

# Choosing performance measures for incentive compensation: experimental evidence

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## Abstract

**Purpose** – The purpose of this paper is to explain how two task characteristics and two individual differences influence which heuristics individuals use, and as a results explain their decision performance when choosing performance measures (PMs) for incentive compensation.

**Design/methodology/approach** – In total, 76 MS accounting students volunteered to participate in an experiment. A between-subjects experimental design was used to test the hypotheses.

**Findings** – The experimental evidence suggests that individuals, while using high-complexity heuristics, can choose an incorrect PM when PM attribute conflict is present and the difference between PM attribute differences is small. Individuals with high goal commitment are more likely to make the correct choice than individuals with low goal commitment, because they focus more on the PMs' goal congruence than on the PMs' noise when making tradeoffs between the conflicting PMs' attributes.

**Research limitations/implications** – The social context can stimulate individuals' empathic concern and/or goal commitment and thus explain individuals' performance when PM attribute conflict is present and the difference between PM attribute differences is small.

**Practical implications** – The results of this study are important to those responsible for designing incentive systems give greater importance to considering not just congruency attributes in PM but precision attributes as well.

**Originality/value** – This paper develops predictions and provides experimental evidence on two task characteristics that influence individuals' use of heuristics when choosing PMs for incentive compensation. In addition, it provides evidence that individual differences can affect individuals' PM choice performance when tradeoffs between PMs' congruity and precision are required.

**Keywords** Quantitative, Performance measures, Heuristics, Decision performance, Incentive compensation

**Paper type** Research paper

## Introduction

From a normative perspective, agency theory analyzes the optimal mechanisms supporting the separation of ownership from control in organizations (Jensen and Meckling, 1976). In this context, the firm owner (principal) delegates the management and control of her/his firm to another individual (agent) in order to maximize the owner's interests. Since a conflict of interest arises in the principal-agent relationship, agency theory deals with the identification of the most suitable performance measure (PM)-based incentive to align the agent's interests with those of the principal.

Empirical research shows that the choice of a PM can be a complex decision (Balsam *et al.*, 2011; Davila and Simons, 1997; Gerhart and Fang, 2014; Ittner *et al.*, 2003), which is often subjectively made by individuals who are not compensation experts, such as first-line supervisors, branch managers, or small-business owners (Baker *et al.*, 1994; Banker *et al.*, 2000; Gibbs *et al.*, 2004; Ittner and Larcker, 1998; Ittner *et al.*, 2003; Martin *et al.*, 2013). Although agency theory can be used to guide the choice of PMs, individuals are not likely to use the complex systems of linear equations proposed by



agency models (e.g. Feltham and Xie, 1994). When a choice task is complex – e.g., high demand of cognitive resources – or when knowledge is limited, individuals use heuristics, which, while simplifying their decision process, can sometimes, decrease their decision performance (Gigerenzer and Todd, 1999; Payne *et al.*, 1993). Psychology literature suggests that individuals' use of heuristics is highly contingent on the task characteristics (Einhorn and Hogarth, 1981; Payne *et al.*, 1993; Trevor *et al.*, 2012). Consequently, identifying characteristics of decision tasks that influence individuals' use of heuristics can help to explain their decision performance when choosing PMs for incentive compensation.

Based on contingent-decision behavior literature in psychology, we identify two task characteristics that are expected to explain individuals' use of heuristics, and as a result, their decision performance. The PM choice requires individuals to process a PMs' attributes informativeness and congruity, therefore, the task characteristics of interest are the attributes of the PMs being considered.

Conflict between PMs' attributes is expected to influence individuals' use of decision heuristics. For example, suppose an individual is choosing a PM to design incentive compensation for a plant manager (e.g. the agent). Using market value of the firm as a PM in the plant manager's incentive compensation captures the principal's expected gross payoff more directly than does a measure of manufacturing cost. However, while market value is a more congruent measure, it is less controllable by the plant manager – i.e., less precise or more noisy compared to manufacturing cost. Individuals' use of heuristics is also expected to be influenced by the difference between PM attribute differences. Under the agency-based optimal incentive compensation, in order for the more precise PM – e.g., manufacturing cost to be preferred over a more congruent PM – e.g., market value, the difference in precision must be of a much larger magnitude than is the difference in congruity. This is because the economic effect of congruity and precision are asymmetrical, i.e., changes in congruity usually have a larger effect on a principal's expected gross payoff than do changes in precision.

This paper develops psychology theory-based predictions and provides experimental evidence on the effect of these two task characteristic on individuals' decision performance. When PM attribute conflict is absent or when PM attribute conflict is present and the differences between PM attribute differences is large, even individuals who are not compensation expert are likely to use heuristics which, while requiring low cognitive effort – e.g., choosing the dominant PM or the PM that has a decisive advantage lead them to the same PM choice as the solution derived from the agency-based model in Feltham and Xie (1994). However, when PM attribute conflict is present and the difference between PM attribute differences is small, the heuristics available require high cognitive effort but do not necessarily lead individuals to an optimal PM choice, and thus individuals' decision performance decreases. Specifically, high-complexity heuristics require individuals to make judgments about the PM attributes' relative importance in order to tradeoff PMs' attributes – i.e., compensatory heuristics and thus, individual differences are expected to explain individuals' decision performance.

This study identifies two individual differences that are expected to influence individuals' judgment about PM attributes' relative importance when using compensatory heuristics. Specifically, individuals' goal commitment is expected to increase the importance of congruity to their PM choice and, as a result, it is expected to increase the likelihood of individuals choosing the most congruent PM. Individuals' empathic concern is expected to increase the importance of precision to their PM choice, and consequently it is expected to increase the likelihood of individuals choosing the

most precise PM. The experimental evidence supports the predicted effect of goal commitment, but not the predicted effect of empathic concern, on decision performance.

The results of this study are important to those responsible for designing incentive systems, just as academic experts in these issues, give greater importance to considering not just congruency attributes in PM but precision attributes as well. Academics and practitioners have so far only paid attention to the concept of congruency, without taking into account the implicit risk observed by the agents, who also evaluate the relationship between risky decisions and their effect on bonuses to be received.

In the next three sections we review literature from economics (e.g. agency theory) and contingent-decision behavior to develop three hypotheses. Two subsequent sections describe the experimental method and results of hypothesis testing. The final section provides discussion and limitations.

### Economic model and PMs choice

Feltham and Xie's (1994) agency-based model is a mathematical representation of a multiple-action multiple-PM agency that explains and predicts the optimal weights on PMs (Prendergast, 2008; Robinson and Sensoy, 2013). Based on this model, we first introduce the PMs' attributes to be considered in designing incentive compensation and then explain how these attributes should be combined to make an economically optimal choice.

Agency-based analytical research indicates that any PM that provides incremental information about actions that a principal wants to motivate should be used for incentive compensation (Holmström, 1979; Ordóñez *et al.*, 2009). In the Feltham and Xie (1994) model, PM informativeness (and as a result, its optimal weight) depends on two PM attributes: congruity and precision.

PM congruity is the degree of congruence between the impact of an agent's action on the PM and on the principal's expected gross payoff. PM congruity can be decomposed into PM sensitivity and action congruity (Banker and Datar, 1989; Datar *et al.*, 2001; Feltham and Xie, 1994). While PM sensitivity is the expected effect of an agent's action on the PM, action congruity is the expected effect of an agent's action on the principal's expected gross payoff. For example, assuming that a cost PM is being used in a plant manager's compensation, while sensitivity captures the impact of the plant manager's initiative on the cost PM, action congruity captures the impact of the same initiative on the firm owner's gross payoff. To illustrate, using Feltham and Xie's (1994) model, suppose there are two actions ( $a_1$  and  $a_2$ ) that an agent can implement. If  $a_1$  and  $a_2$  are not publicly observable, then incentive compensation is assumed to be based on publicly reported PMs. If there are two PMs (PM<sub>1</sub> and PM<sub>2</sub>), then they can be represented as the following linear functions of the agent's actions:

$$PM_1 = \mu_{11}a_1 + \mu_{12}a_2 + \varepsilon_1 \quad (1)$$

$$PM_2 = \mu_{21}a_1 + \mu_{22}a_2 + \varepsilon_2 \quad (2)$$

where  $\mu_{ij}$  is the sensitivity of a PM<sub>*i*</sub> (i.e. the change in PM<sub>*i*</sub> for an incremental change in the agent's actions  $a_i$  and  $a_j$ ). Suppose the principal's expected gross payoff ( $X$ ) can also be represented as a linear function of the two actions:

$$X = b_1a_1 + b_2a_2 + \varepsilon_x \quad (3)$$

In Equation (3),  $b_i$  is the action congruity of a PM (i.e. the change in the principal's expected gross payoff for an incremental change in the agent's action  $a_i$ ).

PM congruity can be expressed as the alignment between  $\mu$  (PM sensitivity) and  $b$  (PM action congruity). All else being equal (e.g. cost of agent's actions, PMs' sensitivities, PMs' precision),  $PM_1$  is more congruent than  $PM_2$  when  $PM_1$  has higher action congruity than  $PM_2$  (i.e. when the use of  $PM_1$  motivates the agent to implement actions that increases the principal's expected gross payoff more than does the use of  $PM_2$ ). Holding action congruity constant, if  $PM_1$  has higher sensitivity than  $PM_2$ , then  $PM_1$  is less congruent than  $PM_2$  because a change of one unit of  $PM_1$  is associated with a lower effect on the principal's expected gross payoff than does a change of one unit of  $PM_2$ .

PM precision refers to the lack of noise in the PM (i.e. the lack of variation in the PM due to factors the agent cannot control). Continuing with the plant manager example, a cost PM may be affected not only by his/her initiatives but also by uncontrollable factors such as changes in raw material or energy prices. Thus, the higher the impact of factors the plant manager cannot control, the higher the noise, and the less precise the cost PM. In Feltham and Xie (1994), PM's noise is captured by the variance of the error term ( $\varepsilon$ ) in Equation (1) and (2). Hence,  $PM_1$  is more precise than  $PM_2$  when the variance of  $\varepsilon_1$  is lower than the variance of  $\varepsilon_2$ . Because action congruity and precision are more directly related to characteristics of accounting information (i.e. relevance and reliability, respectively), we hold sensitivity constant and examine the decision-performance effects of differences in action congruity and precision. A summary of the definitions and explanations of each PM attribute are provided in Table I.

Feltham and Xie's (1994) model assumes that individuals are able to identify the relevant PM attributes and combine them in a complex system of linear equations to determine the optimal weights (i.e. monetary incentive per unit of PM) on PMs. By identifying the optimal weights on each PM, the model determines the principal's expected gross payoff. Thus, in order for individuals to choose the optimal PMs, they should choose the PMs that maximize the principal's expected gross payoff.

### Contingent-decision behavior and PM choice

Although agency-based models can be used to guide the choice of PMs, individuals are not likely to use the complex systems of linear equations proposed by the Feltham and Xie (1994) model to subjectively combine PMs' attributes when choosing PMs. Psychology literature indicates that the complexity of a decision can exceed the

Performance measures' attributes	Definition	Description of attribute meaning
Action congruity	Expected effect on your firm's economic (market) value when the agent implements one unit of action that is intended to affect $PM_i$	The higher this attribute value, the larger the expected effect of a unit of action on the economic (market) value of your firm
Sensitivity	Expected effect on $PM_i$ when the agent implements one unit of action that is intended to affect $PM_i$	The higher this attribute value, the larger the expected effect of a unit of action on the performance measure
Precision	Standard deviation of $PM_i$ due to factors the agent cannot control	The higher this attribute value, the higher the unpredictable variation in this performance measure that is due to factors the manager cannot control

**Table I.**  
Description of  
performance  
measures' attributes

cognitive capacity of individuals (Bonner, 1994; Payne *et al.*, 1993). Contingent-decision behavior literature provides evidence that when making decisions, individuals use heuristics to reduce their cognitive effort (Payne *et al.*, 1993).

Individuals have a set of heuristics available for making decisions, each heuristic having benefits and costs (e.g. expected decision performance and cognitive effort), individuals use these heuristics contingent on task characteristics (Payne *et al.*, 1993). In the case of the choice between two PMs for incentive compensation, individuals are expected to combine PM attributes' values to make a decision. Consequently, they are expected to use heuristics contingent on the attributes' values for the PMs being considered. The subjective complexity of the choice of a PM and decision performance in choosing a PM depend on the PMs' attributes (e.g. precision and action congruity) and the heuristic used to make the choice. Two task characteristics, which represent PM attributes' values, are identified as influencing individuals' use of heuristics: PM attribute conflict and difference between PM attribute differences.

*PM attribute conflict*

In the case of two PMs that differ only with respect to action congruity and precision, PM attribute conflict is present when one of the two PMs is superior on action congruity and the other PM is superior on precision. As indicated by the optimal solution, perfectly rational individuals would choose the PM that maximizes the principal's expected gross payoff. While PM attribute conflict should not affect the decision performance of perfectly rational individuals (e.g. perfect rationality assumption in economic theory), it is expected to influence boundedly rational individuals' use of heuristics and thus their decision performance (Bonner, 1994; Tversky *et al.*, 1988).

*Difference between PM attribute differences*

The economic effects of PM action congruity and PM precision on the principal's expected gross payoff are asymmetrical, in ways that also can affect individuals' use of heuristics. Table II presents two examples of PM attribute conflict and their optimal

PMs' attributes	PM <sub>1</sub>	PM <sub>2</sub>	Difference	Optimal solution <sup>a,b</sup>	PM <sub>1</sub>	PM <sub>2</sub>
<i>Panel A: small difference between the difference for precision and the difference for action congruity</i>						
Action congruity	\$2,000	\$2,500	\$500	Weights	\$0.50	\$0.56
Precision	\$1,200	\$1,800	\$600	Principal's expected gross payoff when only PM <sub>i</sub> is used	\$1,800,000	\$2,500,000
Sensitivity	\$3,600	\$3,600	\$0			
Difference between PM attribute differences			\$100			
<i>Panel B: large difference between the difference for precision and the difference for action congruity</i>						
Action congruity	\$2,000	\$2,500	\$500	Weights	\$0.50	\$0.35
Precision	\$1,200	\$3,600	\$2,400	Principal's expected gross payoff when only PM <sub>i</sub> is used	\$1,800,000	\$1,562,500
Sensitivity	\$3,600	\$3,600	\$0			
Difference Between PM attribute differences			\$1,900			

**Table II.** Performance measures' attributes and optimal solution when performance measure attribute conflict is present

**Notes:** <sup>a</sup>In order to simplify the choice, assume that both the agent's actions and the uncontrollable factors that affect a PM do not affect the other PM; <sup>b</sup>the optimal solution assumes a agent's absolute risk aversion,  $r$ , is equal to 1

solutions. In Panel A, the agency-based optimal solution supports the choice of the  $PM_2$  because it has higher action congruity. The superiority of  $PM_2$  on action congruity (difference in action congruity between  $PM_1$  and  $PM_2$  is \$500) is enough to compensate for the superiority of  $PM_1$  on precision (difference in precision between  $PM_1$  and  $PM_2$  is \$600). In Panel B, in contrast, the more precise PM is the economically preferred PM:  $PM_1$  has a large superiority on precision (difference in precision is \$2,400) which compensates for the superiority of  $PM_2$  on action congruity (difference in action congruity is \$500). This is because a unit of improvement in congruity has a larger effect on a principal's expected gross payoff than does a unit of improvement in precision.

### *Available heuristics*

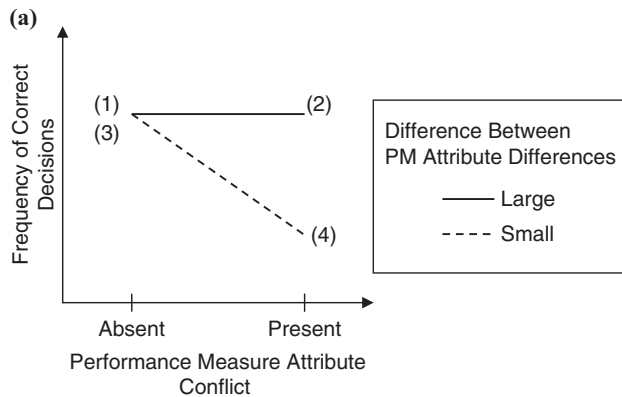
Three heuristics are expected to be used by individuals when choosing a PM from a set of two available PMs. As a first step in choosing a PM, individuals look for a dominant PM (Tversky *et al.*, 1988). If one PM measure is superior on both action congruity and precision, then this measure is chosen. This is a relatively low-complexity heuristic, because individuals only need to know whether a higher or lower PM attribute is preferred but they are not required to make a judgment about the PM attributes' relative importance. However, this heuristic can only be used when PM attribute conflict is absent.

If PM attribute conflict is present then individuals may examine whether a PM has a decisive advantage – that is, whether the difference in one attribute far outweighs the difference in the other attribute for most plausible values of the PM attributes' relative importance (Tversky *et al.*, 1988). Consequently, this is also a relatively low-complexity heuristic because individuals have to compare the magnitudes of the PM attribute differences, but they do not necessarily require making assessments of the PM attributes' relative importance.

If neither PM is dominant nor has a decisive advantage, then individuals are likely to use a compensatory heuristic. These decision strategies require individuals to make judgments about the PM attributes' relative importance in order to resolve the conflict by making tradeoffs between PMs' attributes. Research in psychology provides evidence that making such tradeoffs increases subjective decision complexity (Bonner, 1994; Payne *et al.*, 1993; Shah and Oppenheimer, 2008; Shepard, 1964). Consequently, although compensatory heuristics are simplifications of the decision as modeled by Feltham and Xie (1994), they are more complex than the dominant and decisive-advantage heuristics because they require individuals to make judgments about the PM attributes' relative importance.

### **Hypotheses**

Based on contingent-decision behavior literature, we predict a two-way interaction between PM attribute conflict and difference between PM attribute differences on individuals' decision performance. Figure 1 presents the form of the expected interaction and predictions (a) and (b), respectively). When PM attribute conflict is absent (1 and 3 in Figure 1), individuals are expected to use the dominant heuristic which will lead them to choose the PM that is superior on both attributes, thus individuals are expected to make optimal PM choices. Consequently, the frequency of correct decisions is expected to be high and not affected by the difference between PM attribute differences (1 = 3). When PM attribute conflict is present, however, the difference between PM attribute differences is expected to affect individuals' decision performance. When this difference



- (b)
- (1)  $1 = 3$
  - (2)  $1 = 2$
  - (3)  $2 = 3$
  - (4)  $1 > 4$
  - (5)  $2 > 4$
  - (6)  $3 > 4$

**Notes:** (a): Form of the expected interaction between performance measure attribute conflict and difference between performance measure attribute differences on individuals' decision performance; (b): summary of predictions

**Figure 1.**  
Hypothesis 1

is large (2 in Figure 1), individuals are likely to use the decisive-advantage heuristic and make correct choices. As a result, the frequency of correct decisions should not differ from the conflict-absent conditions ( $1 = 2$ ,  $2 = 3$ ). When this difference is small (4 in Figure 1), however, individuals are expected to use compensatory heuristics and thus their PM choice is expected to be a function of their judgment about the PM attributes' relative importance. In this condition, due to individual differences, some individuals are expected to make correct decisions but others are expected to make incorrect decisions; as a result, the frequency of correct decisions is expected to be lower than in the other three conditions ( $1$ ,  $2$ ,  $3 > 4$ ):

*H1.* Frequency of correct decisions is a two-way ordinal interactive function of PM attribute conflict and difference between PM attribute differences.

Individual differences are only expected to affect individuals' decision performance when they use compensatory heuristics (4 in Figure 1). Psychology theory suggests that a task goal is expected to affect individuals' behavior through the psychological process of directing attention and effort to their decision (Locke and Latham, 1990). Accordingly, task goal is expected to affect individuals' attention to PMs' attributes, and thus, their judgment about the PM attributes' relative importance. However, complex representations of tasks are often incomplete compared to formal scientific models such as Feltham and Xie's (1994) agency-based model. Individuals usually neglect some of the information and are likely to include direct effects or short causal

chains while omitting indirect effects or longer, more complex causal chains (Sterman 1989; Diehl and Sterman, 1995; Markman and Gentner, 2001). As a result, the judgment about the PM attributes' relative importance is not expected to be free of bias and, individuals are expected to simplify the agency problem by focussing on (i.e. considering relatively more important) the PM attribute that is more directly related to the task goal. The following hypotheses explain how individuals' goal commitment (*H2*) and empathic concern (*H3*) are expected to affect individuals' decision performance by directing their attention (i.e. considering relatively more important) to action congruity and precision, respectively.

#### *Goal commitment and individuals' decision performance*

Individuals designing incentive compensation have the specific goal of choosing the PM that maximizes their firm's economic value (e.g. principal's expected gross payoff). The task goal theory (Locke and Latham, 1990) outlines how conscious goals affect performance by directing attention to the task, by increasing effort and persistence, and by prompting the development and use of effective task strategies. As a result, the specific goal "to maximize their firm's economic value" is expected to affect individual's judgment of PM attribute relative importance and their choice of PM.

In addition, Locke and Latham (2002) also indicate that there is an important moderator of the relation between task goal and performance: individual's goal commitment. Goal commitment, defined as "one's attachment to or determination to reach a goal" (Locke and Latham, 1990, p. 125), refers to the cognitive, affective and behavioral aspects of the process of goal striving. Thus, the effect of the firm's goal on individuals' choices is expected to depend on their commitment to the firm's goal.

Specifically, we argue that individuals who are more committed to the firm's goal will pay more attention to action congruity (i.e. considering relatively more important) than to precision because action congruity seems to be more directly related to the firm's goal than precision. Action congruity is a direct measure of how congruent a PM is with the goal of maximizing the firm's economic value. In contrast, the link between PM precision and the economic value of the firm is expected to be indirect because it requires individuals to think about how uncontrollable factors affect a risk-averse agent, how the firm should pay this agent for the risk imposed by the incentive compensation on him or her, and how the agent will act based on this risk-adjusted incentive. In summary, goal commitment is expected to positively affect the importance of action congruity relative to precision on individuals' PM choice. As a result, individuals' goal commitment is expected to be positively associated with the choice of the most action congruent PM and thus positively associated with individuals' decision performance:

- H2.* When PM attribute conflict is present and the difference between PM attribute differences is small, individuals' goal commitment is expected to be positively associated with their decision performance.

#### *Empathic concern and individuals' decision performance*

The choice of PM is not free from a social context. Individuals need to understand the agent's strategy to make correct decisions in an agency context (first-order reasoning in Wilks and Zimbelman, 2004). Consequently, they are expected to make attributions about the mental states (i.e. desires, beliefs, intentions) of the agent by playing the agent's role and sharing the agent's feelings and emotions when facing a particular PM as an incentive mechanism (i.e. by empathizing with the agent). Next, we hypothesize



on how an individual's empathic concern is expected to affect individuals' choice by directing their attention to precision (i.e. considering relatively more important).

Empathy has been defined in the literature as the ability of the individual to understand and share others' emotions (Salovey *et al.*, 2001). This definition recognizes empathy as a cognitive process and an affective capacity, which develops gradually from childhood to adulthood and helps individuals to imagine how decision situations look from the point of view of the other person (Piaget 1932). Literature in social psychology and social neuroscience suggests that empathy is a major determinant of voluntary behavior intended to benefit others (i.e. prosocial behavior in Eisenberg and Miller, 1987; other-regarding behavior in Singer and Fehr, 2005). This process is automatic and individuals are likely to represent the goals of others in terms of their own goals without even being aware of it (Singer and Fehr, 2005).

In addition, research also indicates that there are individual differences in empathy (Singer *et al.*, 2004; Jolliffe and Farrington, 2004). In essence, not every individual has the same ability to understand and share others' emotions. Therefore, the notion that empathy enhances other-regarding behavior in combination with the existence of individual differences in empathy suggest that individuals who exhibit more empathic concern are more likely to have prosocial behavior than are individuals with low-empathic concern (Singer and Fehr, 2005). That is, individuals with relatively high levels of empathy will act in a manner that is more responsive to the feelings of others, when compared to individuals with low levels of empathy.

Consequently, when choosing PM for incentive compensations, individuals with relatively high levels of empathic concern, may act more responsive to the agent's feelings and redirect their attention from the specific task goal (maximizes their firm's economic value) to the agent's goal. Specifically, we argue that individuals with high-empathic concern will pay more attention to PM precision (i.e. considering relatively more important) than to action congruity because precision seems to be more directly related to the agent's goal than action congruity. PM precision directly captures the effect of uncontrollable factors on the risk-averse agent's compensation. The link between action congruity and agent's goal is expected to be indirect because it requires individuals to think about how much the firm's economic value will increase and how much the firms is expected to compensate the agent for a unit of increases on the PM (i.e. the PM weight) considering the risk imposed by the PM precision. In summary, empathic concern is expected to positively affect the importance of PM precision relative to action congruity on individuals' PM choices. As a result, individuals' empathic concern is expected to be positively associated to their choice of the most precise PM and thus negatively associated to their expected decision performance:

- H3.* When PM attribute conflict is present and the difference between PM attribute differences is small, individuals' empathic concern is expected to be negatively associated with their decision performance.

## Experimental method

### *Participants*

In total, 76 MS accounting students volunteered to participate in the experiment. In a similar task, decision performance in Krishnan *et al.* (2005) did not differ significantly between MBA and MS students. Their findings provide support for the use of only one type of student in this study. The participants were paid performance-contingent compensation, as described below.

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### *Experimental materials and procedure*

Participants received introductory materials explaining the task in terms consistent with Feltham and Xie's (1994) model (e.g. multiple-action, multiple-PMs, risk-averse and effort-averse managers, risk-neutral firm owners, one-period decision setting). Participants assumed the role of a manager at the headquarters of a large firm, and their job was to choose a PM that would be used for incentive compensation to motivate a manager. The objective of the owner of the firm, which their choice should support, was to maximize the economic (market) value of the firm, not of the cost of the manager's total compensation. The manager had a one-year non-renewable employment contract to implement a performance-improvement program that would maximize the economic (market) value of the firm. Participants were told that for each available PM, they would receive information on its three attributes that would help them in making their PM choice. In order to ensure that participants understood the setting, definitions and explanations were provided (e.g. Table I).

In natural settings, individuals designing incentive compensation are supposed to make decisions that maximize their firm's expected wealth. Then, in order to align participant's goal with their firm's goal, performance-contingent compensation was explained. "You will receive a fixed pay of \$10 for completing this accounting simulation, regardless of your performance in choosing a performance measure. You will also receive a variable pay of up to \$10 in addition, depending on how well you choose a performance measure. That is, the closer your choice is to the choice that would maximize the expected economic (market) value of your firm, the higher your total pay will be, up to a maximum of \$20 (= \$10+\$10)."

Before participants received information on the PM attributes' values to make their choices, and in order to capture their beliefs about each attribute-decision relation, they were asked to provide their beliefs about how each attribute should directionally affect their decision. Next, participants were asked to return their answers to the administrator and told they could keep the introductory materials until the end of the simulation.

Participants then received information about the attributes' values for the two available PMs (PM<sub>1</sub> and PM<sub>2</sub>) and were asked to choose one of them. As labels affect cognition (Broniarczyk and Alba, 1994; Muchinsky and Dudycha, 1975; Sniezek, 1986), generic names were used for both PMs so that participants' decisions were only influenced by the PMs' attributes and not by their labels (e.g. percent of defects units, cost per unit).

Participants self-paced their way through the experimental materials. After they finished the task, they turned the materials in to the administrator and received post-experiment questions.

### *Variables*

A 2×2 between-subjects experimental design was used to test the hypotheses. The manipulated independent variables were PM attribute conflict (absent or present) and the difference between PM attribute differences (small or large). The PM attributes' values for the four cells resulting from the interaction between these independent variables are in Table III. Thus, when receiving information about the attributes' values for PM<sub>1</sub> and PM<sub>2</sub>, participants were randomly assigned to one of the four cells.

Two additional independent variables were measured in post post-experimental questions. Consistent with prior literature in accounting (Kadous *et al.*, 2003; Klein *et al.*, 2001), a five-item instrument was used to measure goal commitment. A sample item is "I was strongly committed to pursuing my firm's goal." Empathic concern was measured by using (Davis, 1980, 1994) a seven-item instrument. The empathic concern

**Table III.**  
PM Attributes' values provided for performance measure choice

		PM attribute conflict			
		Absent		Present	
<i>Difference between PM attribute differences</i>					
Large					
	PMs' attributes	PM <sub>1</sub>	PM <sub>2</sub>	PM <sub>1</sub>	PM <sub>2</sub>
	Action congruity	\$2,500	\$2,000	\$2,000	\$2,500
	Precision	\$1,200	\$3,600	\$1,200	\$3,600
	Sensitivity	\$3,600	\$3,600	\$3,600	\$3,600
Small					
	PMs' attributes	PM <sub>1</sub>	PM <sub>2</sub>	PM <sub>1</sub>	PM <sub>2</sub>
	Action congruity	\$2,500	\$2,000	\$2,000	\$2,500
	Precision	\$1,200	\$1,800	\$1,200	\$1,800
	Sensitivity	\$3,600	\$3,600	\$3,600	\$3,600

scale measures the individual emotional reactivity or tendency to experience feelings of warmth, compassion, and concern for other people. A sample item is "I would describe myself as a pretty soft-hearted person."

To control for differences across participants other than the manipulated and measured independent variables, post-experimental questions were intended to measure variables for participants' understanding of the materials (i.e. objective of the owner of the firm, and the risk preferences of both the owner and agent), their experience (i.e. number of months working as a manager or accountant), and their knowledge of accounting, calculus, finance, incentive compensation plans, microeconomics and statistics (i.e. number of semesters and average GPA of statistics courses).

The dependent variable was decision performance. Decision performance was measured as a dichotomous variable coded 0 or 1 depending on whether a participant's choice was inconsistent or consistent, respectively, with the agency-based prediction. The optimal choices were obtained by plugging the PM attributes' values into the (Feltham and Xie, 1994) model. The optimal decisions for the four cells of the manipulated independent variables are in Table IV.

**Results**

Prior research indicates that directional errors in the use of PMs' attributes are relatively frequent (Krishnan *et al.*, 2005). To ensure that individuals responded to the

**Table IV.**  
Optimal solutions

		PM attribute conflict			
		Absent		Present	
<i>Difference between PM attribute differences</i>					
Large					
	PMs' attributes	PM <sub>1</sub> <sup>a</sup>	PM <sub>2</sub>	PM <sub>1</sub> <sup>a</sup>	PM <sub>2</sub>
	Weights	\$0.63	\$0.28	\$0.50	\$0.35
	Principal's expected gross Payoff	\$2,812,500	\$1,000,000	\$1,800,000	\$1,562,500
Small					
	PMs' attributes	PM <sub>1</sub> <sup>a</sup>	PM <sub>2</sub>	PM <sub>1</sub>	PM <sub>2</sub>
	Weights	\$0.63	\$0.44	\$0.50	\$0.56
	Principal's expected gross payoff	\$2,812,500	\$1,600,000	\$1,800,000	\$2,500,000

**Note:** <sup>a</sup>Economically preferred PM

experimental manipulation of PM attribute conflict, they were required to have at least a minimum understanding of how each attribute is directionally related to their goal. Consequently, 18 participants were excluded because they reported agency-inconsistent beliefs about how each PM attribute should directionally affect their choice. In addition, to control for a minimum understanding of the decision task, 15 participants were excluded because they answered incorrectly one or more questions related to the information provided about the task and their firm, such as their firm's goal and the risk preferences of both the manager and principal. Thus, 43 of the 76 participants (57 percent) were retained for hypotheses testing.

The participants had completed a mean of 8.39 three-credit semester accounting courses ( $SD = 1.66$ , range 4-12), 1.78 finance courses ( $SD = 1.33$ , range 1-6), 1.41 microeconomics courses ( $SD = 0.71$ , range 1-4), 1.90 statistics courses ( $SD = 0.49$ , range 1-4) and 1.14 calculus courses ( $SD = 0.69$ , range 0-3). Their work experience as a manager or an accountant ranged from 0 to 25 months, with a mean of 4.53 months ( $SD = 6.21$ ). None of them had any experience designing incentive compensation.

With respect to the participants' goal commitment and empathic concern, the results of a confirmatory factor analysis indicated that, for each variable, all of its items loaded in a common factor. Participants' goal commitment and empathic concern scores were calculated by using the standardized factor loading as weights to aggregate the respective standardized items. The two scales had acceptable reliabilities with coefficients greater than 0.70 (Cronbach, 1951; Nunnally, 1978). Prior literature indicates that goal commitment and empathic concern are likely to be affected by task characteristics (Eisenberg and Miller, 1987; Klein *et al.*, 2001). Therefore I eliminated the effect of the manipulated independent variables on the measured independent variables by using, as measures of goal commitment and empathic concern for hypothesis testing, the standardized residuals of the linear regressions of each individual difference variable on the two manipulated independent variables and their interaction term.

To test whether differences across participants other than the measured independent variables may have driven results, measures of participants' knowledge (such as undergraduate GPA and GPA in courses related to accounting, calculus, finance, microeconomics, and statistics) were included as both the dependent variable in a 2 (PM attribute conflict)  $\times$  2 (difference between PM attribute difference) ANOVA and independent variables in a logistic regression on decision performance. The results of the ANOVAs indicated that participants' GPAs in calculus, microeconomics, and statistics did not significantly differ ( $p > 0.05$ ) across the manipulated experimental conditions; and a main effect of PM attribute conflict on undergraduate GPA, accounting GPA and finance GPA such that participants in the conflict-present condition reported significantly ( $p < 0.05$ ) higher GPAs than participants in the conflict-absent condition. However, results of the logistic regressions indicated that none of these variables were significantly associated ( $p > 0.05$ ) with the likelihood of participants making a correct decision. Thus, although random assignment may not have been completely successful in equalizing all of the participants' demographic characteristics across experimental conditions, these differences across experimental conditions did not explain the participants' decision performance.

The Pearson correlations between measures of the participant's characteristics and two measured independent variables are presented in Table V. Most of the participants' knowledge measures were significantly correlated ( $p < 0.05$ ). More importantly, neither goal commitment nor empathic concern was significantly ( $p < 0.05$ ) correlated with

**Table V.**  
Pearson correlation  
matrix: participants'  
characteristics

	Goal commitment	Empathic concern	Overall GPA	Accounting GPA	Calculus GPA	Finance GPA	Microeconomics GPA	Statistics GPA
Goal commitment	1.000	0.344 (0.024)	0.031 (0.843)	0.151 (0.333)	-0.084 (0.617)	-0.009 (0.955)	-0.113 (0.472)	0.118 (0.450)
Empathic concern		1.000	-0.003 (0.986)	0.177 (0.257)	-0.006 (0.973)	0.177 (0.255)	0.168 (0.283)	0.260 (0.093)
Overall GPA			1.000	0.636 (0.000)	0.386 (0.017)	0.613 (0.000)	0.366 (0.016)	0.598 (0.000)
Accounting GPA				1.000	0.434 (0.007)	0.518 (0.000)	0.363 (0.017)	0.526 (0.000)
Calculus GPA					1.000	0.168 (0.315)	0.492 (0.002)	0.398 (0.013)
Finance GPA						1.000	0.116 (0.288)	0.361 (0.018)
Microeconomics GPA							1.000	0.331 (0.030)
Statistics GPA								1.000

**Note:**  $n = 43$  (two tailed  $p$ -values)

any of the participants' knowledge measures. Thus, differences across participants on the two measured independent variables were not likely to be driven by participants' prior knowledge.

### *Hypothesis testing*

*H1* predicted a two-way interaction between PM attribute conflict and difference between PM attribute differences, such that decision performance will be relatively low when PM attribute conflict is present and the difference between PM attribute differences is small (4 in Figure 1); otherwise predicted decision performance is higher and equal for the other three conditions (1, 2 and 3 in Figure 1). Participants' decision performance is presented in Panel A of Table VI. Overall, 86 percent of the participants made correct decisions (37 of 43 participants). The pattern of the frequency of correct decisions was consistent with the form of the hypothesized interaction such that the frequency of correct decisions was 100 percent in cells 1, 2 and 3, but only 33 percent in cell 4.

*H1* was tested by a set of six planned contrasts based on the predicted pattern of cell frequencies in Figure 1. Since small sample size and lack of incorrect decisions in cells 1, 2 and 3 precluded the use of either a  $\chi^2$  test or logistic regression for testing differences in frequencies across cells, Fisher's exact test was used to determine the significance of each planned contrast. A Bonferroni adjustment was used to control the family-wise error at  $p < 0.05$  for the overall test of the interaction hypothesis; thus, the critical p-value level for each contrast was 0.008. Results for each planned contrast are presented in Panel B of Table VI.

When PM attribute conflict was absent, results of contrast 1 indicated that participants' decision performance was not significantly affected ( $p = 1.00$ ) by the difference between PM attribute differences. However, when PM attribute conflict was present, the difference between PM attribute differences affected participants' decision performance. When this difference was large (cell 2), results of contrasts 2 and 3 indicated that the frequency of correct decisions did not significantly ( $p = 1.00$ ) differ from the conflict-absent conditions (cells 1 and 3). When this difference was small (cell 4), results of contrasts 4-6 indicated that the frequency of correct decisions was significantly ( $p < 0.008$ ) lower than in the other three conditions (cells 1-3). Overall, each of the six contrast tests provided support for *H1*.

*H2* and *H3* predicted that when there is PM attribute conflict and a small difference between PM attribute differences (cell 4), the likelihood of a correct decision would be positively associated with participants' goal commitment and negatively associated with their empathic concern, respectively. Since perfect separation of the data and small sample size precluded the use of a logistic regression or a point-biserial correlation, the non-parametric Kendall's rank correlation was used to test the association between correct decision and each of the two individual difference variables. The Kendall's rank correlations are presented on Panel C of Table VI. While *H2* was supported by a positive and statistically significant correlation between correct decision and goal commitment ( $p < 0.05$ ), *H3* was rejected due to the lack of a significant correlation ( $p > 0.05$ ) between correct decision and empathic concern.

### *Supplementary evidence on sample size*

In order to address concerns about small sample size we first conducted ex post power calculations for each hypothesis. The results suggest that power for the test of *H1* and *H2* appeared to be satisfactory but power for the test of *H3* was extremely low.

Panel A: Frequency of correct decisions (number of participants)

		PM Attribute conflict		Overall
		Absent	Present	
Difference between PM attribute differences	Large	1 100% (11)	2 100% (8)	100% (19)
	Small	3 100% (15)	4 33% (9)	75% (24)
	Overall	100% (26)	65% (17)	86% (43)

Panel B: Fisher's exact test (*H1*)

Planned contrast <sup>a</sup>	Fisher's <i>p</i> -value (one tailed)	Contrast supported? (yes/no)
(1) 1 = 3	1.00	yes
(2) 1 = 2	1.00	yes
(3) 2 = 3	1.00	yes
(4) 1 > 4	0.001	yes
(5) 2 > 4	0.007	yes
(6) 3 > 4	0.002	yes

Panel C: Participants' decision performance and hypothesis testing results  
kendall's rank correlation (*H2* and *H3*)

<i>N</i> = 9	Goal Commitment	Empathic Concern
Correct Decision	0.707 <i>p</i> = 0.01	-0.236 <i>p</i> = 0.24

**Table VI.**  
Participants'  
decision performance  
and hypothesis  
testing results

**Notes:** <sup>a</sup>Each contrast refers to predictions presented in (b) of Figure 1 and the respective difference between cells in (a)

Since only nine participants were included in the test of *H2* (participants of cell 4), the estimated Kendall's rank correlation ( $r_k = 0.707$ ;  $p < 0.05$ ) may have been impacted significantly by sampling error, and as a result it may be unstable. In order to address this concern, we also analyzed the parameter stability of the test of *H2* by using the

“exclusion/inclusion of a single data point” procedure suggested by Hollenbeck *et al.* (2006). The results were robust to the removal of any of the nine participants. Considering the results of power analysis and stability test, the small sample size used in testing *H1* and *H2* did not seriously impair the statistical validity of the conclusions. In the case of *H3*, however, the sample size was insufficient.

## Discussion

The experimental results provide support for two of the three hypotheses. First, decision performance was explained by a two-way ordinal interactive function between PM attribute conflict and difference between PM attribute differences such that that decision performance was relatively low when PM attribute conflict was present and the difference between PM attribute differences was small; otherwise decision performance was 100 percent and equal for the other three experimental conditions (*H1*). Second, goal commitment explained differences in decision performance when PM attribute conflict was present and the difference between PM attribute differences was small. Finally, the expected negative effect of empathic concern on individuals’ decision performance when individuals’ use compensatory heuristics was not supported (*H3*). While power analysis indicated that the sample size for the test of *H3* was insufficient, there are other two potential reasons for the lack of significance of this result. First, although participants reported different levels of empathic concern, the social context may not have been strong enough to activate prosocial behavior. Second, empathic concern does not explain individuals’ choice of PMs.

## Limitations

This study has three limitations arising from choices made in the design of the experiment. The first is small sample size; the second is characteristics of the participants; and the third is the information about PM attributes provided to the participants to make their PM choice. First, significant effort was made to include a larger sample size in this study, (76 individuals) but 43 percent of the participants (33 individuals) were not retained for hypotheses testing due to lack of understanding of the task. As a result, the small sample affected the validity of the evidence regarding *H3*.

Second, the participants were a relatively homogenous group of students from an MS in accounting program with low work experience but none of them had any experience designing incentive compensation. Third, the information provided to them was exactly what they needed for making their PM choices. In natural settings, decision makers’ characteristics and the information provided to make PM choices may differ considerably. Individuals’ prior experience in designing incentive compensation may allow them to make appropriate judgments about the PM attributes’ relative importance. Consequently, the conclusions of this study are restricted to situations where individuals choosing a PM do have moderate experience but do not have prior experience in deciding PM-based incentive compensation with these particular tradeoffs.

With respect to the information provided, although PM-based reports are common managerial practices, individuals are not likely to receive detailed information about the numerical value of each PM attribute. Instead, they are likely to make subjective assessments about these attributes’ values. For example, in the case of PM precision, they may try to determine the extent to which a PM reflects factors outside the manager’s control. After individuals complete the subjective assessment of each attribute’s value for the available PMs, however, they are likely to face PM attribute



conflict and difference between PM attribute differences. Therefore, results of the effect of these two task characteristics on individuals' decision performance presented in this paper are not experimental artifacts.

*Implications for human resource professionals and compensation experts*

The results of this study have important implications for human resource professionals and compensation experts. First, it is evident that the literature on agency theory, although widely known in the academic field, does not quite represent how choices are made by average everyday people, who rarely pay attention to its sophisticated mathematical terms. Simply put, and in practice, many agents responsible for designing incentive schemes are not experts in it. Let's review two examples: many entrepreneurs who watched their business grow, and who began hiring employees, have made sure to establish PMs for the different positions in their company. This has not necessarily been optimal, especially in cases of entrepreneurs with no formal education in business administration and unaware of the potential impact of the implementation of certain incentives on the conduct of their employees. In many factories similar instances frequently occur. Often, plant managers are assigned to decide how they will carry out the performance measurement of their employees, and then define the incentives for each position. In this second example, engineers or technical specialists in operational areas must establish PM systems and rewards for their employees, not knowing or ever having received training on how to design incentives.

The lack of knowledge of the agency theory causes many managers to end up working by intuition; this is when the heuristics become shortcuts taken to decide on how to design an incentive system. Instead of evaluating the attributes of a PM precision (e.g. cost per unit) and congruity (e.g. market value), a manager that is not an expert usually prefers to focus only on congruity, it is easier to justify. Why is it like this? The argument is that the more committed employees are to the organization the more interested they are in the objectives of the company, and therefore tend to place much more value on the fact that the indicator is associated with the strategy to make their decision. The problem of not considering precision, and only considering congruity is that many times, the person faced with making decisions, that is to say the agent, sees their remuneration risk because the indicator can vary greatly by way of issues that he or she cannot control and therefore restrict certain actions, which might have benefited the company. In this regard, it is also worth doing the exercise of considering precision attributes that boost the action of the agent. Those who design incentive systems have focussed on mainly choosing indicators that allow for the alignment with the business objectives, regardless of the implicit risk observed by agents who evaluate the relationship between risky decisions and the effect they have on bonuses to be received.

*Implications for researchers*

In general, the literature on key performance indicators has emphasized the importance of measuring performance areas and individuals with indicators aligned with the business strategy. While this is consistent with the concept of congruity, very little has been written about the importance of accuracy considerer. That is to say, in the literature there is a great imbalance that encourages those responsible for designing compensation systems to emphasize the importance of aligning with the strategy, and the studies that take into account the risk that is imposed on the agent are not very

well developed. Formally, we must give more room for the issue of precision in the indicators and not just consistency.

This study provides several opportunities for future research. First, identifying omitted variables can lead to new and interesting testable predictions. For example, a stronger social context can stimulate individuals' empathic concern and/or goal commitment and thus explain individuals' performance when PM attribute conflict is present and the difference between PM attribute differences is small. On the one hand, knowing the manager can increase individuals' empathic concerns and, as a result, increase the likelihood of individuals choosing the more precise PM. On the other hand, accountability can increase the effect of goal commitment and, as a result, increase the likelihood of individuals choosing the more action congruent PM. Second, future research may address how individuals change their PM choices in response to feedback over time. Although feedback in natural settings can be difficult to understand due to an incorrect initial PM choice (Krishnan *et al.*, 2002) or changes in an environment (e.g. uncontrollable factors, delegation), feedback may still provide learning opportunities.

### Conclusion

Many individuals who are not compensation experts choose PMs for incentive compensation, such as first-line supervisors, branch managers, or small-business owners. Individuals are likely to, contingent on the characteristics of the task, use heuristics to simplify the choice of PMs. This study identifies PM attribute conflict and difference between PM attribute differences as two task characteristics that influence individuals' use of heuristics, and as a result, explain their decision performance. Specifically, when PM attribute conflict is present and the difference between PM attribute differences is small, the heuristics available require individuals to make judgments about the PM attributes' relative importance. In this context, the findings suggest that individuals' goal commitment increases the importance of congruity to their PM choice and, as a result, it increases the likelihood of individuals choosing the most appropriate PM for incentive compensation.

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