

**The Effect of Long-Term Bonus Frame and Perceived Justification Pressure on
Managerial Risk Appetite in a Continuous Monitoring Environment**

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ABSTRACT: Hunton et al. (2008) observed a functional effect of continuous monitoring (real earnings management was eliminated) and a dysfunctional effect (managerial risk appetite was unduly diminished) in a decision context involving intertemporal investment in an ongoing, risky, viable project. The current study examines two interventions aimed at alleviating the dysfunctional effect of continuous monitoring in this environment while retaining the functional effect. A total of 99 experienced managers took part in a between-participant experiment that manipulated long-term bonus frame (gain or loss) and perceived justification pressure (high or low). The findings indicate that managerial risk appetite increased (decreased) when the long-term bonus was framed as a loss (gain), and when perceived justification pressure was relatively low (high). A significant interaction term suggests that the influence of relatively high and low perceived justification pressure on managerial risk appetite was greater in the loss frame than the gain frame. The findings contribute to theory and practice in the areas of bonus framing, justification and continuous monitoring.

Key Words: continuous monitoring, bonus bank, cognitive framing, agency theory, prospect theory, justification, managerial myopia, status quo bias, intertemporal investments.

Data Availability: Data is available upon request.

I. INTRODUCTION

Agency theory suggests that an agent's inclination to engage in myopic decision making can be countered by implementing long-term incentive schemes and behavioral monitoring systems (Jensen and Meckling 1976; Eisenhardt 1985, 1989; Indjejikian 1999). Chow et al. (1995) suggests that incentives and monitoring interact and, thus, should be studied conjointly. Hunton et al. (2008) examined these two control mechanisms in the context of managerial risk appetite toward an ongoing long-term risky project, where risk appetite reflected managers' willingness to investment in and continue with an ongoing, risky, viable project. They found that continuous monitoring, relative to periodic monitoring, eliminated real earnings management, regardless of the short-term or long-term horizon of a bonus scheme—a functional effect. However, when the incentive scheme horizon was long-term and monitoring was performed continuously, managerial risk appetite became so constricted that participants were unwilling to change the current level of investment in the project and unwilling to commitment to continuing or discontinuing the project—a dysfunctional effect. The dysfunctional effect is suggestive of managerial myopia, where individuals are overly focused on short-term results (Merchant and Bruns 1986; Narayanan 1985), and the status quo bias, where individuals resist making changes to the current state (Samuelson and Zeckhauser 1988; Kahneman et al. 1991).

While the use of continuous monitoring¹ in organizations is growing at an accelerating rate (PWC 2006; Krell 2006, Brown et al. 2007), Kiker and Kiker (2008) warn that high-frequency electronic monitoring of this nature can trigger unintended negative side effects, such as reduced performance quality, increased stress, decreased job satisfaction and pronounced risk aversion. Their warning coupled with the dysfunctional effect found in Hunton et al. (2008) suggest that researchers and practitioners need to better understand how continuous monitoring

can be implemented in organizations such that desired objectives are achieved while deleterious side effects are minimized (Hunton et al. 2004, 2007). The purpose of the current study is to test the effectiveness of two intervention strategies in a continuous monitoring environment on managerial risk appetite, with the objective of simultaneously discouraging undue managerial myopia and real earnings management.

The current study involves an unbalanced randomized experiment incorporating a two (bonus frame: gain or loss) by two (perceived justification pressure: high or low) between-participant factorial design; in addition, the experiment included a control condition replicating the “periodic reporting by long-term bonus horizon” treatment in Hunton et al. (2008) to serve as a benchmark, as findings from a follow-up study (Hunton et al. 2009) indicate that the level of managerial risk appetite in this condition was appropriate and consistent with the long-term prospects of the project and interests of the company. A total of 99 experienced corporate managers participated in the experiment. The results indicate that when the bonus was framed as a loss (gain) and when perceived justification pressure was relatively low (high), managerial risk appetite increased, as predicted. A significant interaction term suggests that the difference in managerial risk appetite between low and high perceived justification pressure was greater when the bonus was framed as a loss, relative to a gain, as expected. Also, the level of managerial risk appetite in the “loss frame x low perceived evaluation apprehension” condition was equivalent to the benchmark control group, indicating that the dysfunctional effect found in Hunton et al. (2008) was remedied. Further, real earnings management was not apparent in any of the five treatment conditions, suggesting increased managerial risk appetite did not obtain at the expense of earnings management. Analyses of post-experimental clinical debriefing items indicate that continuous monitoring *per se* does not trigger perceived justification pressure; rather, such

pressure appears to stem from relatively wide dissemination of reports emanating from the continuous monitoring system.

From a theoretical perspective, the results demonstrate the interactive effect of two control mechanisms aimed at increasing managerial risk appetite and thwarting real earnings management, thereby alleviating managerial myopia, in a continuous monitoring environment. The findings suggest that framing performance-based incentives in the loss domain (e.g., bonus bank) can increase managerial risk appetite, even though prior research indicates that managers prefer performance-based incentives in the gain domain (Luft 1994, Church et al. 2008). The analyses also suggest that the status quo bias is reinforced by perceived justification pressure, which is amplified in the context of continuous monitoring. Finally, consistent with Hunton et al. (2008), continuous monitoring appears to negate the temptation to engage in real earnings management to obtain a short-term oriented bonus. From a practical viewpoint, should organizations decide to integrate continuous monitoring into their control systems, they need to be cognizant of potential negative side effects of such monitoring on employees who are being monitored, and take steps to ensure employees that the monitoring system will be used judiciously as an enabling, rather than intimidating, performance feedback mechanism. Section III explains the research method. Section IV offers research results, and the final section discusses the study findings.

II. THEORY AND HYPOTHESES

The problem of managerial myopia has been widely documented in both the academic (Merchant and Bruns 1986; Narayanan 1985) and practitioner (PWC 2008; BCG 2009) literatures. Myopia can be broadly defined as managers' dysfunctional preoccupation with short term results (Narayanan 1985). Dysfunction occurs when managers prefer short-term over long-

term options, when the latter options are more congruent with the long-term interests of the firm. In the current study, we examine why managers appear to act myopically in an environment of continuous monitoring, as reflected by their risk appetite for investing in and continuing with an ongoing, risky, viable project.

Organizational incentive systems that focus on annual performance have been identified as contributors to dysfunctional myopia, as these systems arguably force managers to prioritize immediate over delayed results (Merchant and Bruns 1986; Narayanan 1985; Sliwka 2002). Since managers will strive to maximize the expected value of future bonuses, they will prefer course of actions that result in immediate bonuses over those that result in later bonuses (Shelley and Omer 1996). Moreover, risk-averse managers will prefer courses of actions that result in more certain bonuses relative to riskier bonuses (Shelley 1994). The behavioral economics literature describes the extent to which immediate bonuses are preferred over delayed bonuses by the (explicit or implicit) discount rates that managers apply when calculating expected values of immediate and future rewards (Stevenson 1986). The application of high (low) discount rates thus corresponds with a strong (weak) preference for short-term pay-offs over long-term pay-offs (Thaler 1980; 1981), which reinforces (weakens) managerial myopia.

Long-term incentive schemes and behavioral monitoring systems are two mechanisms that could be used to counter managerial myopia. Each mechanism will likely affect the intertemporal trade-offs made by managers in different ways. Long-term reward structures change the managers' incentive functions, as rewards are based on performance over multiple periods, rather than a single period (Hunton et al. 2008). Lengthening managers' incentive horizons will induce their consideration of future decision outcomes by explicitly tying compensation to such outcomes (Read et al. 1999). Behavioral monitoring systems can counter

myopia in two ways: the monitors (e.g., principals) can identify and block agents' decisions that are judged to be myopic in nature, or the known presence of a monitoring system by agents can trigger realization that the principals are watching and judging their actions, thus agents will be more conscious of making decisions that are consistent with the principals' long-term objectives (Baiman 1990; Frederickson et al. 1999, Feltham and Zie 1994).

Hunton et al. (2008) examined these control mechanisms in combination, attempting to understand how continuous monitoring and the time horizon of performance-contingent incentives would affect real earnings management, and how these mechanisms would influence the managerial risk appetite. Their results indicate that continuous monitoring yielded a functional effect; that is, continuous monitoring, relative to periodic monitoring, eliminated real earnings management, regardless of the short-term or long-term horizon of the incentive scheme. However, when monitoring was continuous and the incentive scheme horizon was long-term, managerial risk appetite was constricted to the point where the managers were frozen in a position of inaction, as they expressed a preference to maintain the status quo. The reduced managerial risk appetite was attributed to continuous monitoring having a strong effect on managers' perceived need to justify their decisions to others (Hunton et al. 2009).

In the current study, we examine the main and interactive effects of long-term incentive scheme framing and perceived justification pressure on managerial risk appetite in a continuous monitoring environment. Our research objectives are to maintain the functional effect of continuous monitoring related to earnings management, while alleviating undue managerial myopia.

Managerial Risk Appetite

The concept of managerial risk appetite is rooted in risk behavior theory, where risk behavior is defined as the degree of uncertainty associated with a given decision or course of action, and risk behavior is a function of risk perception and risk propensity (Sitkin and Pablo 1992). Risk perception reflects the decision-maker's assessment of risk that is inherent in a given situation, and risk propensity reflects the tendency of an individual to engage in risky behavior. According to Sitkin and Pablo (1992), risk perception and risk propensity are directly linked with risk behavior, and risk perception moderates the relation between risk propensity and risk behavior. Further, Sitkin and Pablo (1992) indicate that problem framing (e.g., long term-bonus framing) and social influence (e.g., perceived justification pressure) are formative components of risk perception.

In the current study, we manipulate these two components of risk perception and assess the intention of managers to engage in risky behavior. As articulated by Ajzen (1985), an antecedent to behavior is intention, which reflects one's willingness to act in a certain way (Ajzen 1987). Managers' willingness to avoid or absorb outcome uncertainty is referred to as managerial risk appetite (Carpenter 2000).

Long-Term Incentive Framing

Prospect theory (Kahneman and Tversky 1979) suggests that individuals' preferences for gains and losses are asymmetrical, such that the negative utility or disutility associated with a loss exceeds the positive utility associated with a gain. Prospect theory also indicates that whether options are perceived as gains or losses depends on the reference point used by the decision maker, and different reference points can be stimulated by the manner in which the

choice is presented ('framing') (Shelley 1993). Subsequent studies (Thaler 1980; 1981) show that framing can be achieved by the mere wording of a decision task.

The consequence for managerial decision making is that when people are confronted with an incentive scheme that is framed as a loss (i.e. bonus-minus), they will take more risks (Mittal and Ross 1998; Tversky and Kahneman 1981; Yaari 1986, 1987) and exert more effort (Hannan et al. 2005) to avoid or minimize the loss, relative to an incentive scheme that is framed as a gain (fixed-plus). Studies by Luft (1994) and Church et al. (2008) investigate some immediate consequences of prospect theory to incentive systems. Luft (1994) shows that people are more likely to accept incentive contracts described in bonus terms (gains), than identical contracts described in penalty terms (losses). Church et al. (2008) demonstrate that managers' express higher satisfaction with budget-based incentive systems that are bonus-framed than economically equivalent penalty-framed systems; yet, if goal congruent financial incentives are offered, penalty-framed bonuses will yield greater task motivation.

Thaler (1981) extended prospect theory's prediction about gain-loss asymmetry to intertemporal preferences. In contrast with standard discounted utility theory, which proposes that individuals equalize timing of payments by some constant discount rate (Prelec and Loewenstein 1991), he documents that the (implicit) discount factors individuals apply to future receipts and payments differ. Individuals apply relatively high discount rates to receipts (i.e., gains), suggesting a stronger preference for immediate receipts over future receipts. On the other hand, individuals apply relatively low discount rates to payments (i.e., losses), suggesting a stronger preference for future payments over immediate payments. Several later studies confirmed the asymmetry of intertemporal preferences for economically equivalent yet differently framed options (Stevenson 1992; Shelley 1993, 1994; Ahlbrecht and Weber 1997,

Estle et al. 2006). Overall, these findings suggest that the asymmetrical discount rates individuals use to compare immediate and future cash-flows in the domains of gains and losses can affect managerial myopia in the context of intertemporal investment choices (Loewenstein and Prelec 1992).

In the current study, managers are faced with three choices in the gain domain: they could manage real earnings upward, by reducing the current level of investment in an ongoing project, which would offer realization of an immediate bonus, most likely at the expense of earning multiple risky future bonuses; they could leave the current level of investment unchanged, thus sacrificing an immediate bonus and likely forgoing the realization of multiple risky future bonuses; or, they could risk increasing the current level of investment in the project, which would result in sacrificing an immediate bonus, but potentially realizing multiple risky future bonuses. Evidence from Hunton et al. (2008) suggests that they are not likely to engage in real earnings management, due to the presence of continuous monitoring. Instead, they are more likely to either hold the current level of investment constant, which was evident in Hunton et al. (2008), thereby reflecting no managerial risk appetite (status quo position), or, increase the current level to some extent, which would reflect some level of managerial risk appetite. One question is whether the mean level of managerial risk appetite in the gain domain will be different from the loss domain?

In the current study, managers in the loss domain face three choices as well: they could manage real earnings upward, by reducing the current level of investment in an ongoing project, which would avoid the realization of an immediate loss from a bonus bank that contains the sum dollar value of all potential bonuses that could be realized over the remaining life of the project, most likely at the expense of the remaining bonus bank; they could leave the current level of

investment unchanged, thus absorbing an immediate loss from the bonus bank and likely losing the remaining bonus bank; or, they increase the current level of investment in the project, which would result in absorbing an immediate loss from the bonus bank, but potentially avoiding losing the multiple risky future bonuses that remain in the bank.

The endowment effect will likely play a contributing role in this decision. The endowment effect refers to the notion that individuals value goods and services more after, compared to before, they have established an ownership right to the goods and services (Thaler 1980; Kahneman et al. 1991). The bonus bank concept is one way to confer psychological ownership rights to individuals. In a bonus bank scenario, the sum of all potential bonuses that could be earned over multiple periods are placed into a “bank”, the intent of which is to signal contingent ownership rights to managers, the realization of which takes place once they met or exceed prescribed performance criteria. As time unfolds, should they not meet the performance criteria in a given period, the bonus for that period is deducted from the bank.

The endowment effect is expected to motivate the managers to take actions that are consistent with avoiding loss of the bonus bank. As evidenced in Hunton et al. (2008), the presence of continuous monitoring should avert real earnings management; hence, we do not expect the managers to decrease the current level of investment in the project. The endowment effect is expected to encourage managers in the loss domain to subjectively arrive at a positive cumulative discounted value on the remaining bonus bank. Thus, it is unlikely that they will prefer the status quo position, as this would likely ensure loss of the bank. Rather, we expect that the endowment effect will motivate some degree of managerial risk appetite aimed at not losing the bank.

Considering that individuals typically apply relatively lower discount rates to future probabilistic losses than future probabilistic gains (Stevenson 1992, Estle et al. 2006), coupled with the endowment effect (Thaler 1980; Kahneman et al. 1991) operant in the loss domain, we expect that managers in the loss domain will reveal a larger managerial risk appetite than managers in the gain domain. Accordingly, we posit the following:

H1: Managerial risk appetite will be greater when a long-term performance-contingent bonus scheme is framed as a loss, relative to a gain.

Continuous Monitoring and Perceived Justification Pressure

Continuous monitoring refers to the capability to capture and analyze, in (near) real time, financial and non-financial information flowing through an organization's information systems (Hunton et al. 2008). Continuous auditing refers to the same capability, but also includes some level of assurance over the accuracy and reliability of such information (Alles et al. 2002, 2008). In the current study, we refer to the concept of continuous monitoring.

The demand for continuous monitoring of accounting transactions is growing rapidly due to pressure on those responsible for corporate governance to ensure the reliability and integrity of the internal control system and financial reporting (Flowerday and von Solms 2005; Coderre 2006, Warren and Parker 2003). Rapid advances in information and communication technologies are bringing this need closer to reality (Brown et al. 2007). A recent study by Pricewaterhouse Coopers reveals that 81% of surveyed companies either already have or planning on implementing continuous monitoring processes in their organizations (PWC 2006). The convergence of supply and demand factors for continuous monitoring, coupled with the lack of research in this area regarding how such monitoring might affect the attitudes and behaviors of

agents who are being monitored, suggest that more research in this area is warranted (Hunton et al. 2004, 2007).

Hunton et al. (2008) found that continuous monitoring, relative to periodic monitoring, reduced managerial risk appetite. This was explained as a consequence of risk aversion that continuous monitoring induced on the manager due to relatively high perceived justification pressure (Hunton et al. 2009). When managers take actions that hold long-term effects, the actions themselves are immediately observable, but the quality of the actions is postponed to the future. This can lead to a lower preference for taking risky actions, positions or decisions, as the manager might worry about being perceived by “others” as having made a bad decision, even if the outcome of the decision in the future turns out to be good (Tetlock 1983; Tetlock and Boettger 1994).

Accountability theory suggests that justification pressure arises from an explicit or implicit expectation that one will be required to defend his/her feelings, actions and beliefs to others (Lerner and Tetlock 1999). Perceived justification pressure can influence risky decision-making when an individual’s decisions and the consequences thereof are monitored by others, and subsequent evaluations of others hold potential tangible or intangible consequences (Siegel-Jacobs and Yates 1996; Curely et al. 1986). An influential evaluation of this nature involves managers’ concern over reputational damage stemming from being unfairly judged or second-guessed by others, particularly when the managers feel as though they will have no forum or opportunity to justify their actions (Hirschleifer 1993).

Perceived justification pressure can contribute to a status quo bias (Samuelson and Zeckhauser 1988; Kahneman et al. 1991), where individuals tend to gravitate toward maintaining the status quo unless there is a compelling force evoking a change in the steady state. This

psychological predisposition is similar to another phenomenon termed managerial conservatism (Hirshleifer and Thakor 1992). The potential effects of monitoring on managerial conservatism have been documented for various types and levels of managers. At the strategic level, Hirschleifer (1993) and Hirshleifer and Thakor (1992) find that managers who have incentives to build their reputations are more inclined to invest in safer projects. At the operational level, Kiker and Kiker (2008) present a meta-analysis of findings concerning the relationship between electronic performance monitoring and work-related outcomes. They find that performance monitoring resulted in lower performance quality, especially in complex task environments, as well as in lower job satisfaction and higher stress. Overall, these findings suggest that continuous monitoring can heighten managers' perceived justification pressure, which can lead to increased risk aversion out of fear of harming their reputations.

On the flip side, more frequent monitoring, relative to less frequent monitoring, can have a positive effect on managers' decision quality if such the output of such monitoring serves a valuable performance feedback function between the manager and his immediate supervisor (Hartmann and Slapnicar 2009). Employees will feel more empowered to take risks that are compatible with the long-term interests of the company if they feel as though they will be given a fair chance to justify their decisions at the time they are made, and as the ramifications of such decisions become evident in future periods (Shaw et al. 1995, Geen 1980, 1983). Such justification opportunity is important to risky choice behavior because without the opportunity to defend ones actions to others, individuals tend to resort to safer rather than riskier positions (Tetlock 1983; Lerner and Tetlock 1999). This suggests that the output of a continuous monitoring system (e.g., variance analyses) should be confidential and restricted to a relatively small circle of recipients. Else, if the output is widely distributed to individuals throughout the

organization, decision makers likely will be hesitant to burden too much risk out of fear that others will “arm chair quarterback” their decisions without complete understanding of the decision context, and the decision-makers will feel as though they have to justify their decisions to everyone who is privy to the decision consequences, not just when the decision is made, but as the consequences of the decision unfold over time.

Hunton et al. (2008, 2009) reported experimental findings indicating that perceived justification pressure was dampening managerial risk appetite in the context of continuous monitoring, in large part due to reputational concerns. Examination of their experiment reveals that the distribution of output from the monitoring system (e.g., the continuous monitoring reporting procedure) was sent to the manager’s superior, as well as other corporate managers and peer managers. We suggest that this relatively wide distribution likely elevated perceived justification pressure to a considerably high level, thus freezing them into a status quo position. In this light, we predict the following:

H2: Managerial risk appetite will increase when a continuous monitoring reporting procedure lowers, relative to elevates, perceived justification pressure.

Interaction of Cognitive Framing and Perceived Justification Pressure

Extant evidence suggests that different elements of the control system interact. For example, Chow et al. (1995) found that truthful reporting by managers was the outcome of an interaction between performance monitoring and incentive compensation. Hunton et al. (2008) found that the willingness of managers to continue with and invest in an ongoing risky project was the result of an interaction between monitoring frequency (periodic versus continuous) and incentive scheme horizon (short-term versus long-term). Similarly, we expect that the two control system mechanism examined herein, cognitive frame of the incentive scheme and

perceived justification pressure, will interact. We predict that the difference between the relatively high and low perceived justification pressures will be significantly larger in the loss frame than the gain frame, as next articulated.

When perceived justification pressure is relatively high, managers can be paralyzed into a riskless status quo position (Roca et al. 2006), as evidenced in the gain frame from Hunton et al. (2008), in which managers indicated no risk appetite. In the loss frame, the endowment effect is expected to stimulate an increase in managerial risk appetite, relative to the gain frame; however, the full extent of potential increase is likely to be constrained by the psychological pull of maintaining the status quo (Curley et al. 1986), thereby resulting in a relatively small (guarded) increase in managerial risk appetite in the loss frame, compared to the gain frame.

When perceived justification pressure is relatively low, managers in the gain and loss frames will be released from the grip of maintaining the status quo, thus managerial risk appetite will likely increase, potentially to the limits of the differential implicit discount rates they apply to gaining the future bonuses or losing the bonus bank. Hence, we suggest that the difference in managerial risk appetite between the high and low perceived justification pressures will be greater in the loss frame than the gain frame because asymmetrical discounting between the frames will be relatively unconstrained by the status quo bias in the loss frame. Thus, we predict the following interaction hypothesis:

H3: The differential effect of lower versus higher perceived justification pressure on managerial risk appetite will be greater when a long-term performance-contingent bonus scheme is framed as a loss, relative to a gain.

III. RESEARCH METHOD

We administered an unbalanced randomized experiment that included a two (bonus frame: gain or loss) by two (perceived justification pressure: high or low) between-participants, factorial design, and a fifth control group. The frequency of performance monitoring was held constant at “continuous” in the between-participant design. The control group mirrored one treatment in Hunton et al. (2008), wherein monitoring was periodic rather than continuous, the long-term bonus was framed as a gain, and perceived justification pressure was relatively high. We included the control group as a benchmark because in a subsequent study by Hunton et al. (2009), 61 experienced managers reviewed the case materials and research findings from Hunton et al. (2008) and indicated, among other things, that the risky long-term project was viable and should be supported in the future, and the relatively high level of managerial risk appetite obtained in the “periodic monitoring x long-term incentive” condition in Hunton et al. (2008) was warranted. In the current study, participants made two decisions after reading a project management case scenario, both of which reflected managerial risk appetite.

Case Scenario

The case asks participants to assume the role of a division manager at a publicly traded technology manufacturing company, called ABC Manufacturing.² The division manager reports to the Chief Operating Officer (COO). The case company reported assets of about \$1 billion and net income of approximately \$90 million in the prior year. The case explains that, as a division manager, you actively participate in selecting, managing and evaluating investments in various projects for your division. The case then mentions that the primary measure used to evaluate performance is each project’s three-year moving average return on investment (ROI).

The next section of the case describes an on-going Finger-Print Scanner project that has been assigned to you because the manager who initiated the project recently left the company. The project started at the beginning of 2007 and it is now June of 2009³, thus the project has been underway for 2.5 years. Currently, the three-year moving average ROI for the project will likely be 8% if the project continues as is until the end of 2009. The expected three-year moving average ROI for the project through 2009 is 10%, thus the project is under-performing by -2%.

The case explains that the project has not started off as expected. Product demand has been less than anticipated, mainly because pricing is not as competitive as initially thought due to an actual defect rate (8%) that is higher than originally expected (3%). The manager is told that if (s)he cuts quality control expenditures for the remainder of 2009, product costs will decrease. With these lower costs, the sales price of the product will be reduced, thus unit sales should increase. However, sales-returns in future years will likely increase if quality does not improve. On the other hand, the manager is told that if (s)he increases quality control expenditures for the remainder of 2009, product costs will increase. With these higher costs, the sales price of the product will be increased, thus unit sales should decrease. However, sales-returns in future years will likely decrease if quality actually improves.

The manager is shown a table that explains the likely outcome of reducing, maintaining or increasing quality control expenditures. Reducing expenditures will raise the actual three-year moving average ROI (2007 through 2009) to 11% (1% over the 10% hurdle), maintaining the current level of expenditures will keep the actual three-year moving average ROI at 8% (2% under the 10% hurdle), and increasing expenditures will decrease the actual three-year moving average ROI to 3% (7% under the 10% hurdle). Thus, the manager is confronted with a situation where lowering expenditures will raise the actual three-year moving average ROI above the

expected rate, but likely will harm the long-term interest of the project; doing nothing (status quo) will keep the actual three-year moving average ROI below the expected rate and probably will not change the project's future prospects; and increasing expenditures will reduce the actual three-year moving average ROI below the expected rate even further than doing nothing, but possibly will enhance the long-term interest of the project.

Finally, the manager is told that ABC Manufacturing's internal audit department audits divisions on a continuous basis via a continuous monitoring system, such that divisions are audited at all times. Hence, continuous monitoring is held constant in all conditions, except for the control condition where monitoring is periodic, as described below.

Independent Variables

Perceived Justification Pressure

In the Hunton et al. (2008) study, perceived justification pressure was deemed to be quite high based on the results of post-experimental debriefing questions and a subsequent study (Hunton et al. 2009). Scrutiny of their experimental materials suggests that perceived justification pressure could have been elevated because peer division and other corporate managers were privy to the project variance and control exception reports, along with the manager's immediate supervisor. Participants in the Hunton et al. (2009) study indicated that perceived justification pressure was high because there was an implicit force pushing the managers to feel as though they would have to justify their decisions to everyone on the distribution list, some of whom are not in a position to understand all of the assumptions and contextual conditions leading to the decisions. The procedure explained in Hunton et al. (2008) and replicated in the 'high perceived justification pressure' treatment in the current study reads as follows:

Significant variances and control exceptions are continuously reported to you and your immediate superior (the COO) as they occur, and they are reported to other divisional managers and other corporate managers.

The current study attempts to lower perceived justification pressure by re-stating the reporting distribution procedure in the ‘low perceived justification pressure’ treatment as follows: ⁴

Significant variances and control exceptions are continuously reported to you and your immediate superior (the COO) as they occur.

Bonus Framing

In the Hunton et al. (2008) study, the performance-contingent bonus was framed as a gain, which is similarly framed in the current study as follows:

As a divisional manager you are paid a fixed salary, which is budgeted to increase at an annual rate of 5% from 2010 through 2012). In addition, you can earn a bonus for the Finger-Print scanner project. Bonuses are based on the projects’ actual three-year moving average ROI compared to the project’s expected three-year moving average ROI.

For the Finger-Print scanner project, you will earn a bonus of 30% of your annual salary at the end of each of the four remaining years of the project (2009, 2010, 2011, 2012) if the project's three-year moving average ROI meets or exceeds the expected three-year moving average ROI at the end of each year. If the project's three-year moving average ROI fails to meet or exceed the expected three-year moving average ROI in any given year, you will not receive the 30% bonus.

In the cognitive loss frame, the performance-contingent bonus was described as follows: ^{5,6,7}

As a divisional manager you are paid a fixed salary, which is budgeted to increase at an annual rate of 5% from 2010 through 2012. In addition, you can earn a bonus for the Finger-Print scanner project. Bonuses are based on the projects’ actual three-year moving average ROI compared to the project’s expected three-year moving average ROI.

Your company has just deposited a lump sum of money (equal to 30% of your current 2009 salary and 30% of your projected salaries for 2010, 2011 and 2012) in a trust account in your name. The trust account is maintained by your company’s bank. An amount of money equal to 30% of your salary for a given

year will be withdrawn from the trust account and paid to you at the end of that year (2009, 2010, 2011 and 2012) if the project's three-year moving average ROI meets or exceeds the expected three-year moving average ROI. If the project's three-year moving average ROI fails to meet or exceed the expected three-year moving average ROI in any given year, an amount of money equal to 30% of your salary will be deducted from the trust account and returned to the company. Unless and until the bonus is actually paid to you at the end of a given year, the funds in trust account are neither taxable to you nor do they earn interest.

Control Condition

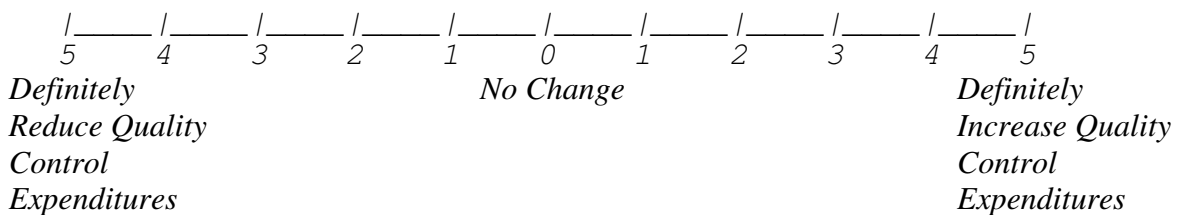
In the control condition, the high perceived justification pressure and gain frame treatments described above were administered, in conjunction with periodic monitoring, which was worded as in Hunton et al. (2008):

ABC Manufacturing's internal audit department audits divisions on a rotating basis such that divisions are audited once every three years.

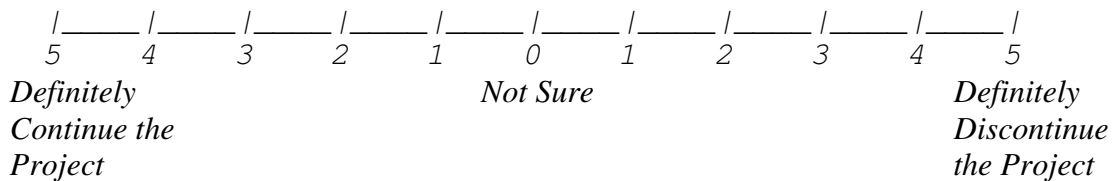
Dependent Variables

The two dependent variables were worded and scaled as follows, as in Hunton et al. (2008):

*Please rate your willingness to change quality control expenditures for the **second half (July through December) of 2009** by placing an "X" at the appropriate place on the scale below.*



Please rate your willingness to continue or discontinue the Finger-Print scanner project by placing an "X" at the appropriate place on the scale below.



Experimental Procedure

Participants were recruited from three educational/training sessions held by an international consulting firm. The topics of sessions one, two and three, respectively, were complying with OSHA safety rules, valuing derivative instruments, and achieving ISO quality and environmental standards. Each session lasted a full day. The sessions were held at three major U.S. cities during June, 2009. At the beginning of each session, attendees volunteered to participate in a study about managerial decision-making.⁸

The session facilitators and one of the researchers handed two sealed envelopes to each participant.⁹ Participants removed the case materials from the first envelope, which included a cover sheet, voluntary consent form, case materials and dependent variable response sheet. After reading the case materials and responding to the dependent variable items, they placed all materials back into and sealed the first envelope. Next, they opened the second envelope, responded to manipulation check and debriefing questions, provided demographic information, and placed all open materials back into the envelope. As an incentive to participate in the study, the researchers provided each participant with a \$50 contribution to the charity of his/her choice. It took participants about 15 minutes to complete the experiment.

IV. RESULTS

Participants

A total of 99 managers participated in the experiment (27 from session one, 44 from session two and 28 from session three, each representing a different company). Descriptive statistics related to the participants are shown on Table 1.

[Insert Table 1 about here]

The mean age (39.22), years work experience (12.28) and years in current position (6.37) suggest that the managers were experienced. There were 62 male managers and 37 female managers. Seventy-three managers held a bachelors degree, and 26 held a master's degree. Most of them described themselves to be in the ranks of middle management (68), while the remaining managers were in upper management (31). Participants worked in the functional areas of general management (18), operations management (36) and finance/accounting/internal audit (45). Seven different industries were represented, with the largest numbers of participants working in transportation (32) and manufacturing (31). Finally, very large-size companies (30), large-size companies (26) and medium-size (30) companies were broadly represented. Statistical analyses indicate that neither the demographic variables shown on Table 1 nor the session number are significantly different across the five treatment conditions (all p-values > .10), suggesting that randomization was effective.

Manipulation Checks

Contextual Conditions

Participants were asked whether the bonus scheme was based on an annual comparison of actual versus expected ROI, or a three-year moving average of actual versus expected ROI. All participants understood that the bonus was calculated on a three-year moving average.

To further examine whether the bonus scheme focused attention on the long-term, we asked participants to respond to the following item: The bonus compensation system (1 = encourages managers to focus on the short-term, 4 = encourages managers to focus on the intermediate-term, 7 = encourages managers to focus on the long-term). The overall mean (standard deviation) was 6.30 (0.81), and the means were not significantly different across the five treatment conditions ($F = 0.16$, $p = .96$).

Next, participants were asked whether they initiated the long-term project or whether they were assigned to an ongoing project. All participants responded that they took over an ongoing project. This variable was included in the experimental materials to avoid any confounding of escalation of commitment with dependent variable responses.

Participants were asked about the significance of the 30% bonus, relative to their total annual compensation (1 = not very significant, 4 = somewhat significant, 7 = very significant). The overall mean (standard deviation) was 6.28 (0.67), and the means were not significantly different across the five treatment conditions ($F = 0.07, p = .99$).

Bonus Frame

One manipulation check question for bonus frame was worded as follows:

With regard to the bonuses, over the remaining four years of the project (2009 through 2012), I feel as though I potentially could (please circle one number on scale below):

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
<i>Lose a large amount of money</i>	<i>Lose a modest amount of money</i>	<i>Lose a small amount of money</i>	<i>Neither lose nor gain money</i>	<i>Gain a small amount of money</i>	<i>Gain a modest amount of money</i>	<i>Gain a large amount of money</i>

ANOVA model results using this item as a dependent variable yielded the following: bonus frame ($F = 634.49, p < .01$), evaluation apprehension ($F = 0.16, p = .70$) and interaction term ($F = 0.06, p = .81$), and means for the gain (5.73) and loss (1.48) frames are in the anticipated direction based on the treatment conditions. Additional testing indicates that the distance from the mid-point of the scale to the gain mean ($5.73 - 4.00 = 1.73$) is significantly smaller ($t = 4.77, p < .01$) than the distance of the loss mean to the mid-point of the scale ($4.00 - 1.48 = 2.51$), suggesting that the subjective utility of the bonus scheme was greater in the loss frame than the gain frame, which is consistent with the differential slopes of the utility curves in each domain as described in prospect theory (Kahneman and Tversky 1979) and the endowment effect (Kahneman et al. 1991).

A second bonus frame manipulation check question asked whether the sum total of all bonuses from 2009 through 2012 were placed into a bonus bank (no or yes). All participants in the gain frame responded “no” and all participants in the loss frame responded “yes”. Based on the results of the manipulation check questions, the bonus frame manipulation was deemed effective.

Perceived Justification Pressure

One of the manipulation questions asked the following:

Aside from the internal audit department, who is privy to significant variances and control exceptions related to the Finger-Print Scanner project (please check one of the options below):

- a. _____ *No one except for me.*
- b. _____ *My immediate superior and me.*
- c. _____ *My immediate superior and me, other divisional managers and other corporate managers.*

All participants in the low justification condition responded with “a” and all participants in the high justification condition responded with “c”, in accordance with their treatment conditions.

Tetlock (1983) indicates that perceived justification pressure is reflected by an individuals’ degree of concern or worry about having to justify their decisions to others. Accordingly, we asked participants the following question:

How would you describe the amount of pressure you feel with regard to having to justify your decisions related to the Finger-Print Scanner to others?

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
<i>No</i>			<i>A moderate</i>			<i>A lot of</i>
<i>Pressure</i>			<i>amount of</i>			<i>pressure</i>
			<i>pressure</i>			

ANOVA model results using this item as a dependent variable yielded the following: bonus frame (F = 0.15, p = .70), justification pressure (F = 125.08, p < .01) and interaction term (F =

1.17, $p = .28$). The means for high (5.62) and low (4.44) justification pressure are in the anticipated direction.

Justification is also indicated by the extent of anxiety and stress related to performance evaluation induced by exposing the consequences of an individual's decisions to other parties, which reflects the individual's level of evaluation apprehension (Tetlock and Boettger 1994).

Thus, we asked the following question to assess perceived evaluation apprehension:

The performance reporting system (please circle one number on scale below):

1	2	3	4	5	6	7
<i>Alleviates anxiety about performance evaluations</i>			<i>Neither</i>			<i>Generates anxiety about performance evaluations</i>

ANOVA model results using this item as a dependent variable yielded the following: bonus frame ($F = 0.01$, $p = .97$), justification pressure ($F = 191.63$, $p < .01$) and interaction term ($F = 1.57$, $p = .21$). The means for high (6.21) and low (3.73) evaluation anxiety are in the anticipated direction.

Another question, identical to the prior one, was asked, except the scale labels were changed to: 1 = decreases stress, 4 = neither, 7 = increases stress. ANOVA model results using this item as a dependent variable yielded the following: bonus frame ($F = 1.52$, $p = .22$), justification pressure ($F = 144.09$, $p < .01$) and interaction term ($F = 0.15$, $p = .70$). The means for high (6.19) and low (3.72) evaluation stress are in the anticipated direction

Finally, we assessed the participants' perceived reputation concern by asking them the following question:

Assume you indicated that you were willing to definitely increase quality control expenditures for the second half of 2009 and you were willing to definitely continue with the project. Had you indicated these high degrees of willingness, how concerned would you have been about potentially harming your reputation in the company?

1	2	3	4	5	6	7
<i>No</i>			<i>Moderate</i>			<i>High</i>
<i>Concern</i>			<i>Concern</i>			<i>Concern</i>

ANOVA model results using this item as a dependent variable yielded the following: bonus frame ($F = 0.42, p = .52$), justification pressure ($F = 126.17, p < .00$) and interaction term ($F = 0.14, p = .71$). The means for high (6.17) and low (3.51) reputation concern are in the anticipated direction.

Overall, results from the manipulation check items suggest that the perceived justification pressure treatment was effective.

Control Condition

Participants responded to a question regarding the frequency of monitoring. Although monitoring was held constant at continuous in the 2x2 conditions, in the fifth control condition, monitoring was treated as periodic (once every three years). The response item read as follows:

Which of the following best describes the frequency with which the internal audit department monitors your performance? (please circle one number on scale below):

1	2	3	4	5	6	7
<i>Once</i>	<i>Annually</i>	<i>Quarterly</i>	<i>Monthly</i>	<i>Weekly</i>	<i>Daily</i>	<i>Continuously</i>
<i>Every</i>						
<i>3 Years</i>						

All participants in the four continuous monitoring conditions responded with a '7', while all respondents in the control condition responded with a '1'. Thus, the monitoring treatment was considered successful in the all five conditions.

Also, in the control condition, the bonus frame was a gain. A one-way ANOVA using the bonus frame manipulation question (above) yielded significance ($F = 167.60, p < .01$). Based on the results of Scheffe multiple pairwise testing ($\alpha = .05$), the control condition mean (5.60) was not significantly different from the gain x low (5.67) or gain x high (5.77) means in the 2x2 conditions, but it was significantly different from the loss x high (1.50) and loss x low (1.47) means in the 2x2 conditions. Finally, all participants in the control condition responded “no” to the bonus bank item. Accordingly, the gain frame manipulation in the control condition was deemed successful.

In the control condition, perceived justification pressure was manipulated as high. A one-way ANOVA using the scaled ‘perceived justification pressure’ manipulation check question (above) yielded significance ($F = 33.89, p < .01$). Based on the results of Scheffe multiple pairwise testing ($\alpha = .05$), the control condition mean (5.40) was not significantly different from the gain x high (5.55) or loss x high (5.70) means in the 2x2 conditions, but it was significantly different from the gain x low (3.28) and loss x low (2.94) means in the 2x2 conditions. Quantitatively and qualitatively similar results were obtained from the scaled question that assessed performance evaluation “anxiety” and “stress” along the seven-point scale.

Finally, a one-way ANOVA model, including all five treatment conditions, was significant ($F = 41.62, p < .01$) on the reputation concern item (above). The results of Bonferroni multiple pairwise testing ($\alpha = .05$) revealed the following pattern of means: 3.39 (gain x low) = 3.63 (loss by low) < 6.14 (gain x high) = 6.20 (loss x high) = 6.26 (control condition). As expected, reputation concern was relatively high when perceived accountability was manipulated to be relatively high, including the control group. Overall, manipulation checks in the control condition were deemed satisfactory.

Preliminary Testing

The dependent variable of interest is managerial risk appetite, which was measured with two response items: (1) willingness to change quality control expenditures and (2) willingness to continue with the project. Item scaling is shown on Table 1, Panel A.¹⁰ The two items are highly correlated ($r = .96, p < .01$); thus, they are averaged to form a managerial risk appetite index.

[Insert Table 2 about here]

A preliminary regression model was run with the dependent variable (managerial risk appetite), independent variables (bonus frame, perceived justification pressure, and bonus frame x perceived justification pressure), and covariates (demographic variables shown on Table 1 along with session number).¹¹ None of the covariates were significant (the lowest p-value (.18) was obtained for years of professional work experience). Accordingly, no covariates are included in the upcoming statistical analyses.

ANOVA analyses for managerial risk appetite are shown on Table 2: Panel B offers descriptive statistics, Panel C reveals the 2x2 ANOVA results wherein statistical results for the H1, H2 and H3 can be found, Panel D displays the results of contrast testing specific to H3, and Panel E presents multiple pairwise comparisons among all five treatment means for purposes of comparing the 2x2 treatment conditions to the benchmark control group. A graphical depiction of the results is presented in Figure 1.

[Insert Figure 1 about here]

Hypothesis One (H1)

The first hypothesis posits that when the bonus is framed as a loss, relative to a gain, managerial risk appetite will increase. The bonus frame treatment is significant ($F = 13.28, p <$

.01) (see Table 1, Panel C), and the main effect means for loss (2.77) and gain (1.55) are in the expected direction. Thus, H1 was supported.

Hypothesis Two (H2)

The second hypothesis asserts that when perceived justification pressure is low, relative to high, managerial risk appetite will increase. The justification treatment is significant ($F = 21.98$, $p < .01$) (see Table 1, Panel C) and the main effect means for low (3.00) and high (1.40) are in the expected direction. Hence, relatively lower perceived justification pressure increased managerial risk appetite, as compared to relatively higher perceived justification pressure, as expected by H2.

Hypothesis Three (H3)

The third hypothesis (H3b) posits that the differential effect of low versus high perceived justification pressure on managerial risk appetite will be smaller when the performance-contingent bonus is framed as a loss, relative to a gain. The significant interaction term ($F = 5.66$, $p = .02$) (see Table 1, Panel C) and the significant contrast test results (see Table 1, Panel D) support H3. The interaction can be visualized on Figure 1.

Control Condition

Finally, we compared the benchmark control condition to the 2x2 treatment conditions. For this analysis, we ran a one-way ANOVA model and then conducted a Bonferroni multiple pairwise comparison test among all five treatment means (see Table 1, Panel E). The control condition mean and the “loss frame x low justification pressure” mean were equivalent, but both means were significantly higher than all other means, which were not significantly different from each other. These findings suggests that managerial myopia and status quo bias created by continuous monitoring, relative to periodic monitoring (as noted in Hunton et al. 2008), can be

alleviated by framing performance-contingent bonuses as losses and instituting performance reporting procedures designed to minimize perceived justification pressure.

Real Earnings Management

One of the dependent variables (willingness to change quality control expenditures) can be examined in isolation to determine whether any of the five treatment means are suggestive of real earnings management attempts. Recall, unless the managers decide to reduce the current level of quality control expenditures, they can not earn the 2009 bonus; thus, real earnings management can be detected by examining whether any means are significantly lower than zero (no change). The five means (standard deviations) for this variable are: gain x high = 1.18 (1.84); gain x low = 1.94 (1.16); loss x high = 1.50 (1.93); loss x low = 3.84 (1.01); and, control group = 2.95 (1.19). The results of t-tests (untabulated), where each mean was compared to zero (middle of the scale, indicating no change in the current level of quality control expenditures) are all positive and significant ($p < .01$), suggesting that real earnings management is not apparent in any of the treatment conditions.

Post-Experimental Debriefing

A final set of post-experiment questions assessed the extent to which the performance monitoring system, as contrasted with the performance reporting system, affects perceived justification pressure. To test this concept, the same two scaled response items related to ‘anxiety’ and ‘stress’ (1 = low, 7 = high) used as manipulation check items for perceived justification pressure (above) were asked, except wording above the scale was changed from “The performance reporting system” to “The performance monitoring system”. The overall means (standard deviations) across all five experimental conditions were 3.71 (1.18) for ‘anxiety’ and 3.75 (0.96) for ‘stress’. One-way ANOVA models (five levels) were non-

significant for anxiety ($F = 0.16$, $p = .96$) and stress ($F = 0.30$, $p = .88$). When these results are compared to the manipulation checks for perceived justification pressure, it appears as though it is not continuous monitoring *per se* that generates higher pressure, relative to periodic monitoring; rather, it seems to be the managers' anxiety and stress over who will be privy to the reporting of performance-related findings arising from the monitoring system.

V. DISCUSSION

This study examines how different modes of two organizational control mechanisms, monitoring and incentives, can affect managers' consideration of long-term and short-term consequences of their decisions. The results suggest that when bonuses are framed as losses (gains) and perceived justification pressure is low (high), managerial risk appetite increases. Further, study results suggest that incentive framing and perceived justification pressure interact, such that the differential effect of high and low perceived justification pressure on managerial risk appetite is greater in the loss frame than the gain frame. Supplemental analyses indicate that risk aversion attributed to continuous monitoring arises not from being monitored necessarily, but from stress and anxiety over who in the organization is privy to the output from the monitoring system.

Findings from the current study complement and extend Hunton et al. (2008) who found functional and dysfunctional effects associated with continuous versus periodic monitoring, and long versus short-term incentive horizons. On the functional side, Hunton et al. (2008) reported that real earnings management was eliminated with continuous monitoring. They spotted real earnings management when the participants were willing to reduce the current level of investment in an ongoing risky project to earn a short-term bonus. In the current study, there was no indication of real earnings management, as participants in all treatment conditions were

willing to either maintain or increase the current level of investment. On the dysfunctional side, participants in the Hunton et al. (2008) study became overly risk averse in light of continuous monitoring and long-term incentives (framed as gains), as they were unwilling to invest more resources into the project and were noncommittal in their willingness to continue or discontinue the project. In the current study, managerial myopia and the status quo bias indicated in Hunton et al. (2008) was alleviated by framing the long-term incentives as losses and lowering perceived justification pressure; thus, the functional effect was retained and the dysfunctional effect was remedied. As a point of reference, we included in our experimental design, a benchmark control condition replicating the treatment condition in Hunton et al. (2008) wherein participants did not engage in real earnings management and indicated the highest level of managerial risk appetite (periodic monitoring by long-term incentives), which was deemed to be appropriate under the circumstances (Hunton et a. 2009). We found that the mean level of managerial risk appetite in the “loss frame by low perceived evaluation apprehension” condition was statistically equivalent to the benchmark control condition, indicating that the managerial risk appetite in this condition was not elevated to an unreasonable level.

These findings have several implications for theory and practice, as managerial myopia is a relevant issue to the management of firms across industries (BCG 2009). First, the results indicate that framing of a contingent-incentive scheme affects the subjective discount rate that managers applied to future bonuses. Understanding incentive-based framing effects of this nature can help principals to counter managerial myopia, which has partially contributed to contemporary financial crises (PWC 2008; BCG 2009). Second, when firms implement a continuous monitoring system, managers should be aware of the perceived justification pressure that can accompany the system and take necessary actions to ensure affected employees that the

system is enabling rather than coercive. Finally, the interactive effect of monitoring and incentive systems on managerial behavior suggests that the design and implementation of management controls requires the parallel consideration of unintended individual, group and organizational ramifications.

The current study is limited in several ways. First, the sample was drawn from participants who enrolled in the seminars offered by a major consulting firm, thus, we do not know the extent to which a self-selection bias affected the study results. Second, the case scenario presented to the participants could limit generalizability of the findings, although we are not drawing inferences directly from the specific task; rather, our inferences arise from underlying theory. Finally, the way in which the bonus bank manipulation was worded in this study likely does not resemble actual bonus bank schemes in business, but a manipulation check indicated that the participants did feel a sense of having been endowed with something valuable that they did not want to lose in this condition, which is the theoretical essence of a bonus bank.

Future research should focus on other ways to maximize the effectiveness of continuous monitoring. For instance, even though we found that a narrowly targeted distribution of output recipients from the monitoring system helped to alleviate perceived justification pressure, such pressure might be further assuaged by informing the monitored agent precisely how the information will be used (e.g., learning and growth or punishment). Also, perhaps those who are implementing the system should clearly inform the monitored individuals as to what actions are being monitored. Finally, future research might examine the types of activities that should and should not be monitored on a high frequency basis, as too much monitoring over certain activities might restrain valued innovation, whereas too little monitoring over other activities might encourage deviant behavior.

ENDNOTES

¹ Continuous monitoring provides external auditors, internal auditors and corporate managers the capability to track, in (near) real time, financial and non-financial information flowing through a company's information systems. Continuous auditing can offer the same features, in addition to providing some level of assurance (Kogan et al. 1999). In the current study, we are referring to the former, as monitoring is performed by internal auditors and no assurance is provided.

² The case background material replicated Hunton et al (2008), except for the omission of some non-diagnostic information. This information was eliminated due to time constraints imposed by the participating consulting firm that provided the participants. The consulting firm insisted that participants should be able to read the case and respond to the questions in about 15 minutes. Participants in the Hunton et al. (2008) experiment took an average of 22 minutes to complete the case. As a test, we administered the exact background material found in Hunton et al. (2008) in conjunction with one of our treatment conditions (gain frame x high evaluation apprehension) to a pilot group of 6 managers (pilot group #1), and it took them an average of 20 minutes to finish. The 6 managers helped the researchers to eliminate extraneous and non-diagnostic information from the case background material. We then re-administered the same treatment condition, along with the more parsimonious background material, to a second pilot group of 8 (different) managers (pilot group #2). It took them an average of 16 minutes to complete the case, which was acceptable to the consulting firm. Managers who read the more parsimonious background material told the researchers that they felt as though they had sufficient information to respond to the case questions. Further, responses from the first and second pilot groups were similar in direction and magnitude.

³ The experiment was administered during June, 2009.

⁴ One could argue that reporting project variances only to the manager himself or herself would beget the lowest level of perceived justification pressure since there would no one to whom the manager would have to justify; however, discussions with members of pilot group #1 (see earlier footnote) suggested that it would be impractical to exclude the manager's supervisor from the distribution list; hence, such exclusion might harm mundane reality of the case. Additionally, pilot group participants all agreed that distributing the project variances to other division managers and other corporate managers definitely heightens perceived justification pressure and, especially with respect to the manager's reputation concern throughout the organization.

⁵ The gain and loss frames were tested and refined using pilot groups #1 and #2 (see earlier footnote). The participants helped the researchers to craft the manipulations to be economically equivalent, and to design the 'loss' frame manipulation to induce a feeling that the participants were endowed with something valuable (the bonus bank) that they did not want to lose.

⁶ A post-experiment supplemental study was conducted using the same independent variables as the current experiment; however, the dependent variable asked participants to think about the bonus portion of the compensation scheme and compare their subjective present value of the 2009 bonus to their cumulative subjective present value of the other three bonuses combined (2010, 2011 and 2012). Next they were asked to respond to the following item: "The three future bonuses combined have _____ to me than the 2009 bonus (1=much less value, 3 = about the same value, 5 = much more value). A total of 23 second-year MBA students participated (gain frame x high justification = 5 participants, and the other three conditions each had 6 participants). The mean (standard deviation) in each treatment was: 1.17 (0.41) gain x high justification; 3.40 (0.55) gain by low justification; 3.33 (0.52) loss x high justification; and 4.83 (0.41) loss by low justification. Results of an ANOVA model are: bonus frame ($F = 83.76$, $p < .01$), justification pressure ($F = 90.07$, $p < .01$) and interaction term ($F = 3.48$, $p = .08$). These findings suggest that the subjective value of the future bonuses, relative to the immediate bonus, is less in the gain x high justification condition, about the same in the gain x low justification and loss x high justification conditions, and more in the loss x low justification condition. This indicates that the implied discount rate applied to the future bonuses was highest in the gain x high justification condition, lower and about the same in the gain x low justification and loss x high justification conditions, and lowest in the loss x low justification condition, as theory would predict.

⁷ A second post-experiment supplemental study was administered to determine whether participants in the loss and gain frames held different beliefs about the firm's assessment of the ultimate likely success of the project. The internal validity concern is that participants in the loss frame might believe that the firm's likelihood is higher than the gain frame, as signaled by the firm's deposit of future bonuses into a trust account (bonus bank). If this is the case, the differential beliefs would potentially confound the outcomes. Twenty-nine experienced managers (14 in the gain frame and 15 in the loss frame) participated in a two treatment study where the gain and loss frames were manipulated. After reading the case materials, they responded to three DV's: (1) It appears as though the COO and other upper-managers believe that the Finger-Print Scanner project ultimately will meet or exceed the overall ROI objective, (2) Regarding the Finger-Print Scanner project, the COO and other upper-managers really want me to continue with the project, and (3) Regarding the Finger-Print Scanner project, the COO and other upper-managers really want me to increase the current level of quality control expenditures for the second half (July through December) of 2009. The response scales for all three DV's was: -5 = strongly disagree, 0 = not sure, 5 = strongly agree. The DV items were highly inter-correlated (Cronbach alpha = .93); thus, they were averaged to form a belief index. The mean (standard deviation) in the gain and loss frames, respectively, were: 1.41 (1.14) and 1.27 (1.37). The means were not significantly different ($t = 0.30$, $p = 0.77$). Hence, the participants' beliefs about the firm's assessment of the ultimate likely success of the project were not different between the bonus frames.

⁸ The research study was administered before the educational/training sessions began to ensure that there would be no potential confound between the experiment and the session topic.

⁹ The experimental treatments were stacked in random order.

¹⁰ The scales did not have negative signs in the experimental materials; rather, the data were coded in this manner for statistical analyses purposes.

¹¹ The independent variables were dummy coded (0,1), as were all nominal demographic variables and session numbers.

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Table 1
Demographic Profile of the Manager Participants (N = 99)

	Mean	Std. Dev.	Minimum	Maximum
Age	39.22	2.54	34	46
Years of professional work experience	12.28	1.91	8	17
Years in current position	6.37	1.74	4	9
	<u>Number</u>			
Gender				
Male	62			
Female	37			
Highest degree obtained				
Bachelors	73			
Masters	26			
Managerial level of current position				
Middle manager	68			
Upper manager	31			
Description of current job function				
General management	18			
Operations Manager	36			
Finance/accounting/internal audit	45			
Industry of current employer (two-digit SIC code)				
Oil & Gas	5			
Construction	12			
Transportation	32			
Manufacturing	31			
Retail	13			
Financial services	3			
Health care	3			
Size of current employer (within industry)				
Very Large	30			
Large	26			
Medium	30			
Small	7			
Very Small	6			

Table 2
Statistical Analyses of Managerial Risk Appetite

Panel C: ANOVA Model of Between-Subjects Effects

Source	<u>S.S</u>	<u>d.f.</u>	<u>M.S.</u>	<u>F-ratio</u>	<u>p-value (two-tailed)</u>
Intercept	378.16	1	378.16	174.28	<0 .01
Bonus Frame	28.80	1	28.80	13.28	< 0.01 (H1)
Justification	47.69	1	47.69	21.98	< 0.01 (H2)
Frame x Justification	12.27	1	12.27	5.66	= 0.02 (H3)
Error	162.74	75	2.17		
Total	617.50	79			

Adjusted R² of the ANOVA model = .33
 Observed power of Bonus Frame = .95
 Observed power of Justification = .99
 Observed Power of the interaction term = .65

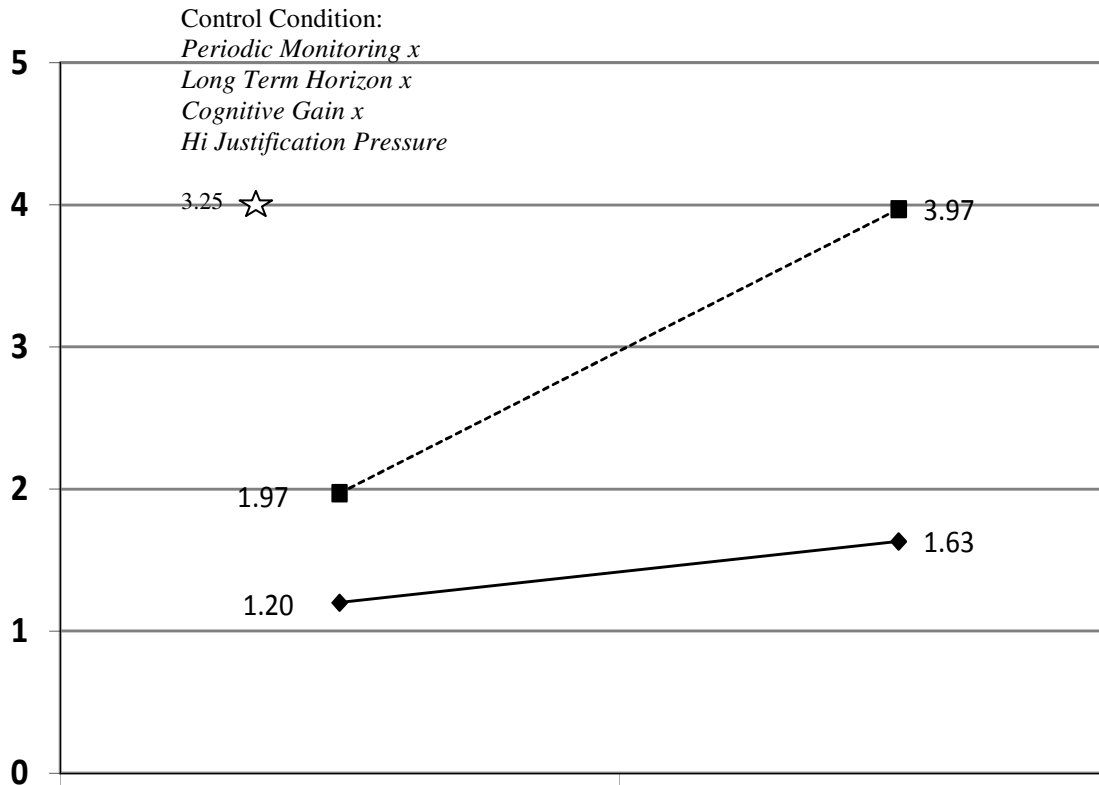
Panel D: Contrast Testing for Interaction Hypothesis H1 (one-tailed p-value)

H3	(Gain x Lo – Gain x Hi)	<	(Loss x Lo – Loss x Lo)	t-statistic	p-value
	(1.97 – 1.20)	<	(3.97 – 1.63)	2.38	= 0.01

Panel E: Bonferroni Pairwise Comparison Test (alpha = .05) [F-ratio = 13.53, p < .01]

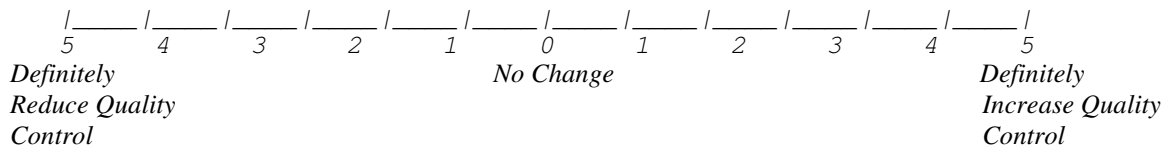
$$\frac{\text{Loss x Lo}}{3.97} = \frac{\text{Control}}{3.28} > \frac{\text{Gain x Lo}}{1.97} = \frac{\text{Loss x Hi}}{1.63} = \frac{\text{Gain x Hi}}{1.20}$$

Figure 1
Graphical Depiction of Managerial Risk Appetite



The two dependent variable items below (reverse coded) were highly correlated ($r = .96, p < .01$); thus, they were averaged to form a Managerial Risk Appetite index, as reflected on the Y axis.

Please rate your willingness to change quality control expenditures for the **second half (July through December) of 2009** by placing an "X" at the appropriate place on the scale below.



Please rate your willingness to continue or discontinue the Finger-Print scanner project by placing an "X" at the appropriate place on the scale below.

