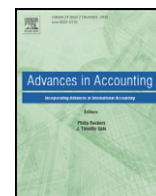




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The effect of a decision aid on risk aversion in capital investment decisions

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ABSTRACT

In this study we examine whether a decision aid is an effective means of reducing risk aversion within a capital investment decision context, and under what conditions. Participating in the experiment were 78 working adults (mid management) with a mean age 30 and enrolled in a leading U.S. MBA program. We predict and find that a decision aid will be most effective among individuals intolerance of ambiguity and exhibiting high negative affect.

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1. Introduction

Risk due to uncertainty or ambiguity is present to some extent in many, if not most, of life's important decisions; and, research shows that it consistently influences choice across a variety of decision contexts (Camerer and Weber 1992). Within business specifically, the outcomes of prospective capital investments are rarely known with certainty, and outcome ambiguity is the rule rather than the exception.³ Further, uncertainty and ambiguity have been shown to negatively influence managers' resource allocation decisions (e.g. Ghosh & Ray, 1997; Ho, Keller, & Kelya, 2002, 2005). Sprinkle, Williamson and Upton (2007) note that "risk aversion leads individuals to...select "safe" projects...(that) reduce firm welfare." (p. 437). In this study, we examine the effectiveness of a decision aid to reduce risk aversion.⁴

When rendering capital investment decisions, managers often are faced with multiple options from which to choose on behalf of the firm. The uncertainty and ambiguity inherent in capital investment decisions increase choice complexity and task difficulty which, in turn, influence deliberative processes and ultimate choice (Sawers, 2005). Prior research demonstrates that individuals have limited cognitive capacity and, as a consequence, they commonly rely on simplifying heuristics

and/or affective reactions in complex decision environments (Forgas & George, 2001).

Decision aids are often employed, both in practice and in research, as a means of guiding employee decision making in directions beneficial to the firm. (Bonner, 2008; Carmona, Lowe, & Reckers, 2011; Ho & Vera-Munoz, 2001). Still, while organizations invest substantial resources in the development, implementation and utilization of decision aids, desired benefits are not always realized (Bonner, 2008, Carmona et al., 2011). A variety of individual and task variables can limit or enhance the effectiveness of decision aids (Bonner, 2008; Glover, Prawitt, & Spilker, 1997). If the underlying cause(s) of suboptimal decision making are not addressed by the aid then the decision aid will not yield benefits; and development costs will be wasted. In decision contexts where outcome ambiguity may have higher salience to selected decision makers, increasing the amount of task structure and clarity through a decision aid may be an effective means of influencing choice behavior (Bonner, 2008) (Fig. 1).

Individual characteristics, such as tolerance for ambiguity and dispositional affect, have been shown to influence decision making in an environment of uncertainty and ambiguity (e.g. Cianci & Bierstaker, 2009; Curtis, 2006; Forgas & George, 2001; Ghosh & Ray, 1992; Lowe and Reckers (2012)). Specifically, tolerance of ambiguity (TOA) has been shown to influence decision making across a number of business contexts including but not limited to capital budgeting (e.g. Carmona et al., 2011; Ghosh & Ray, 1997). In business contexts set in environments of uncertainty and ambiguity, dispositional affect also has been shown to influence audit judgment (e.g., Bhattacharjee & Moreno, 2002; Cianci & Bierstaker, 2009), ethical decision making (e.g., Curtis, 2006; Lowe & Reckers, 2012), and investment decisions (Sawers, 2005). Accordingly, in the research reported herein, we hypothesize differential decision aid effectiveness across individuals exhibiting different levels of tolerance of ambiguity and levels of positive and negative affect.

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³ "Outcome ambiguity" is defined (as in Curley and Yates, 1985, p. 274) as "uncertainty about the processes by which outcomes are determined". When estimating the return of a potential capital investment, the return could be estimated as an unambiguous 16% or could be presented as a range of outcomes (e.g. the return lies between 14 and 18%). In the latter case, ambiguity exists regarding which return will be realized.

⁴ I use the term "range estimate decisions" throughout this paper to denote decisions with projected outcomes (e.g., estimated ROI) that are ambiguous (e.g. presented as a range estimate of possible outcomes) as defined in footnote 1.

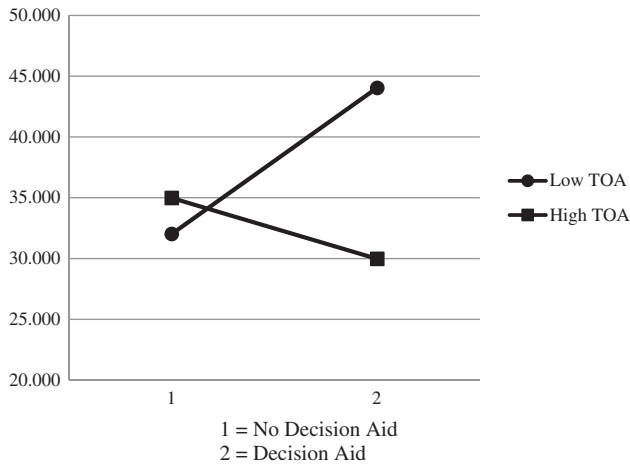
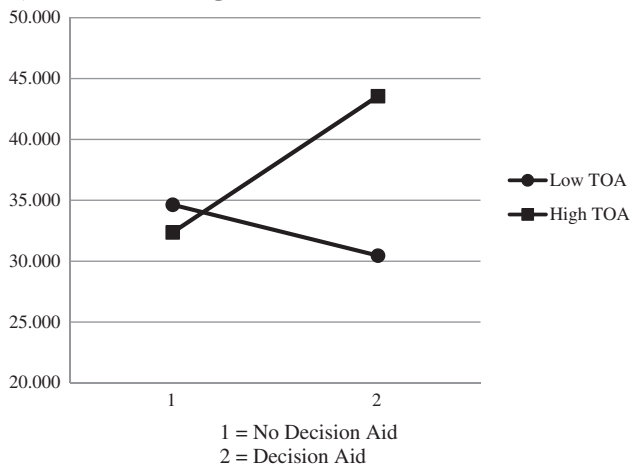
A) Estimated Marginal Means of Points**B) Estimated Marginal Means of Points**

Fig. 1. A: Estimated marginal means of points. B: Estimated marginal means of points.

We conducted an experiment in which participants selected among three capital investment proposals with the investment proposals varying in levels of outcome ambiguity. The proposal promising the greatest contribution to corporate goals was also the proposal with the greatest outcome risk (ambiguity). All participants were provided with information about company goals (both long- and short-term) to assist in their decision making. Additionally, half the participants received a decision aid requiring assessment of the contribution of each proposal toward achieving each of the various long- and short-term strategic goals of the organization. Participants then allocated points among the three capital investment proposals according to their relative degree of support. Individual levels of tolerance of ambiguity were measured using the MacDonald (1970) tolerance of ambiguity scale; and dispositional affect was measured using a modified PANAS scale (Watson & Tellegen, 1985).

We predicted and found that decision aids would have their greatest effect among individuals reticent to make a decision on their own (those exhibiting high negative affect, consistent with Sawers, 2005) and individuals intolerant of ambiguity and seeking decision making structure (Bonner, 2008).

The results of this study have implications for decision aid use and design in capital investment decisions and contribute to existing literature regarding the factors that influence decision aid effectiveness. As most accounting decisions involve some degree of uncertainty, the factors that influence these types of decisions are of particular

interest to many accounting researchers (e.g., Bonner, 2008; Haka, 2007; Loewenstein, Rick, & Cohen, 2008).

The remainder of this paper is organized as follows: Section II provides the theoretical issues and develops the hypotheses for this study. The research methodology is described in section III, followed by the results in Section IV. Section V summarizes the results and discusses implications, limitations and directions for future research.

2. Theoretical issues and hypothesis development

2.1. Decision making processes and outcome ambiguity

Prior research has demonstrated that individuals do not always behave “rationally”. The concept of “bounded rationality” encompasses the idea that individuals are often but not always strictly “rational”. Individuals have frequently been found to make decisions that do not optimize expected (economic) value. Explanations for such behavior include cognitive limitations (Kahneman & Tversky, 1979) and affective disposition (Forgas and George, 2001). Decision makers frequently rely on shortcuts or heuristics to assist them in making decisions or default to affective reactions when faced with difficult decision tasks. Though these heuristics and affective reactions can lead to normatively correct decisions, in some situations they also have been shown to lead to suboptimal decision making. Errors and/or biases in judgments and decisions may result in managerial decisions that are inconsistent with the long-term interests of a firm or society (e.g., Cianci & Bierstaker, 2009; Ghosh & Ray, 1992, 1997; Ho & Vera-Munoz, 2001; Sprinkle, Williamson, & Upton, 2007).

Ambiguity is one factor that has consistently been shown to influence choice behavior (e.g., Einhorn & Hogarth, 1986; Ellsberg, 1961; Ghosh & Ray, 1997; Ho et al., 2002; Viscusi & Magat, 1992). Ellsberg (1961) examines choice behavior related to ambiguity. In a choice between two items that are identical except for the degree of ambiguity in the probabilities, he finds that people tend to choose the option with lower ambiguity. Many subsequent studies also report ambiguity aversion (e.g., Einhorn & Hogarth, 1986; Viscusi & Magat, 1992) or participants' willingness to pay a premium to avoid ambiguity (e.g., Camerer and Weber 1992; Becker and Brownson, 1964).

The precise mechanisms through which ambiguity aversion influences decisions remains unclear (Loewenstein et al., 2008; Camerer and Weber 1992); however, most proposed explanations incorporate a difference in the salience of the ambiguous information to the decision maker (Du & Budescu, 2005; Loewenstein et al., 2008). The increased salience of ambiguous information leads decision makers to selectively focus on a small subset of information in the decision task. Selective attention influences the way that decisions are made and the options that are selected (Krantz & Kunreuther, 2007; Weber & Johnson, 2009). Several studies suggest that changing the salience of the information will alter the decision maker's tendency to select ambiguity averse options (e.g. Du & Budescu, 2005; Ho et al., 2002). Ho et al. (2005) examine the influence of outcome ambiguity and irrelevant information on capital budgeting decisions and find that in a gain context, managers select investments that do not maximize firm value. To ensure that managers at various levels of the organization are focusing on the factors that the organization finds most relevant to capital investment decisions, Ho et al. (2005) suggest implementing systems that explicitly state the items to consider throughout the capital budgeting process. Together, these research findings suggest a decision aid designed to refocus attention on all salient aspects of the decision may be an effective means of reducing aversion to outcome ambiguity in managerial decision making.

2.2. Decision aids

Decision aids are widely employed in practice and in research as a means overcoming biases in individual judgments and decision making

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