoring on each of these benchmarks.

In the partial condition, 20.8% (10 of 48) of participants anchored on division profit, with 66.7% (32 of 48) anchoring on an equal split. This coding is also validated graphically. As

¹⁵ When the two authors' coding is compared, a inter-rater reliability score, as measured by Cohen's Kappa, of 0.81. When the authors' coding is compared to that of an independent coder, we achieve an inter-rater reliability score, as measured by Cohen's Kappa, of 0.81. Both of measures are above the generally accepted benchmark of 0.80 (Stokes et al. 2000).

¹⁶ The remaining 10 participants (10.0%) identified other anchors.

indicated in Figure 3, the average actual allocations across the two performance conditions straddle the horizontal line that represents anchoring on an equal split, suggesting that the majority of participants anchored on an equal split in the partial discretion condition. The pattern of anchor choices differs significantly across the two bonus plan conditions ($\chi^2 = 7.535, p < 0.01$). Thus, the degree of discretion influences the choice of anchor information, and H2 is supported.

Hypothesis 3

H3 predicts that regardless of anchor, managers will insufficiently adjust bonus allocations for other relevant information, thereby failing to fully incorporate relevant non-contracted information. To test this hypothesis, we compare the bonus allocations of all participants who did not attempt comprehensive calculations to the weighted average Fully Incorporated Benchmark.¹⁷ Because we are combining our two contextual settings, and because the benchmarks are slightly different across the two settings, we use a weighted average Fully Incorporated Benchmark, based on the number of participants in each setting. Specifically, as calculated in Appendix 2, we noted the Fully Incorporated Benchmark for the understated-performance condition was 72.2% in Setting 1 and 68.4% in Setting 2.¹⁸ Since there were 41 participants in the understated-performance condition in Setting 1 and 44 participants in Setting 2, the weighted average benchmark across both settings is 70.2 percent. For the overstated-performance condition, the

¹⁷ For this and the remaining tests, “participants who did not complete a comprehensive calculation” include those participants who were identified as using an anchoring and adjustment heuristic as well as those participants who did not sufficiently describe a decision process. Results are inferentially identical if participants who did not sufficiently describe a decision process are removed.

¹⁸ We report all statistical comparisons to Fully Incorporated Benchmark using this overall weighted average. However, results are inferentially identical if we instead use weighted averages specific to each individual test. For example, if we calculate separate weighted averages for the full and partial participants, these will vary slightly from the overall weighted average, because of small differences in these participants’ controllability assessments. If we conduct the tests for each group based on these different weighted averages, results are inferentially identical to those we report.

Fully Incorporated Benchmark in Setting 1 (Setting 2) is 47.8% (44.7%) and there are 43 (42) participants, yielding a weighted average Fully Incorporated Benchmark of 46.3 percent.

To examine H3, we first point out that a positively sloped line connecting participants' actual bonus allocations across the two performance conditions signals that participants, on average, incorporated non-contracted information to some degree. For example, on a weighted average basis, if participants *fully* incorporated non-contracted information, we would expect to see a difference in allocations across the two performance conditions of 23.9% (i.e., 70.2% - 46.3%). That is, the slope of the line connecting participants' actual allocations across the two performance conditions would be equivalent to the slope of the line representing the weighted average Fully Incorporated Benchmark. Accordingly, we test H3 by comparing the difference in actual bonus allocations across performance conditions to the Fully Incorporated Benchmark.

In the full discretion condition, as reported in Panel A of Table 3 and depicted in Figure 3, the difference in the actual allocations across the two performance conditions is 3.8% (51.1% in the overstated-performance condition versus 54.9% in the understated-performance condition). This 3.8% difference is significantly less than the benchmark difference of 23.9% ($t = 9.2$, $p < 0.01$). In other words, in Figure 3, the slope of the line representing the participants' actual allocations is significantly lower than the slope of the line representing the weighted average Fully Incorporated Benchmark. Thus, we conclude that when participants with full discretion used an anchoring and adjustment heuristic, they insufficiently adjusted from anchor information, thus failing to fully incorporate non-contracted information. H3 is supported in the full discretion condition.

Similarly, as reported in Panel B of Table 3 and depicted in Figure 3, for those participants in the partial discretion condition, the difference in the actual allocations across the two

performance conditions is 4.7% (53.5% in the overstated condition versus 58.2% in the understated condition). This 4.7% difference is significantly less than the benchmark difference of 23.9% ($t = 16.0, p < 0.01$). We conclude that when participants with partial discretion used an anchoring and adjustment heuristic, they insufficiently adjusted from anchor information, thus failing to fully incorporate non-contracted information. H3 is supported in the partial discretion condition.

- Insert Table 3 and Figure 3 about here -

Hypothesis 4

H4 predicts that even when managers attempt comprehensive calculations, managers with partial discretion are less likely than managers with full discretion to fully incorporate non-contracted information because they fail to take into account the non-discretionary portion of the bonus allocation. To test this hypothesis, we examine bonus allocations for participants who attempted comprehensive calculations. We conduct an (untabulated) ANOVA, in which the dependent measure is the total bonus allocated to Control Devices, and the independent variables are the bonus plan type and the performance condition. This ANOVA finds a significant interaction ($F = 7.42, p = 0.02$), suggesting that for those participants who attempted comprehensive calculations, the bonus allocation depends on whether the manager has full or partial discretion. We follow up for both the full and partial discretion conditions by comparing actual allocations to the weighted average Fully Incorporated Benchmark.

As reported in Panel A of Table 4 and depicted in Figure 4, for managers in the full discretion condition, the difference in participants' actual allocations across the two performance conditions is 26.1% (44.1% in the overstated-performance condition versus 70.2% in the

understated-performance condition). This 26.1% difference is not significantly different from the benchmark difference of 23.9% ($t = -0.6, p = 0.54$). In other words, the slopes of the two lines in Figure 4 are not significantly different. These results suggest that participants with full discretion who comprehensively calculate an actual performance measure fully incorporate non-contracted information.

These results are in contrast to those for participants in the partial discretion condition. As reported in Panel B of Table 4 and depicted in Figure 4, for those participants in the partial discretion condition, the difference in participants' actual allocations across the two performance conditions is 13.8% (51.2% in the overstated-performance condition vs. 65.0% in the understated-performance condition). This 13.8% difference is significantly less than the benchmark difference of 23.9% ($t = 5.3, p < 0.01$). In other words, in Figure 4, the slope of the line representing participants' actual allocations is significantly lower than the slope of the line representing the weighted average Fully Incorporated Benchmark. Thus, we conclude that participants with partial discretion who comprehensively calculate an actual performance measure fail to fully incorporate non-contracted information. Taken together, these results support H4, suggesting that when managers attempt comprehensive calculations, those with full discretion are more likely than those with partial discretion to fully incorporate non-contracted information into bonus allocations.

- Insert Table 4 and Figure 4 about here -

Supplemental Data and Analysis

One alternative explanation for our results relates to the lack of incentives provided to participants. The lack of incentives may have increased participants' propensity to engage in the anchoring and adjustment heuristic (i.e., exert minimal cognitive effort) and/or adjust insufficiently from the anchor. While individuals' propensity to employ the anchoring and

adjustment heuristic and adjust insufficiently is generally considered immune to incentives (see Hastie and Dawes (2001) and Epley and Gilovich (2005) for related discussion), we explore this potential explanation via an additional experiment. We provided Setting 2 experimental materials (partial discretion, overstated and understated performance condition) to 40 M.B.A. students (none of whom participated in our first experiment) as a *graded* class assignment. The additional pressure to thoroughly analyze performance and to justify the bonus pool allocation using this analysis provides an explicit incentive to exert cognitive effort in experimental task performance.¹⁹ We chose Setting 2 and the partial discretion condition for this investigation, because these are the conditions where we saw the greatest use of an anchoring and adjustment heuristic. Therefore, by replicating our experiment in a “high stakes” setting, we are giving incentives the best chance to increase effort, reducing reliance on the anchoring and adjustment heuristic. Results of this replication are reported in Figure 5 and are inferentially identical to those from the primary experiment.²⁰ Thus, it does not appear that our experimental results are due to the lack of participants’ incentives to exert cognitive effort.

V. DISCUSSION

The purpose of a discretionary bonus plan is to allow managers to incorporate non-contracted information into bonus pool allocation decisions. While previous research has demonstrated the effectiveness of discretionary bonus plans, this study establishes that managers have difficulty incorporating non-contracted information. Results of this study suggest two

¹⁹ Note that the graded assignment provided incentives to thoroughly analyze performance and justify allocations, but did not suggest that there is a “right answer.” Thus, student participants were provided with a realistic task of subjective performance evaluation.

²⁰ One notable difference across participant pools (unrelated to our hypotheses) is the extent to which participants described their thought processes and reasoning behind their bonus pool allocations. Participants who completed experimental materials as a part of class provided much longer and more organized statements, consistent with incentives argument.

sources of this difficulty. One, managers tend to exhibit behavior consistent with anchoring and insufficient adjustment. That is, managers choose a subset of available information as a “starting point,” and then (insufficiently) adjust for other relevant non-contracted information. Two, even when managers attempt comprehensive calculations to incorporate non-contracted information, they fail to perform additional calculations necessary in the partial discretion scenario. These two sources of difficulty result in managers’ failure to fully incorporate some relevant non-contracted information. Ironically, we find that allowing managers greater discretion can partially mitigate their cognitive biases, leading to allocations that are closer to the theoretically optimal allocation. This result is especially interesting given that most bonus plans do not endow managers with “full” discretion (e.g., Murphy and Oyer 2003).

Our study contributes to the growing literature on subjective performance evaluation and, more specifically, to literature considering the benefits and costs of discretionary bonus pools (e.g., Baiman and Rajan 1995; Ittner et al. 2003; Fisher et al. 2005). We address explicit statements in Ittner and Larcker (1998, p. 228) and Sprinkle (2003, p. 305) concerning the need for research on managerial discretion in performance evaluation. In particular, by examining the failure to fully incorporate non-contracted information into discretionary bonus pool allocations, we develop an understanding of potential obstacles and costs of managerial discretion. Beyond developing academics’ understanding, our study is important to managers and accountants developing and implementing incentive systems containing discretionary bonus pools. Our research sheds light on factors that preclude full incorporation of relevant non-contracted information, ultimately circumventing intended benefits of providing managers discretion.

Our study is subject to several limitations. One, we examine managers’ bonus pool allocation under very specific circumstances (e.g., operationalizing relevant non-contracted

information as quantifiable). Further, as we contend and experimental results suggest, managers' bonus pool allocations are sensitive to bonus plan design. Thus, our theory may not generalize to bonus pool design attributes not explicitly considered in this study. Another potential limitation stems from the fact that we intentionally chose not to provide participants incentives to perform experimental tasks. This design choice is representative of a common managerial scenario – one in which managers are not compensated directly for evaluative tasks. While results were inferentially similar in our limited investigation of the effect of incentives on bonus pool allocations, it is an empirical question (beyond the scope of our study) whether and how incentives to perform evaluative tasks influences managers' subjective performance evaluation.

Our study implicitly establishes future research opportunities. For example, in our Setting 2, participants' assessments of controllability differed when performance was overstated versus understated (results not tabulated). Future research might investigate such asymmetric behavior, and help develop an understanding of the role of accounting information and incentive contracts in determining managers' resistance to "reward" one employee at the "expense" of another. In addition, future research could examine more directly factors beyond the full versus partial discretion distinction that influence anchor information choice. Such research may enhance academics' and practitioners' understanding of the influence of anchor information type on the adjustment process itself. Finally, future research could also examine the behavior of the employees being evaluated. That is, in this study, we investigate potential costs of managerial discretion initiated by evaluators. Future research might investigate costs introduced by employees' reaction to manager-induced inaccuracies (e.g., insufficient adjustment from an anchor, managers' bias, etc.). Such research might shed light on the mechanisms at work in scenarios similar to that described in Ittner et al. (2003).

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TABLE 1
Both Settings - All Participants
ANOVA Results for Actual Bonus Allocations

Panel A: ANOVA Results for Actual Bonus Allocations^a					
<u>Source of Variation</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Setting	166.52	1	166.52	3.00	0.09
Bonus Plan	496.70	1	496.70	8.84	< 0.01
Performance	2174.98	1	2174.98	38.70	< 0.01
Setting x Bonus	8.17	1	8.17	0.15	0.70
Setting x Performance	4.14	1	4.14	0.07	0.79
Bonus x Performance	0.04	1	0.04	0.00	0.98
Setting x Bonus x Performance	0.28	1	0.28	0.01	0.94
Error	9104.03	162	56.20		

Panel B: Means (Std) for Actual Bonus Allocations for Setting 1^a				
		<u>Bonus Plan</u>		<u>Marginal Mean</u>
		<u>Full Discretion</u>	<u>Partial Discretion</u>	
<u>Performance Condition</u>	Overstated Performance	49.8% (8.0) n=21	53.8% (4.4) n=22	51.8%
	Understated Performance	57.4% (11.3) n=20	61.2% (6.1) n=21	59.3%
	Marginal Mean	53.6%	57.5%	

Panel C: Means (Std) for Actual Bonus Allocations for Setting 2				
		<u>Bonus Plan</u>		<u>Marginal Mean</u>
		<u>Full Discretion</u>	<u>Partial Discretion</u>	
<u>Performance Condition</u>	Overstated Performance	48.7% (9.2) n=21	51.6% (4.3) n=21	50.1%
	Understated Performance	55.4% (8.8) n=22	58.5% (5.0) n=22	57.0%
	Marginal Mean	52.1%	55.0%	

^a Bonus allocation is the percentage of the total bonus allocated to the Control Devices employee.

TABLE 2
Both Settings - All Participants
Anchors and Bonus Allocation Decision Process

Panel A: Number (Percent) of Participants by Decision Process and Bonus Plan					
		Decision Processes ^a			
		<u>Anchor</u>	<u>Comprehensive Calculation</u>	<u>Did Not Describe</u>	<u>Total</u>
Bonus Plan	Full Discretion	52 (61.9%)	15 (17.9%)	17 (20.2%)	84 (100.0%)
	Partial Discretion	48 (55.8%)	25 (29.1%)	13 (15.1%)	86 (100.0%)
	Total	100 (58.8%)	40 (23.5%)	30 (17.7%)	170 (100.0%)
Panel B: Number (Percent) of Participants by Anchor and Bonus Plan					
		Anchors ^a			
		<u>Division Profit</u>	<u>Equal split</u>	<u>Other</u>	<u>Total</u>
Bonus Plan	Full Discretion	25 (48.1%)	23 (44.2%)	4 (7.7%)	52 (100.0%)
	Partial Discretion	10 (20.8%)	32 (66.7%)	6 (12.5%)	48 (100.0%)
	Total	35 (35.0%)	55 (55.0%)	10 (10.0%)	100 (100.0%)

^a Both decision processes and anchors are based on coder classification of participants' descriptions of their thought processes and reasoning behind bonus pool allocations.

TABLE 3
Both Settings - Participants Not Using Comprehensive Calculation
Comparison of Weighted Average Fully Incorporated Benchmark to Actual Bonus
Allocations

Panel A: Bonus Allocations and Fully Incorporated Benchmark for Full Discretion			
	<u>Overstated</u>	<u>Understated</u>	<u>Difference</u>
Number of Participants	31	38	-
Weighted Average Fully Incorporated Benchmark ^a	46.3	70.2	23.9
Mean (std) Bonus Allocations ^b	51.1 (8.6)	54.9 (9.3)	3.8
T-test (<i>p-value, two-tailed</i>) ^c			9.2 (<i>p < 0.01</i>)
Panel B: Bonus Allocations and Fully Incorporated Benchmark for Partial Discretion			
	<u>Overstated</u>	<u>Understated</u>	<u>Difference</u>
Number of Participants	28	33	-
Weighted Average Fully Incorporated Benchmark ^a	46.3	70.2	23.9
Mean (std) Bonus Allocation ^b	53.5 (4.4)	58.2 (4.8)	4.7
T-test (<i>p-value, two-tailed</i>)			16.0 (<i>p < 0.01</i>)

^a Weighted Average Fully Incorporated Benchmark is the weighted-average of the Fully Incorporated Benchmark from Setting 1 (adjusted for non-contracted information) and the Fully Incorporated Benchmark from Setting 2 (adjusted for non-contracted information and controllability assessments). See Appendix 2 for calculation.

^b Bonus allocation is the percentage of the total bonus allocated to the Control Devices employee.

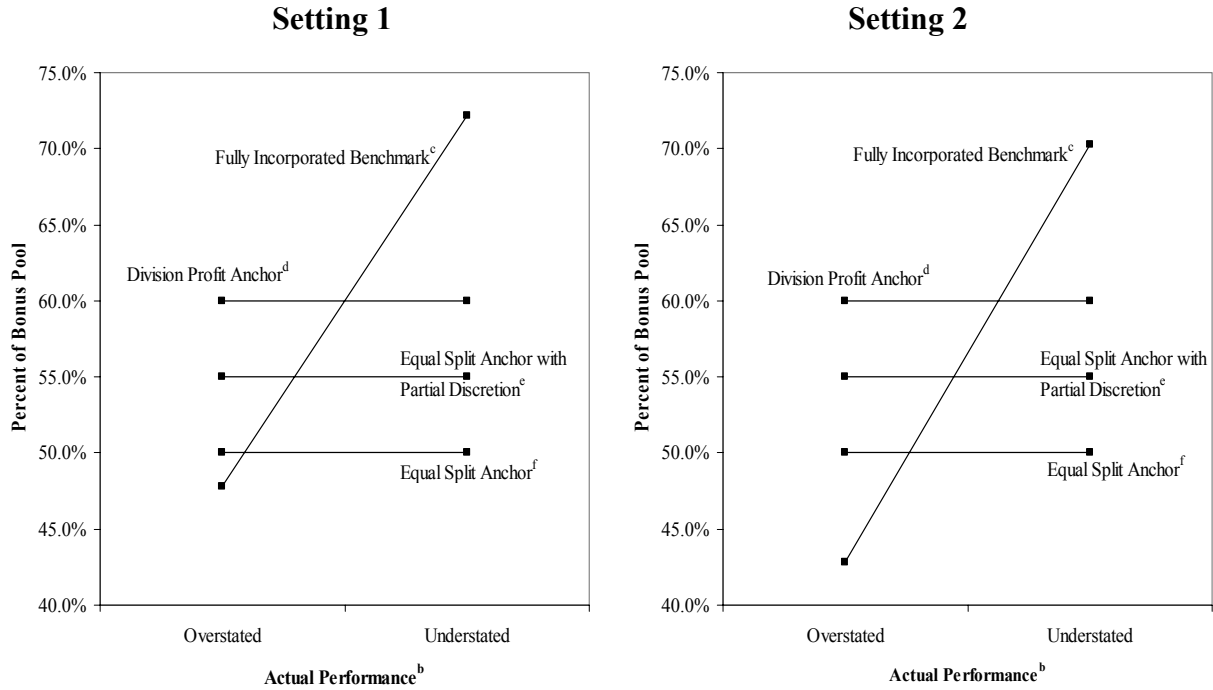
TABLE 4
Both Settings - Participants Using Comprehensive Calculation
Comparison of Weighted Average Fully Incorporated Benchmark to Actual Bonus
Allocations

Panel A: Bonus Allocations and Fully Incorporated Benchmark for Full Discretion			
	<u>Overstated</u>	<u>Understated</u>	<u>Difference</u>
Number of Participants	11	4	-
Weighted Average Fully Incorporated Benchmark ^a	46.3	70.2	23.9
Mean (std) Bonus Allocations ^b	44.1 (6.3)	70.2 (4.2)	26.1
T-test (<i>p-value, two-tailed</i>)			-0.6 (0.54)
Panel B: Bonus Allocations and Fully Incorporated Benchmark for Partial Discretion			
	<u>Overstated</u>	<u>Understated</u>	<u>Difference</u>
Number of Participants	15	10	-
Weighted Average Fully Incorporated Benchmark ^a	46.3	70.2	23.9
Mean (std) Bonus Allocations ^b	51.2 (4.2)	65.0 (5.2)	13.8
T-test (<i>p-value, two-tailed</i>)			5.3 (<i>p < 0.01</i>)

^a Weighted Average Fully Incorporated Benchmark is the weighted-average of the Fully Incorporated Benchmark from Setting 1 (adjusted for non-contracted information) and the Fully Incorporated Benchmark from Setting 2 (adjusted for non-contracted information and controllability assessments). See Appendix 2 for calculation.

^b Bonus allocation is the percentage of the total bonus allocated to the Control Devices employee.

FIGURE 1
Both Settings – Potential Anchor Benchmarks and Fully Incorporated Benchmark^a



^a For simplicity, only the Control Devices employee is reported.

^b Division profit is equal across conditions but in the overstated-performance condition, the division profit overstates actual performance while in the understated-performance condition, the division profit understates actual performance.

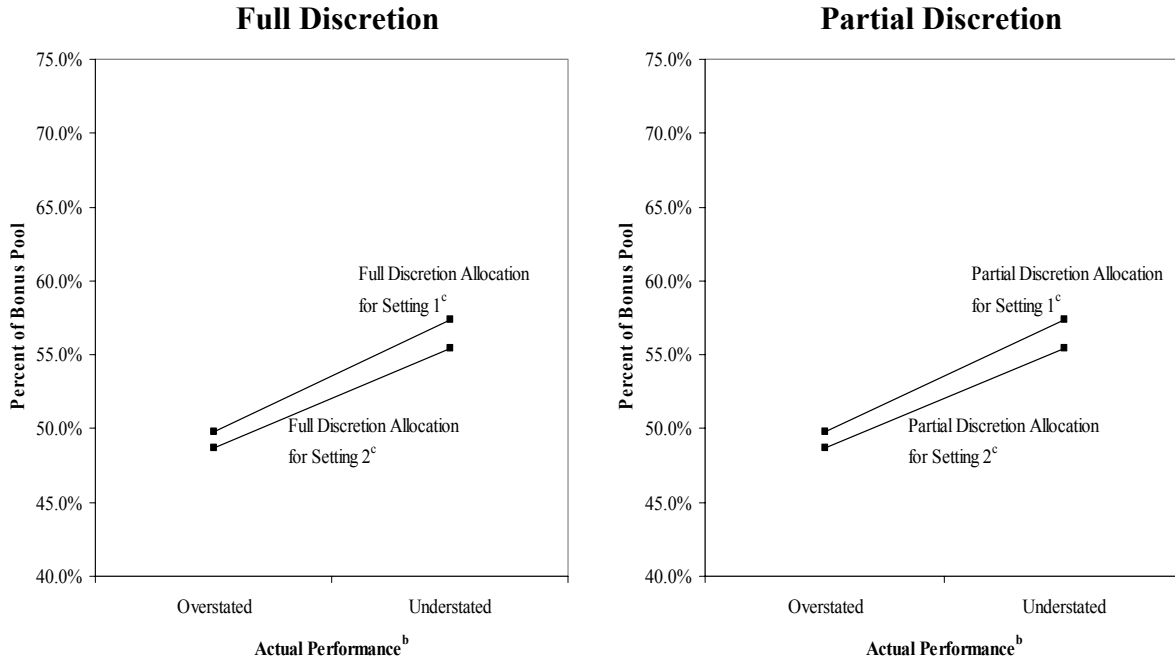
^c The Fully Incorporated Benchmark for Setting 1 adjusts for non-contracted information. The Fully Incorporated Benchmark for Setting 2 adjusts for both non-contracted information and controllability assessments. See Appendix 2 for calculation.

^d Division Profit Anchor represents Control Devices profit as a percent of total corporate profit (60%).

^e Equal Split Anchor with Partial Discretion is half (non-discretionary) profit as a percent of total corporate profit (60%) and half (discretionary) equal split (50%) for 55%.

^f Equal Split Anchor represents a 50/50 split of the total available bonus.

FIGURE 2
Setting 1 and Setting 2 – All Participants
Partial Discretion and Full Discretion Bonus Allocations
with Fully Incorporated Benchmark ^a

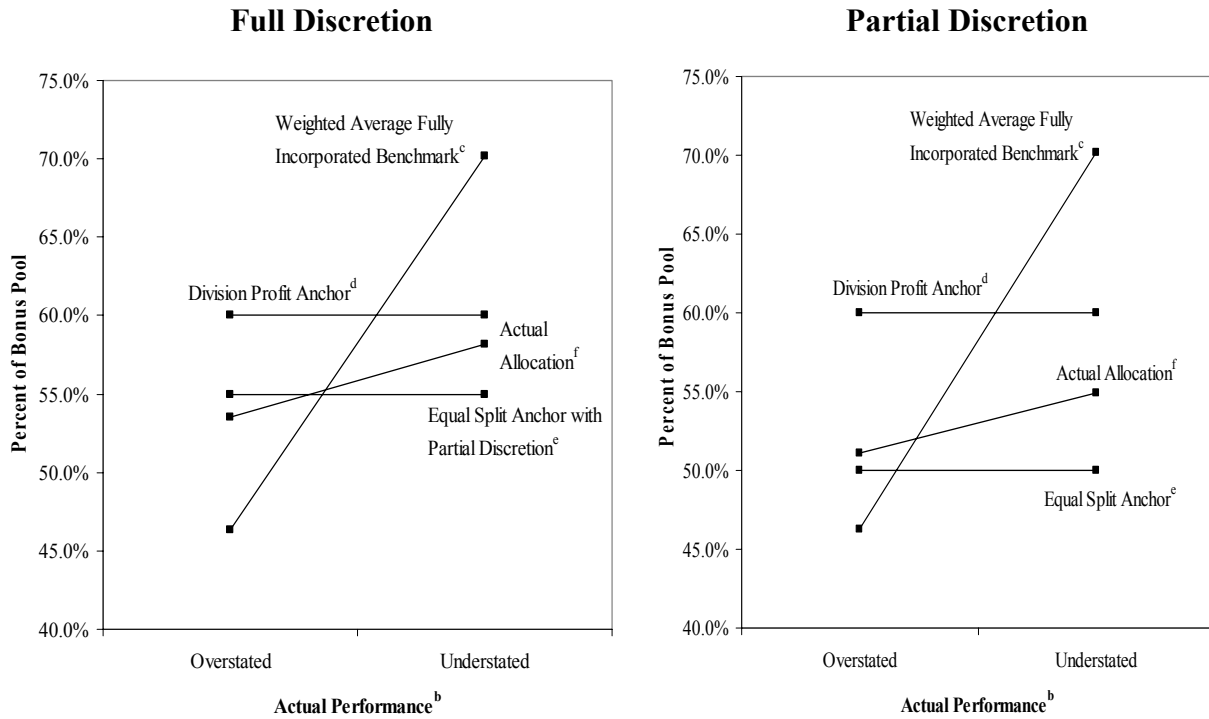


^a For simplicity, only the Control Devices employee is reported.

^b Division profit is equal across conditions but in the overstated-performance condition, the division profit overstates actual performance while in the understated-performance condition, the division profit understates actual performance.

^c Actual Bonus Allocations are the percentage of the total bonus allocated to Control Devices employee.

FIGURE 3
Both Settings – Full and Partial Discretion
Participants Not Using Comprehensive Calculation
Anchors, Weighted Average Fully Incorporated Benchmark and Actual Bonus Allocations ^a



^a For simplicity, only the Control Devices employee is reported.

^b Division profit is equal across conditions but in the overstated-performance condition, the division profit overstates actual performance while in the understated-performance condition, the division profit understates actual performance.

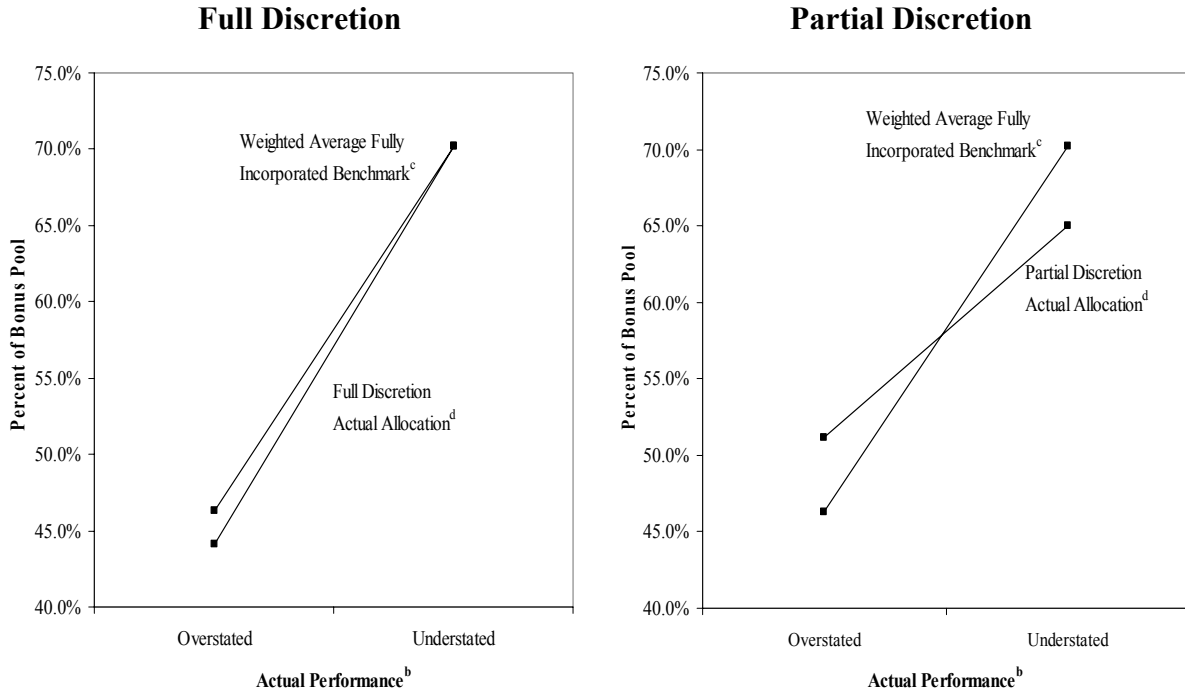
^c Fully Incorporated Benchmark is the weighted-average of the Fully Incorporated Benchmark from Setting 1 (adjusted for non-contracted information) and the Fully Incorporated Benchmark from Setting 2 (adjusted for non-contracted information and controllability assessments). See Appendix 2 for calculation.

^d Division Profit Anchor represents Control Devices profit as a percent of total corporate profit (60%).

^e In the Full Discretion condition, Equal Split Anchor represents a 50/50 split of the total available bonus. Equal Split Anchor with Partial Discretion is half (non-discretionary) profit as a percent of total corporate profit (60%) and half (discretionary) equal split (50%) for 55%.

^f Actual Bonus Allocations are the percentage of the total bonus allocated to Control Devices employee.

FIGURE 4
Both Settings – Full and Partial Discretion
Participants Using Comprehensive Calculation
Weighted Average Fully Incorporated Benchmark and Actual Allocations



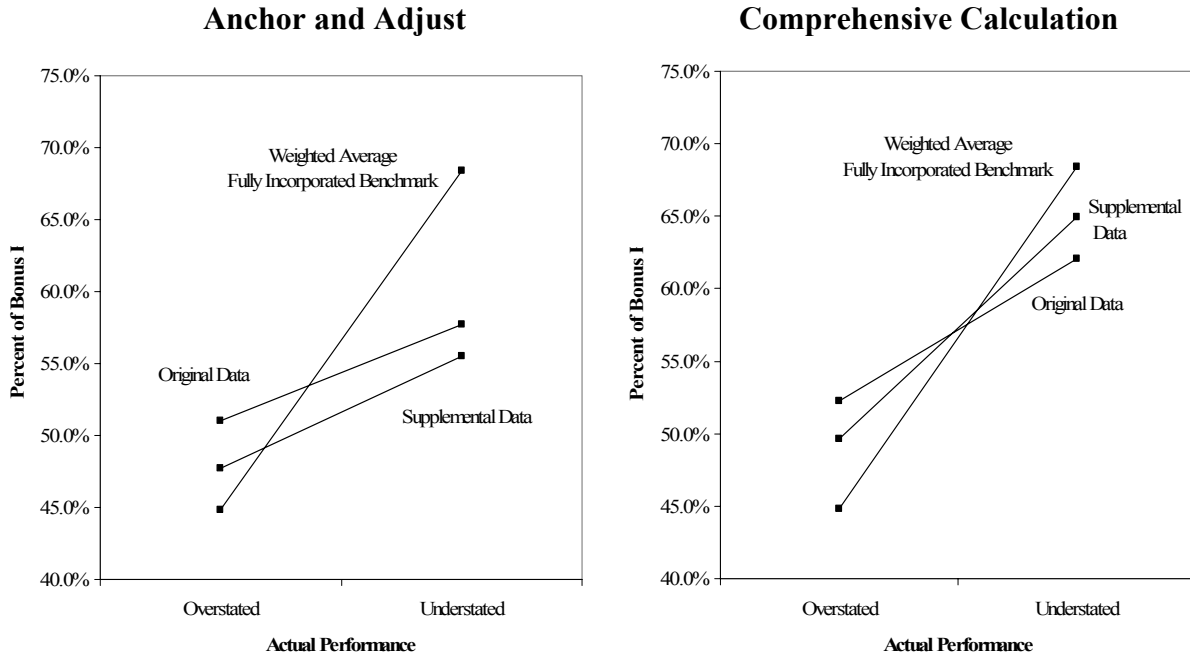
^a For simplicity, only the Control Devices employee is reported.

^b Division profit is equal across conditions but in the overstated-performance condition, the division profit overstates actual performance while in the understated-performance condition, the division profit understates actual performance.

^c Fully Incorporated Benchmark is the weighted-average of the Fully Incorporated Benchmark from Setting 1 (adjusted for non-contracted information) and the Fully Incorporated Benchmark from Setting 2 (adjusted for non-contracted information and controllability assessments). See Appendix 2 for calculation.

^d Actual Bonus Allocations are the percentage of the total bonus allocated to Control Devices employee.

FIGURE 5
Setting 2 – Partial Discretion
Data from Original and Supplemental Participants
Weighted Average Fully Incorporated Benchmark and Actual Allocations



^a For simplicity, only the Control Devices employee is reported.

^b Division profit is equal across conditions but in the overstated-performance condition, the division profit overstates actual performance while in the understated-performance condition, the division profit understates actual performance.

^c Weighted Average Fully Incorporated Benchmark is the weighted-average of the Fully Incorporated Benchmark from Setting 2 (adjusted for non-contracted information and controllability assessments) for participants in the partial condition from both the original and supplemental samples. See Appendix 2 for calculation.

^d The Original Data refers to actual bonus allocations of participants from the original sample (i.e., used in conducting hypothesis tests).

^e The Supplemental Data refers to actual bonus allocations of participants who completed experiment-case materials as part of a graded assignment.

APPENDIX 1
Excerpts from Experimental Materials
Setting 1 - Partial Discretion, Understated Condition

Company Information

Peninsula Industries, Inc. (hereafter *Peninsula*) is a manufacturing company based in San Diego, California. The company has two divisions: (1) Control Devices and (2) Electronics.

The Control Devices Division, managed by Amy Xavier, manufactures machine controllers for large specialized installations. The Electronics Division, managed by Claire Hadley, manufactures automatic-frequency-control components for many radios and television sets.

Peninsula's corporate strategy is to maximize current profit in order to maintain a strong stock-share price.

In 2004, profit from the two divisions was as follows:

Control Devices Division	\$7,350,000
Electronics Division	<u>\$4,900,000</u>
Total Corporate Profit	\$12,250,000

Bonus Plan Details

Each division manager's compensation includes both (1) a fixed salary and (2) a performance-based bonus.

The two division managers share a bonus pool, which is determined based on overall corporate profit. Specifically, the bonus pool equals 1% of corporate profit.

Because 2004 corporate profit was \$12,250,000, the total bonus pool for the two division managers is **\$122,500**.

One half (i.e., 50%) of the bonus pool is distributed to the two managers based on the divisions' profits. That is, each division manager receives a bonus equal to 0.5% of her division's profit. Based on 2004 profits, this half of the bonus pool will be distributed as follows:

Control Devices (0.5% of \$7,350,000)	\$36,750
Electronics Division (0.5% of \$4,900,000)	<u>\$24,500</u>
Total	\$61,250

The remainder (i.e., other 50%) of the bonus pool (\$61,250) is distributed to the two managers based on your discretion.

You are allowed this discretion to ensure that division managers are compensated based on information not reflected by each division's profit.

DIVISION PERFORMANCE INFORMATION

Activity during 2004

One of the controllers manufactured by the Control Devices Division is a key component of one of the Electronics Division's products – an automated thermostat for airplane cabin temperature systems, referred to as ACTS. Corporate policy, implemented in 2002, requires that the Electronics Division purchases all of its ACTS internally, if they are available. It also requires that the Control Devices Division sell ACTS in the outside market only after internal demand is satisfied. This policy is intended to increase and take advantage of existing synergy among divisions. The mandated, arbitrarily-set transfer price is 150% of the direct manufacturing costs incurred by the supplier division related to the transferred goods. (There is no outside market for most of Peninsula's products, and so market-based transfer pricing is not generally feasible at the firm.)

During 2004, the Control Devices Division transferred 1,573,200 ACTS to the Electronics Division. Per unit information for the transferred ACTS is as follows:

Direct materials	\$ 2.19
Direct labor	<u>3.49</u>
Total direct costs per unit	\$ 5.68
Multiplier	<u>x 1.50</u>
Transfer price	\$ 8.52

In her summary report, Amy Xavier, the manager of the Control Devices Division, noted that had she not had to fill the Electronics Division order, her division would have been able to sell all of the ACTS supplied to the Electronics Division to the outside market for a higher price.

(continued on next page)

Additional Information

In preparation for your meeting with the two division managers, your senior financial analyst, Reese, provided you with the following information:

- Both the Control Devices Division and the Electronics Division operated at full capacity.
- Non-financial performance measures suggest that operating efficiency of both divisions did not fluctuate significantly from the prior year.
- Neither division implemented major changes to processes related to manufacturing, other operations, or marketing.
- For the first time this year, an outside market for ACTS existed. The average market price per ACTS unit during 2004 was \$9.47.

Reese also provided you with summary financial information for the two divisions' overall performance, which is presented below:

	Control Devices Division	Electronics Division	Total
Sales	\$165,298,000	\$90,311,000	\$255,609,000
Cost of Goods Sold	<u>117,362,000</u>	<u>74,565,000</u>	<u>191,927,000</u>
Gross Margin	47,936,000	15,746,000	63,682,000
Operating Expenses	<u>40,586,000</u>	<u>10,846,000</u>	<u>51,432,000</u>
Net Profit	7,350,000	4,900,000	12,250,000

Setting 2
Full Discretion, Overstated Condition

Company Information

Peninsula Industries, Inc. (hereafter *Peninsula*) is a manufacturing company based in San Diego, California. The company has two divisions: (1) Control Devices and (2) Electronics.

Peninsula's corporate strategy is to maximize current profit in order to maintain a strong stock-share price.

In 2004, profit from the two divisions was as follows:

Control Devices Division	\$7,350,000
Electronics Division	<u>\$4,900,000</u>
Total Corporate Profit	\$12,250,000

Bonus Plan Details

Each division manager's compensation includes both (1) a fixed salary and (2) a performance-based bonus.

The two division managers share a bonus pool, which is determined based on overall corporate profit. Specifically, the bonus pool equals 1% of corporate profit.

Because 2004 corporate profit was \$12,250,000, the total bonus pool for the two division managers is **\$122,500**.

The entire bonus pool (\$122,500) is distributed to the two managers based on your discretion.

You are allowed this discretion to ensure that division managers are compensated based on information not reflected in such objective performance measures as corporate profit.

(continued on next page)

DIVISION MANAGERS' REPORTS

What follows are each division manager's summary report for 2004.

Control Devices Division

The Control Devices Division manufactures machine controllers for large specialized installations, as well as numerous smaller installations, in the chemical, paper and petroleum industries. In the mid-1970s, the division had developed and patented an electro-mechanical thrust transmission device that had allowed the division to achieve a large market share. In the last two decades, electronic components had been added to maintain the company's competitive position.

Amy Xavier had managed the Control Devices Division for three years and had done reasonably well. Profit for 2004, however, was higher than the prior year actual amount and expectations. Amy noted that the cost of a key raw material – copper – decreased substantially during 2004. Amy noted that the cost decrease was due to the actions of Mekere Mautoma – an army leader in Bougainville (an island in the eastern portion of Papua New Guinea). In May 2004, Mautoma and his battalion defeated a band of rebels who had illegally controlled and limited supply from the Bougainville copper mine – one of the world's largest mines. Amy had included a copy of an article in the *Wall Street Journal* in her report – the headline was “An Audacious Hero in Papua New Guinea Shakes Copper Market.”

Summary financial information is presented below:

	2004 <u>Actual</u>
Sales	\$165,298,000
Cost of Goods Sold	<u>117,362,000</u>
Gross Margin	47,936,000
Operating Expenses	<u>40,586,000</u>
Net Profit	7,350,000

Your senior financial analyst, Reese, investigated this issue and found that (1) the cost of copper represents 30% of Cost of Goods Sold and (2) the price of copper decreased by 8.9%.

Electronics Division

Historically, the Electronics Division's main product had been an automatic-frequency-control (AFC) component that went into many radios and television sets. Claire Hadley, who had taken over the then moderately profitable division three years earlier, designed a similar component that could be effectively used in cordless, cellular, and digital telephones. The division's competition was mostly from larger companies.

In the Electronics Division's industry, fast delivery was key to satisfying customers. Not only was speed important, but precise delivery time was required by almost all customers to keep their inventory low. In 2004, freight and distribution costs were higher than expected. At the beginning of 2004, the freight and distribution industry experienced a major strike organized by the employees' labor union. A new compensation contract was signed in February 2004, and employees returned to work. The new compensation contract increased labor costs and forced an overall price increase within the freight and distribution industry. Claire included a copy of an article from *The Economist* titled, "How Long Will We Pay Higher Shipping Prices? FOREVER!"

Summary financial information is presented below:

	<u>2004 Actual</u>
Sales	\$90,311,000
Cost of Goods Sold	<u>74,565,000</u>
Gross Margin	15,746,000
Operating Expenses	<u>10,846,000</u>
Net Profit	4,900,000

Your senior financial analyst, Reese, notes that (1) the cost of shipping represents 50% of operating expenses and (2) shipping prices increased by 6.4%.

Primary Questions from both Settings
Partial Discretion Condition

Part A

The 50% of the bonus pool that is under your discretion – which amounts to \$61,250 – is yet to be distributed.

Please write in the amount of money each manager should receive from the second half of the total bonus pool.

Note: It is corporate policy that the entire bonus pool be distributed. Therefore, please ensure that the sum of the two division managers' bonuses sums to \$61,250 exactly.

Amy Xavier – Control Devices Division	_____
Claire Hadley – Electronics Division	_____
Total	\$ 61,250

Part B

Please explain your thought processes and the reasoning behind the bonus allocation decisions you made in PART A.

If applicable, please include in your discussion specific information you considered in making your decisions.

If you need additional paper, please use the back of this sheet or raise your hand.

APPENDIX 2
Sample Calculations
Setting 1

The following represents information provided to participants and comprehensive calculations to fully incorporate non-contracted information in bonus pool allocations in Setting 1.

1. Given Information (all conditions)

	<u>Control Devices</u>	<u>Electronics</u>	<u>Total</u>
Sales	\$165,298,000	\$90,311,000	\$255,609,000
Cost of Goods Sold	<u>117,362,000</u>	<u>74,565,000</u>	<u>191,927,000</u>
Gross Margin	47,936,000	15,746,000	63,682,000
Operating Expenses	<u>40,586,000</u>	<u>10,846,000</u>	<u>51,432,000</u>
Net Profit	7,350,000	4,900,000	12,250,000

2a. Additional Information and Calculation Details – Understated-Performance Condition

In the **understated-performance** condition, participants received the following additional information:

- The mandated transfer price is \$8.52 (1,573,200 units)
- For the first time this year, an outside market for ACTS existed. The average market price per ACTS unit during 2004 was \$9.47.

This information suggests that the Control Devices division would have earned more profit had they been allowed to sell outside and/or sell to the Electronics division at the market price. Further, the Electronics division saved money (i.e., earned a higher profit) due to the mandated transfer price.

The amount by which both divisions' profit should be adjusted is:

$$1,573,200 \times (\$9.47 - \$8.52) = \$1,494,540$$

So the revised division profit information is \$8,844,540 for Control Devices and \$3,405,460 for Electronics. Thus, the allocation based on this revised division profit (i.e., the Fully Incorporated Benchmark) is 72.2% for Control Devices and 27.8% for Electronics.

These allocation percentages result in the following allocations of 100% of the bonus pool:

$$\begin{aligned} \text{Control Devices} &= 72.2\% \times \$122,500 = \$88,445 \\ \text{Electronics} &= 27.8\% \times \$122,500 = \$34,055 \end{aligned}$$

2b. Additional Information and Calculation Details – Overstated-Performance Condition

In the **overstated-performance** condition, participants received the following additional information:

- The mandated transfer price is \$8.52 (1,573,200 units)
- For the first time this year, an outside market for ACTS existed. The average market price per ACTS unit during 2004 was \$7.57.

This information suggests that the Control Devices division would have earned less profit had they been forced to sell outside and/or sell to the Electronics division at the market price. Further, the Electronics division lost money (i.e., earned a lower profit) due to the mandated transfer price.

The amount by which both divisions' profit should be adjusted is:

$$1,573,200 \times (\$8.52 - \$7.57) = \$1,494,540$$

So the revised division profit information is \$5,855,460 for Control Devices and \$6,394,540 for Electronics. Thus, the allocation based on this revised division profit (i.e., the Fully Incorporated Benchmark) is 47.8% for Control Devices and 52.2% for Electronics.

These allocation percentages result in the following allocations of 100% of the bonus pool:

$$\begin{aligned} \text{Control Devices} &= 47.8\% \times \$122,500 = \$58,555 \\ \text{Electronics} &= 52.2\% \times \$122,500 = \$63,945 \end{aligned}$$

3. Sample Partial Condition Adjustment

In the partial condition, one additional calculation is necessary – the original 50% of the bonus pool determined by division profit should be taken into account to determine the 50% the participant is splitting up to yield a final total bonus allocation representing that above.

In the understated-performance condition, the following information applies:

	<u>Control Devices</u>	<u>Electronics</u>
Desired bonus allocation (calculated above)	\$88,445	\$34,055
Non-discretionary bonus allocation (60-40 split)	36,750	24,500

Therefore, to achieve the desired bonus allocation, participants in the **partial** condition need to split the discretionary portion of the bonus pool in the following way:

$$\begin{aligned} \text{Control Devices} &= 88,445 - 36,750 = 51,695 \\ \text{Electronics} &= 34,055 - 24,500 = 9,555 \end{aligned}$$

4. Fully Incorporated Benchmarks

The following figures show the Fully Incorporated Benchmark, calculated as described above, in each of the four conditions.

<u>Condition</u>	<u>Control Devices</u>	<u>Electronics</u>
Full, Understated	88,445	34,055
Full, Overstated	58,555	63,945
Partial, Understated	51,695	9,555
Partial, Overstated	21,805	39,445

Sample Calculations – Setting 2

The following represents information provided to participants and comprehensive calculations to fully incorporate non-contracted information in bonus pool allocations for Setting 2.

1. Given Information

Financial Information (all given)	<u>Control Devices</u>	<u>Electronics</u>
Sales	\$165,298,000	\$90,311,000
Cost of Goods Sold	<u>117,362,000</u>	<u>74,565,000</u>
Gross Margin	47,936,000	15,746,000
Operating Expenses	<u>40,586,000</u>	<u>10,846,000</u>
Division Profit	7,350,000	4,900,000
Percentage of Reported Corporate Profit	60%	40%
Cost Fluctuation Information		
Source of fluctuation (line item)	Copper (COGS)	Shipping (OpExp)
Reported cost as percent of line item	30%	50%
Reported cost (percent x line item)	35,208,600	5,423,000

2a. Additional Information and Calculation Details – Understated-Performance Condition

	<u>Control Devices</u>	<u>Electronics</u>
Direction of fluctuation	Unfavorable	Favorable
Percentage fluctuation	10.9% higher	5.7% lower
Financial impact	\$3,460,539*	(\$327,795)*

* The financial impact (for Control Devices as an example) is calculated via the following:
 $CC \times 1.109 = \$35,208,600$ (where CC is the controllable portion of the cost)
 Solving for CC, $CC = \$35,208,600 / 1.109 = 31,748,061$
 The financial impact is the difference between the controllable portion and reported total:
 $35,208,600 - 31,748,061 = 3,460,539$

Average Controllability Assessment:	21.6%	25.6%
Uncontrollable Portion of Financial Impact (100% - Controllability Assessment) x Financial Impact	\$2,713,063	(\$243,879)

This allows for the calculation of what division profit (and the resulting bonus pool split) would have been absent the uncontrollable cost fluctuation (i.e., division profit adjusted for uncontrollable financial impact):

Revised division profit	\$10,063,063	\$4,656,121
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2b. Additional Information and Calculation Details – Overstated Condition

	<u>Control Devices</u>	<u>Electronics</u>
Direction of fluctuation	Favorable	Unfavorable
Percentage fluctuation	8.9% lower	6.4% higher
Financial impact	(\$3,439,698)	\$326,195
Average Controllability Assessment:	8.7%	14.1%
Uncontrollable Portion of Financial Impact (100% - Controllability Assessment) x Financial Impact	(\$3,140,444)	\$280,202

This allows for the calculation of what division profit (and the resulting bonus pool split) would have been absent the uncontrollable cost fluctuation (i.e., division profit adjusted for uncontrollable financial impact):

Revised division profit	\$4,209,554	\$5,180,202
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3. Sample Bonus Pool Allocations

In the understated-performance condition, for example, Control Devices (Electronics) contributes 68.4% (31.6%) of the total revised profit (corporate profit adjusted for the uncontrollable cost fluctuations):

$$\$10,063,063 + \$4,656,121 = 14,719,184$$

$$\text{Control Devices portion} = \$10,063,063 / 14,719,184 = 68.4\%$$

$$\text{Electronics portion} = \$4,656,121 / 14,719,184 = 31.6\%$$

Thus, the allocation based on the revised division profit (i.e., the Fully Incorporated Benchmark) is 68.4% for Control Devices and 31.6% for Electronics.

$$\text{Control Devices} = 68.4\% \times \$122,500 = \$83,790$$

$$\text{Electronics} = 31.6\% \times \$122,500 = \$38,710$$

4. Sample Partial Condition Adjustment

In the partial condition, one additional calculation is necessary – the original 50% of the bonus pool determined by division profit should be taken into account to determine the 50% the participant is splitting up to yield a final total bonus allocation representing that above.

In the understated condition, the following information applies:

Desired bonus allocation (calculated above)	\$83,790	\$38,710
Non-discretionary bonus allocation (60-40 split)	36,750	24,500

Therefore, to achieve the desired bonus allocation, participants in the **partial** condition need to split the discretionary portion of the bonus pool in the following way:

$$\text{Control Devices} = 83,790 - 36,750 = 47,040$$

$$\text{Electronics} = 38,710 - 24,500 = 14,210$$

5. Fully Incorporated Benchmark

The following figures show the Fully Incorporated Benchmark, calculated as described above, in each of the four conditions.

<u>Condition</u>	<u>Control Devices</u>	<u>Electronics</u>
Full, Understated	83,790	38,710
Full, Overstated	54,880	67,620
Partial, Understated	47,040	14,210
Partial, Overstated	18,130	43,120