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# Do Changing Reference Levels affect the Long-Term Effectiveness of Incentive Contracts?

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Do Changing Reference Levels Affect the Long-Term Effectiveness of Incentive  
Contracts?

by

Lee M. Kersting

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
School of Accountancy  
College of Business  
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## **ABSTRACT**

This study examines whether reference levels change over time and the impact on individuals' risk-taking behavior. I apply expectations-based reference-dependent preferences theory to analyze whether individuals' reference levels change over time in an economic setting. The theory suggests that individuals develop reference levels based on expectations of future outcomes (Koszegi and Rabin 2006). Therefore, this study examines whether individuals' expectations affect the setting of their reference level and how possible changes in reference levels affect subsequent risk-taking behavior. This study also provides evidence on how budget-based contracts impact individual risk taking behavior in a single period setting. Prior research has used multiple theories in an attempt to explain contradictory results relating to budget target difficulty and risk-taking behaviors. This study provides more evidence to the literature by further examining the impact of budget-based contracts on individuals' risk-taking behavior. A 1 x 2 between subjects experiment was conducted over five periods. Budget target was the manipulated factor at two levels: easy and moderate. Results suggest that individuals under easy budget targets make riskier decisions. Additionally, individuals' reference levels change over time and the change in reference level is greater for those individuals who continually attain their budget target, suggesting that expectations do increase the reference level. Lastly, in the current study, changes in reference level do not have a significant impact on risky decision making.



## **1.0 INTRODUCTION**

### **1.1 Research Questions and Motivation**

Budgeting is an important activity in management accounting and an essential business process for most organizations. Budgets are used by virtually all organizations for a variety of reasons. They can be used to plan and coordinate activities and they can also be used to motivate, evaluate, and reward performance (Baiman and Demski 1980; Baiman 1990; Luft and Shields 2003). In designing an incentive compensation system, many organizations choose to incorporate budget-based measures into their contracts in order to influence behavior and align owner and employee interests (Bonner, Hastie, Sprinkle, and Young 2000; Murphy 2001). Budgets influence behavior by directing employee attention towards desirable actions and by creating performance standards against which actual performance is judged (Bonner et al. 2000; Sprinkle 2003).

The majority of research examining the impact of budget-based contracts on employee behaviors examines effort-intensive tasks (Bonner et al. 2000). Few studies examine the impact of budget-based contracts on employee risk-taking behavior (Chow, Kohlmeyer, and Wu 2007; Sprinkle, Williamson, and Upton 2008) and even fewer examine the effectiveness of budget-based contracts over time. Organizations that use incentive contracts expect that these contracts will be effective over multiple periods. This study investigates whether incentive contracts, specifically budget-based contracts,

maintain their desired effectiveness over time. Specifically, the effectiveness of a budget-based contract could be dependent on individuals' reference levels, which may not remain constant over time, but rather could vary based on prior economic outcomes, or the attainment (or failure to attain) the budget target. Therefore, this study will examine how changes in individuals' reference levels over time, as a function of meeting or failing to meet the budget target, impacts individuals' decision making over time.

Most prior studies analyzing the effects of incentive system design on goal congruence examine single period settings (e.g., Chow et al. 2007; Sprinkle et al. 2008). An open question is whether incentive system designs maintain their desired effect over multiple periods. It is possible that over time the effectiveness of an incentive system could deteriorate or be enhanced due to changes in individuals' reference levels, to the extent that the reference level could change based on having met (or not met) budget targets (Kahneman and Tversky 1979; Lopes 1987; Koszegi and Rabin 2006). Additionally, decision making theory suggests that reference levels play a vital role in individuals' decisions (Kahneman and Tversky 1979; Lopes 1987). Therefore, it is important to analyze whether reference levels change, and if they do, what is the impact on incentive contracts effectiveness.

To analyze the aforementioned research question, I apply expectations-based reference-dependent preferences theory (Koszegi and Rabin 2006). This theory proposes how individuals' reference levels are developed. Expectations-based reference-dependent preferences theory suggests that expectations, derived from an individuals' environment, play a critical role in the development of reference levels. Specifically, individuals' develop expectations of what is going to occur in a subsequent time period,

and these expectations, along with exogenous factors, play a role in the formulation of individuals' reference levels. Therefore, this study will examine whether expectations of future economic outcomes impact individuals' reference levels.

In addition to analyzing the multi-period effectiveness of budget-based contracts, this study also provides empirical evidence on the applicability of security-potential/aspiration level theory (SP|A). The effect of budget-based contracts on the level of risk an employee is willing to take, has not always provided conclusive results (e.g., Chow et al. 2007; Sprinkle et al. 2008).<sup>1</sup> Most research analyzing risky decision making applies prospect theory to describe individual behavior.<sup>2</sup> Additional theories, such as SP|A, may be more applicable in certain situations. SP|A was developed to describe how individuals approach and make risky decisions and to recognize the importance of attaining one's aspiration level.<sup>3</sup> In budget-based contracts, the budget goals can be thought of as reference levels and SP|A stresses the importance of the reference level and how its achievement, whether guaranteed or not, affects individuals' behaviors. Therefore, in an economic setting which incorporates budget-based contracts, it is possible that SP|A has more explanatory validity than prospect theory in describing

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<sup>1</sup> Chow et al. (2007) found that high budget targets lead to higher risk-taking behavior while Sprinkle et al. (2008) found that low budget targets lead to higher risk-taking behavior. An implicit assumption in this study is that most firms want their employees to take certain amounts of risk and the design of incentive compensation systems can help firms accomplish this objective.

<sup>2</sup> Prospect theory suggests that individuals use their reference level to code alternatives (outcomes) as gains or losses. Once these alternatives are framed as gains or losses, prospect theory suggests the individuals in a loss frame will be risk-seeking and individuals in a gain frame will be risk-averse (Kahneman and Tversky 1979).

<sup>3</sup> Prospect theory describes a reference level as the reference point. A reference point is the kink in the prospect theory value function at which an individual perceives an outcome as a gain or a loss (Kahneman and Tversky 1979). An aspiration level, as described by security-potential/aspiration level theory, is an outcome that receives special attention in the decision making process (Lopes 1987). The term reference level, in this study, is a general term that encompasses both reference points and aspiration levels.

individuals' behaviors. This study provides additional empirical evidence relating to the applicability of SP|A to individual decision making under budget-based contracts.

The effect of incentive schemes, and particularly budget-based contracts, on managers' risk-taking behavior is an area that has received little attention in the literature (Sprinkle 2003; Sprinkle et al. 2008; Drake and Kohlmeyer 2010). One of the fundamental issues firms face when using budget-based contracts is determining the attainability of the budget target. Goal setting theory suggests that firms should set difficult but attainable goals which have been shown to increase individuals' effort and thus increase output. There is ample empirical evidence to support this claim (e.g., Mento, Steel, and Karen 1987; Locke and Latham 1990; 2002; Jeffrey, Onay, and Larrick 2010). The results relating to difficult but attainable goals, however, are generally related to *effort-intensive* tasks and tasks with a direct link between effort and output. The question of how budget target difficulty affects risk-taking behavior in tasks that have a more tenuous link between effort and output is a less studied area and is the setting of this study. Therefore, this study will also assess how budget-based targets affect individuals' risk-taking behavior in a setting where the link between effort and output is tenuous.

## **1.2. Research Design**

To address the aforementioned research questions a 1 x 2 between-subjects experiment was conducted. The between-subjects factor, budget target level, was manipulated at two levels, easy and moderate.<sup>4</sup> In designing budget-based incentive systems, one of the most important aspects is the difficulty of the selected budget target.

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<sup>4</sup> A difficult budget target level is not included because prospect theory and security-potential/aspiration level theory have the same predictions relating to difficult budget targets. Specifically, for difficult targets individuals must be risk-seeking in order to attain the budget target.

Prior research suggests that most firms use moderate budget targets, rather than difficult budget targets, to encourage employees to attain the budget goals (Merchant and Manzoni 1989) and subsequent research suggests firms should use moderate budget targets (Fisher, Pfeffer, and Spinkle 2003). Therefore, this study incorporates budget difficulty as a variable to assess its effects on risk-taking behavior and how budget target difficulty may affect individuals' reference levels and subsequent behavior. The experiment incorporates five periods in order to assess how individuals' reference levels change over time and the concomitant effects on risk-taking behavior. The experimental task involves participants selecting from a range of alternatives that vary in level of risk. Experimental participants are undergraduate students who received performance-based compensation for their participation in the experimental task.

There are a number of dependent variables in the experiment. The first is the variance of the project that is selected.<sup>5</sup> Every participant will be presented with seven alternatives from which one must be selected. The alternatives were developed to simulate the risk-return continuum, where lower risk alternatives have smaller variances and higher risk alternatives have higher variances. The variances are defined by incorporating two factors. The first factor is the probability of attaining the budget target. This factor dictates the likelihood of not attaining (receiving base salary) or attaining the budget target (base salary plus variable bonus) and is a simulation of downside risk, which provides information relating to the worst case scenario, the receipt of only base annual pay (Shapira 1994). The probability of attaining the budget target directly impacts the other component of variance, the difference between the highest and lowest

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<sup>5</sup> In the experiment "projects" as used in the discussion of the experiment were referred to as products. The term project is used for expositional purposes.

compensation amounts if a specific budget target is met. For low risk alternatives the lowest and highest amounts are fairly close together, and the difference between the highest and lowest amounts increases as more risk is incorporated into alternatives. Therefore, when an individual decides to take more risk they are increasing the variance of the payments they could possibly receive.

The other dependent variable is the change in reference level. A participant's reference level is assessed by their answer to the following question, "At what level of payment would you have neither positive nor negative emotion?" (Arkes, Hirshleifer, Jiang, and Lim 2010). This variable is measured as the difference between a baseline reference level and the reference level at the end of the experiment.

### **1.3 Results and Contribution**

The results of the study provide evidence that individuals under easy budget targets make more risky decisions than individuals under moderate budget targets. This suggests that firms wanting their employees to make risky decisions should utilize easy budget targets. The results also suggest that individuals' reference levels change over time and the magnitude of the change in reference level is dependent upon the number of times the budget target was attained. Specifically, there is a positive relationship between the number of times the budget target was attained and change in reference level. This suggests that individuals who continually attain the budget target have greater expectations of future economic outcomes than those who miss the budget target at least once. Lastly, this study does not provide evidence that changes in reference level impact subsequent decision making. Most theories relating to risky decision making, such as security-potential/aspiration level theory and prospect theory, propose that reference

levels play a vital role in decisions that are made. This study does not find evidence to support this prediction.<sup>6</sup>

This study makes several contributions to the academic literature. I provide further evidence of the applicability of a decision making theory, security-potential/aspiration level theory, in an accounting context. This analysis contributes to decision making literature and compensation literature. I also apply expectations-based reference-dependent preferences theory in an accounting context and provide evidence that expectations of future economic outcomes impact the formulation of individuals' reference levels. This finding contributes to decision making literature and reference level literature.

I also provide empirical evidence that reference levels change over time. Prior decision making theories suggest that reference levels change over time but there is a paucity of empirical evidence documenting this change. Additionally, this study contributes to reference level literature by demonstrating that continual attainment of a budget target increases individuals' reference levels.

This study also makes a number of contributions to practice as well. Prior research examining the effect of budget target difficulty has not provided a definitive conclusion of the behavioral impact of budget target level on employee risk-taking behavior. This study provides additional empirical evidence that easy budget targets lead to more risk-taking behavior than moderate budget targets, which are the preferred budget target difficulty level in practice (Merchant and Manzoni 1989). Therefore, firms

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<sup>6</sup> Possible explanations why this result was not found are presented in the conclusions section of the study.

wanting their employees to make more risky decisions should implement easy budget targets rather than moderate budget targets.

Lastly, the results suggest that individuals' reference levels change over time. Organizations should be aware of employees' changes in reference level because changes in reference level can impact the effectiveness of incentive contracts. Therefore, organizations should be very diligent in analyzing the behaviors that incentive contracts elicit and be aware that changes in employees' reference levels could be a main factor if employee behaviors are not in line with management's goals.

The remainder of the proposal is presented in sections. The next section presents the literature review and hypothesis development. The third section presents the method and experimental procedures. The fourth section presents the results of the experiment and supplemental analysis. The last section contains the conclusions.



## **2.0 BACKGROUND AND LITERATURE REVIEW**

### **2.1 Budgets**

Budgets permeate many aspects of an organization. They affect how decision rights are allocated and are also used to motivate, evaluate, and reward performance (Baiman and Demski 1980; Baiman 1990; Luft and Shields 2003; Sprinkle et al. 2008). Budgets can also be incorporated into budget-based performance contracts, in which budgeted performance targets are embedded in compensation contracts. From a directing and informational perspective, budget-based contracts are very effective at focusing employees' attention to the specific goals embedded within the contract (Fisher et al. 2008). Budget-based contracts can also be used to create goal congruence (Milgrom and Roberts 1992; Sprinkle 2003). Specifically, the use of budget-based contracts can align the goals of the firm with the goals of employees by incentivizing activities that benefit the firm (Milgrom and Roberts 1992). In some cases, budget-based contracts can be used to incentivize employees to take a certain action, such as selecting between risky alternatives.

An empirical question for which there is mixed evidence in the literature relates to how budget targets affect risky decision making and whether individuals' reference levels for evaluating and selecting risky projects change over time or remain constant. The following sections describe the academic literature related to how budget targets should be set in order to create goal congruence between the firm and its employees, describes

theories related to risky decision making, and provides a description of how reference levels may be determined and may change over time.

## **2.2 Budget-Targets and Goal Setting**

### **2.2.1 Goal Setting**

Goal setting theory and goal setting literature suggest that firms should set difficult but attainable performance targets. This literature is replete with empirical evidence that performance increases with target difficulty and that goals improve performance (e.g., Mento et al. 1987; Locke and Latham 1990, 2002; Jeffrey et al. 2010). According to goal theory, more difficult goals improve performance by motivating greater effort and persistence at a task (Locke and Latham 1990). The empirical evidence supporting the positive association between goal difficulty and performance generally relates to *effort intensive* tasks. In these types of tasks, the positive relationship between goal difficulty and performance persists until the goal becomes too difficult and individuals do not have the ability to reach it and “give up” (Locke and Latham 1990, 2002; Sprinkle et al. 2008). In general, there is consensus that goal difficulty increases performance relating to *effort intensive* tasks because the link between effort and outcome is clear.

An area that has received less attention is how goals affect decisions under risk (Valence 2001; Jeffrey et al. 2010). Many managerial tasks are not necessarily effort intensive, but rather are based on achieving some goal of expected profit or return on investment, compared to achieving an effort intensive production goal (Ruchala 1999). Most existing research examining risk taking and goal attainment suggests that pursuing a goal increases risk taking (e.g., Mao 1970, Payne, Laughhunn, and Crum 1980, 1981;

Larrick, Heath, and Wu 2009). For example, field studies suggest that managers are more willing to take on risks in order to reach a goal (Mao 1970; March and Shapira 1987, 1992) either because the goal has a specific financial reward related to the achievement of the goal or because goals create internal motivation to achieve the goal. Research also suggests that individuals are more willing to take on risks to reach hypothetical job-related goals (Payne et al. 1981), to reach a real monetary goal (Larrick et al. 2009), and are more willing to cheat in order to reach a goal (Schweitzer, Ordóñez, and Douma 2004). Although this evidence suggests that difficult performance targets increase individuals' willingness to take on risks in order to achieve the goal, there is also evidence that this is not always the case (e.g., Bavelas and Lee 1978; Rothkopf and Billington 1979; Polzer and Neale 1995; Sprinkle et al. 2008; Ordóñez, Schweitzer, Galinsky, and Bazerman 2009).

Although most do not question the effectiveness of goals, some researchers have been concerned with isolating boundary conditions and unintended consequences of goal setting (Ordóñez et al. 2009). For example, Ordóñez et al. (2009) suggest that stretch goals can have serious side effects, such as shifting risk attitudes, promoting unethical behavior, and triggering the psychological costs of goal failure. In addition, prior research has demonstrated that difficult goals can harm performance on complex tasks and can detract from performance on tasks or task dimensions for which goals are not set (Bavelas and Lee 1978; Rothkopf and Billington 1979; Polzer and Neale 1995). Therefore, there is evidence suggesting that difficult performance targets are not always optimal in all settings.

There is some research that questions the validity of the assumption that difficult goals increase risk taking. Merchant and Manzoni (1989) surveyed fifty-four profit centers and found that budget targets in the field are not generally set to be difficult. They report that budget targets were set to be achievable for most years included in the study in order to reduce the risk of managers giving up on the goal and to also make managers who achieved the goal feel like “winners” (Merchant and Manzoni 1989). There is also empirical evidence that “moderately” difficult goals or targets enhance overall firm performance while “over-ambitious” or difficult targets induce inferior incentives on productivity (Van der Stede 2000; Fisher, Pfeffer, and Sprinkle 2003). Additionally, Hirst (1987) suggests that task uncertainty may moderate the association between goal difficulty and performance.

Other research has demonstrated potential downside effects of difficult performance targets or settings where difficult performance targets are not optimal. Schweitzer et al. (2004) found that participants were more likely to cheat in an experimental setting in order to reach a goal when they had a high performance target. In an analytical investigation, Kuang and Suijs (2009) suggest that managers compensated with a cash bonus plan should have performance targets that are below the level that would maximize their effort because this decreases the compensation risk placed on the employee while not having a significant impact on the amount of effort exerted. In other words, the authors suggest that modest or easy performance targets are optimal in this setting. The conclusions of Kuang and Suijs (2009) are consistent with the argument for setting performance targets that are easily achievable (Merchant and Manzoni 1989; Hirst and Lowry 1990; Fisher et al. 2003).

Based on extant research, therefore, it is uncertain whether more difficult performance targets lead to more risk taking or less risk taking and in what situations more difficult performance targets may lead to poor results. The empirical evidence appears to provide mixed results, and therefore the impact of goals on risk taking warrants further investigation.

### **2.2.2 Budget Targets**

Budgets are used in virtually all organizations (Murphy 2001; Fisher et al. 2008). In addition to budgets, budget-based contracts are also used extensively in practice and come in a variety of forms (Murphy 2001; Sprinkle and Williamson 2004; Chow et al. 2007; Fisher et al. 2008). Bonner et al. (2000) conclude from their review of eighty-five studies in various fields that budget-based incentive schemes are the most likely to produce positive effects, such as increased productivity and effort, which foster goal congruence.<sup>7</sup>

There are a number of studies that are of particular importance to this study. Ruchala (1999) examined whether budget goal attainment and different types of incentive compensation affected individuals' selection and continuance of risky investment projects.<sup>8</sup> Ruchala (1999) designed her experiment to mimic an investment portfolio choice. After the first project selection, participants were informed whether or not they were ahead or behind their budget goal and were also told that their selections in the subsequent periods would affect whether or not they would achieve their budget goal. Therefore, the experiment is essentially a single period analysis containing multiple

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<sup>7</sup> Bonner et al. (2000) use the term quota scheme, but the criteria (Bonner et al. 2000, 26) corresponds to budget-based contracts which use a form of quota (budget-target).

<sup>8</sup> The budget goal in Ruchala (1999) was 20%. Participants were informed after the initial selection whether their return was 18% or 22% and that their subsequent decisions could affect *final* goal attainment.

selections of risky projects because the final goal attainment (failure to attain) occurred only once. The results suggest that individuals who were told they were behind their budget goal after their first decision in the experiment made riskier investment decisions in subsequent periods than participants who were told they were ahead of their budget goal. The results tend to support prospect theory predictions that individuals in a loss frame (told they are behind the budget goal) will exhibit more risk-seeking behavior while individuals in a gain frame (told they are ahead of the budget goal) will exhibit more risk-averse behavior.

The analysis of the change in risky decision making, however, was not based on the same task, but rather was based on participant's responses to an investment ranking task (Ruchala 1999). Therefore, Ruchala (1999) did not investigate what drove this change, i.e., whether it was a change in risk attitude or a change in individuals' reference levels. In relation to incentive contract type, Ruchala (1999) demonstrates that a bonus-based contract, in which monetary rewards are not paid unless the budget goal is attained, lead to significantly riskier decisions when combined with not achieving the budget goal.<sup>9</sup> The main implication from Ruchala (1999) is that budget goal attainment has a significant effect on participants' subsequent risky investment decisions; failure to achieve the budget target promotes risk-seeking behavior.

Drake and Kohlmeyer (2010) reexamine how prior outcomes and incentive schemes influence how individuals frame current decisions and influence individuals' risk behavior. They examine how individuals react when they are told they are behind or

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<sup>9</sup> Ruchala (1999) compared bonus-based contracts to profit sharing contracts. Under profit sharing contracts, participants receive a monetary share of the profit regardless of budget goal attainment. There was no hypothesis for a main effect of incentive compensation and when a main effect variable for compensation was included in the model the results were insignificant.

ahead of some reference level. Drake and Kohlmeyer (2010) do not, however, examine how individuals' reference levels change over time, which is the focus of the current study. In an experiment analyzing risky investment decisions, they find support for Ruchala's (1999) results by demonstrating that individuals who are given a negative performance report, which is equivalent to failing to reach a budget target, are motivated to engage in more risk-seeking behavior than individuals who are given a positive performance report. Taken together, Ruchala (1999) and Drake and Kohlmeyer (2010) illustrate that prior outcomes can influence subsequent risk-taking behavior under budget-based contracts.

Recent research in accounting has examined how the level of budget-targets affects propensity to take risks. In two closely related articles, Chow et al. (2007) and Sprinkle et al. (2008) examined this issue. Chow et al. (2007) investigated a single period product selection setting, in which individuals were told to select one out of seven products to manufacture and sell. Each product had a unique distribution relating to the return the product would generate. Participants were also presented with either an easy performance target (budget-target) of 5 percent or a difficult performance target of 25 percent. The budget targets were based on the product return. For example, the easy budget target was set to a 5 percent return on the product selected. Participants then made their selection of which product to produce and sell. The results from the experiment support prospect theory's prediction that difficult budget targets lead to more risk taking by individuals. This finding suggests that firms wanting their employees to take more risks should implement difficult budget targets in order to create goal congruence.

Sprinkle et al. (2008) examined how the level of a budget target affects individuals' propensity to take risks in a single period setting. Sprinkle et al. (2008) also incorporated an effort element in their experiment to investigate the trade-off between effort and risk taking. In their experiment, individuals were presented with a matrix containing twelve projects. Participants were presented with four pieces of information: (1) probability of meeting the budget, (2) amount paid if the budget is not met, (3) lowest amount paid if the budget is met, and (4) the highest amount paid if the budget is met. Unlike Chow et al. (2007), the experimental design incorporated a costly effort component. The results pertaining to risky decisions from Sprinkle et al. (2008) suggest that individuals' propensity to take risks increases when they are compensated based on easier budget targets compared to more difficult budget targets. These results are contradictory to Chow et al. (2007) and suggest that easy budget targets, rather than more difficult budget targets, would be beneficial for firms wanting their employees to take greater risks in their decision making. The authors apply security-potential/aspiration theory rather than prospect theory to explain their results.<sup>10</sup>

It is interesting that the two studies addressing virtually the same research question generated results that suggest two opposing prescriptions for creating goal congruency through the use of budget targets and apply two distinct decision theories to explain the results. Chow et al. (2007) suggest that difficult budget targets lead to a higher propensity for risk taking while Sprinkle et al. (2008) suggest that easy budget targets lead to a higher propensity for risk taking. There are a number of possibilities for why the results were so different. First, Chow et al. (2007) used actual budget targets,

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<sup>10</sup> A detailed discussion of Sprinkle et al. (2008) and the application of security-potential/aspiration theory is presented in a subsequent section.



which were communicated to the experimental participants, whereas Sprinkle et al. (2008) did not explicitly state what the budget targets were, but rather incorporated the budget targets into the information presented to participants in the decision matrix. The decision matrix used in Sprinkle et al. (2008) presented participants with four pieces of information relating to each of the twelve projects from which the participants selected: probability of meeting the budget, amount paid if the budget is *not* met, lowest amount paid if the budget is met, and highest amount paid if the budget is met. Therefore, Sprinkle et al. (2008) did not explicitly state the parameters of the budget targets but rather incorporated the easy and more difficult budget targets into these four pieces of information.

Second, the difficulty of the budget targets could be different between the two studies. In Chow et al. (2007), the budget targets were based on an expected level of return and were set at 5 percent (easy) and 25 percent (difficult). In this case, the 25 percent budget target may have been perceived as extremely difficult to achieve, thus forcing participants to engage in risk-taking behavior in order to possibly achieve the budget target. Sprinkle et al. (2008) did not explicitly mention what the budget targets were but did mention that “difficult” targets would not produce the same study results as they found. In other words, it can be presumed that Sprinkle et al. (2008) designed their experiment to incorporate “moderately” difficult budget targets.

Another possible reason for the difference in results is that Sprinkle et al. (2008) incorporated a costly effort component in order to analyze the trade-off between risk and effort. There were no costs of effort in Chow et al. (2007). Generally employees who make investment/project decisions do not exert the physical effort to impact the outcome.

They generally serve in a management capacity, delegating responsibility and making decisions on courses of action (Ruchala 1999). Therefore, their main focus is on the decision, weighting the cost/benefit of the alternatives. They would not consider the cost of effort exerted by others to implement or execute the decision. It is possible that the incorporation of the cost of effort lead to different empirical results.

The products presented in Chow et al. (2007) followed much of prior research by holding the expected value of all possible alternatives constant. By holding expected value constant, the outcome variance of the projects is manipulated, thus simulating different levels of risk. This method is beneficial to isolate how risk affects individual's decision making. Sprinkle et al. (2008) presented alternatives that had different expected values, different variances, and different levels of downside risk. Sprinkle et al. (2008) incorporated these factors into their experimental design. This study will follow Chow et al. (2007) and most extant research and hold expected value of the alternatives constant while incorporating many of the design aspects of Sprinkle et al. (2010).

Lastly, none of the project selections available for selection in Chow et al. (2007) guaranteed the achievement of the budget target. As will be discussed in detail later, security-potential/aspiration theory is dependent upon the achievement of an individual's aspiration level. If the achievement of an aspiration level is not possible, then individuals are predicted to behave in accordance with prospect theory. Therefore, the results of Chow et al. (2007) could be supported by both prospect theory and security-potential/aspiration theory. This study will analyze whether including alternatives that allow for the attainment of the aspiration level affects risk-taking behaviors.

### **2.3 Security-Potential/Aspiration Theory**

Security-potential/aspiration (SP|A) theory is a descriptive theory of decision-making under risk, which attempts to account for how individuals approach decisions under risk (Lopes 1987). SP|A theory contains many of the same elements as prospect theory. For example, SP|A assumes that most individuals are loss-averse and also utilizes the concept of a reference level. In SP|A, however, the reference level is referred to as an aspiration level (Lopes 1987, 1990). An aspiration level is an outcome that takes a special position in the decision process (Diecidue and van de Ven 2008).

Aspiration levels can take many forms. They can be determined by exogenous factors, such as contract parameters or budget targets, or can be determined by endogenous factors, such as expectations and knowledge of prior outcomes, or a combination of the two (Kahneman and Tversky 1979; Koszegi and Rabin 2006). Regardless of how an aspiration level is developed, individuals generally code outcomes below the aspiration level as failures and outcomes above the aspiration level as successes. The aspiration level provides a clear delineation between success and failure. Individuals place value on the overall probability of success and the overall probability of failure. Empirical research has demonstrated that individuals place a great deal of weight on the overall probability of success and concludes that this focus on the overall probability of success is in contrast with expected utility and with prospect theory (Payne 2005). Prior research also suggests decision making models should incorporate overall probability of success and failure into the models due to the importance individuals place on it (Payne 2005).

The focus on the overall probability of success relative to an aspiration level can also be seen in interviews and field studies of managers. For instance, the response of one manager in a field study clearly states that an aspiration level plays a vital role in decision making when he says that “risk is the prospect of not meeting the target of return,” (Mao 1970, p. 353). In the same study another manager states that “I never worry about the project going above the return. Risk is what might happen when the return is going to be less,” (Mao 1970, p. 354). Both of these statements suggest that an aspiration level, in this case a target rate of return, is a central focus in decision making. Additionally, subsequent research also suggests that a manager’s primary focus is placed on avoiding actions that could potentially place one below some aspiration level (Lopes 1987). In other words, managers focus their attention on actions that put them in danger of falling below an aspiration level which subsequently makes the opportunities for gains less salient because the focus is on the danger of losses, not the opportunities for gains.<sup>11</sup>

The focus on the overall probability of success and failure is a central feature of SP|A theory and plays a vital role in how individuals select among risky alternatives. SP|A theory proposes that individuals evaluate alternatives in two stages when making decisions in uncertain environments (Lopes 1987; Sprinkle et al. 2008). In the first stage, individuals evaluate possible alternatives by assessing the probability of meeting a minimum aspiration level. The aspiration level could be some exogenous factor, such as a budget target, or could be based on endogenous factors, such as an individual’s expectations, or a combination of the two. Regardless of how the aspiration level is

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<sup>11</sup> Petty and Scott (1984) found this idea of a target return among *most* managers in a more extensive study.

developed, the aspiration level has special significance for individuals in the decision process.

In the first stage of SP|A theory, individuals focus their attention on alternatives that meet the aspiration level with certainty (Lopes 1987). Therefore, individuals focus on the alternatives that allow them to meet the aspiration level with certainty and reject all potential alternatives that do not guarantee the attainment of the aspiration level. By focusing on projects that guarantee the achievement of the aspiration level individuals are able to remove projects that do not guarantee the aspiration level from consideration in the decision process. This evaluation illustrates the importance of the probability of success. If the probability of successfully achieving the aspiration level is in jeopardy for a particular alternative, then individuals will reject that alternative, thus removing it from consideration in their decision-making process (Lopes 1987; Lopes and Oden 1999).

SP|A theory suggests that individuals in the first stage of decision making act in a risk-averse manner, rejecting alternatives that place them in danger of missing the minimum aspiration level. Individuals will reject high-risk alternatives even if they contain the highest possible payout or have very high expected values (Lopes 1987; Sprinkle et al. 2008). Therefore, the focus on the worst possible outcomes may lead individuals to disregard the “best” possible alternatives, based on probabilities, if there is even a small chance that this alternative will leave them short of their aspiration level. At the end of the first stage of the decision process SP|A proposes that individuals have eliminated projects that do not allow them to meet their aspiration level with certainty.

In the second stage of SP|A theory, the focus switches to potential payoffs. Specifically, if multiple alternatives meet the aspiration level with certainty, then

individuals will behave in a more risk-seeking manner. Therefore, of the remaining alternatives that passed the first stage, individuals will focus now on alternatives that have the highest possible payoffs.<sup>12</sup> Once an individual's aspiration level can be met with certainty (by meeting the first stage criterion) and all of the remaining alternatives place an individual above the aspiration level, the focus turns to the alternatives with the highest possible payout. Of the alternatives remaining, those with the highest potential payout are generally the alternatives with higher variances (risk), and these alternatives receive more focus in the decision making process, leading to more risk-seeking behavior.<sup>13</sup>

	<b>Focus</b>	<b>Risk Behavior</b>
<b>First-Stage</b>	Eliminating projects that place the aspiration level in jeopardy	<i>Risk-averse</i> – decrease the risk of failing to attain the aspiration level
<b>Second-Stage</b>	Selecting the project with the highest possible payoff	<i>Risk-seeking</i> – select alternative with highest potential payout

**FIGURE 1.** Two-Stage Security-Potential/Aspiration Level Theory

The development of SP|A theory is based on empirical evidence demonstrating the importance of individuals' aspiration levels. Early research suggested that

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<sup>12</sup> Highest potential payoff refers to the highest amount of payment possible from the alternative. This does not imply that individuals will select the *most* risky project. This implies that individuals will become *more* risk-seeking.

<sup>13</sup> When alternatives meet the aspiration level with certainty, individuals will act in a risk-seeking manner selecting projects that at least allow them the chance to achieve their aspiration level (Lopes 1987). Therefore, when no alternative guarantees the aspiration level with certainty, individuals will behave in accordance with prospect theory predictions.

individual's aspiration levels play an important role in effort-related tasks (Stedry 1960). Subsequent research in a variety of domains led to the proposal of SP|A theory.

Schneider and Lopes (1986) analyzed whether individuals exhibited preference reversals predicted by prospect theory. The results relating to the gain domain generally supported prospect theory; individuals tended to act in a risk-averse manner. This result, while not overly supportive of SP|A, does not rule out SP|A as a descriptive theory of decision making. Specifically, the risk-averse behavior may have been due to a lack of alternatives that satisfied the first stage of SP|A. In the first stage of SP|A individuals eliminate alternatives from consideration that place the aspiration level in jeopardy. If there are no alternatives that guarantee the attainment of the aspiration level, then individuals tend to act in a risk-seeking manner, selecting alternatives that at least give them a chance to attain their aspiration level. This could explain individuals' behaviors in the gain domain. Schneider and Lopes (1986) did show, however, that in the loss domain, the possibility of losing at least some amount posed a serious threat to the participant's sense of safety (aspiration level). The results exhibited a mixed pattern of preferences which suggested that participants appeared to dislike lotteries at both extremes. It appears they disliked the safest option because it would not allow them to meet their aspiration level and disliked the riskiest option presumably because the threat to their security is too high and individuals wanted to minimize the chance of the worst loss (Schneider and Lopes 1986). These results are contrary to prospect theory, which would suggest that individuals would be risk-seeking in the loss domain.

More recent research has provided more concrete evidence in support of SP|A theory. Lopes and Oden (1999) analyzed whether the selection of different lotteries was

better explained by prospect theory or SP|A theory.<sup>14</sup> In their experiment they performed a number of manipulations that shifted, scaled, or moved lotteries around a reference level. Prospect theory would predict that as long as the outcomes did not cross the reference level, individuals' behavior should not change based on scaling or shifting (Kahneman and Tversky 1979), whereas SP|A theory would suggest that scaling or multiplying would affect the evaluation of alternatives because individuals' aspiration levels should change. The results tended to support SP|A theory. Particularly, the data showed that when individuals' aspiration levels were fully satisfied and not in jeopardy (stage 1) individuals tended to make riskier decisions and selected lotteries with higher predicted outcomes (stage 2).

Lopes and Oden (1999), however, did not analyze how reference levels changed over time, which is the focus of this study. Additionally, Lopes and Oden (1999) did not use financial incentives in their study. Research has shown that financial incentives lead to more motivation and higher levels of effort (e.g., Vroom 1964, Bonner 2008). Therefore, the outcomes of individuals' decisions may differ in the presence of financial incentives, which is more indicative of a real world setting. Specifically, firms have increased their use of monetary incentives in recent years, particularly for upper-level managers (*Wall Street Journal* 1999; Bonner 2008). Therefore, the current study is different than Lopes and Oden (1999) due to the longitudinal experiment and the inclusion of financial incentives.

The results of Lopes and Oden (1999) are also supported by additional research. Research examining task types showed that when individuals have multiple alternatives

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<sup>14</sup> Lopes and Oden (1999) presented participants with alternatives that were not tied to financial incentives. The alternatives presented hypothetical outcomes.



that satisfy the aspiration level with certainty (stage 1) individuals are more willing to take additional risks in their decision process (stage 2) (Mukherjee 2010). In other words, the two stage process proposed by SP|A theory is empirically supported by demonstrating that individuals in more complex, engaging tasks showed riskier behavior when all of the possible outcomes were positive. The results from this study again refute the prospect theory prediction that individuals in the gain domain will exhibit risk-averse behavior.

Despite the evidence providing support for SP|A theory, an important question is how SP|A theory relates to accounting. The relation between accounting and SP|A theory lies in the aspiration level. Prior research in accounting has suggested that management accounting practices can have an important influence on an individual's aspiration levels, which will therefore presumably affect performance (Birnberg et al. 2007). A management accounting example would be whether individuals internalize budget targets and regard achieving the budget target as a matter of success or failure. In effect, budget targets can serve as an individual's aspiration level. Prior research suggests that an important question is how budgeting can directly influence levels of aspiration (Birnberg et al. 2007).

In contrast to all of the research conducted applying prospect theory (e.g., Ruchala 1999; Chow et al. 2007; Drake and Kohlmeyer 2010) there is only one study in accounting that analyzes the applicability or implications of SP|A theory in a budgeting context (Sprinkle et al. 2008). Sprinkle et al. (2008) analyze the trade-off between effort and risk taking in the presence of budget-based targets. Specifically, they analyzed how budget targets, easy or more difficult, as well as costs of effort, affect individuals'

propensity to take risks in a single period investment decision setting. Their application of SP|A theory suggests that individuals with easy budget targets will be more risk-seeking than individuals with more difficult budget targets. Specifically they suggest that easy budget targets will increase the likelihood that more projects will meet the aspiration level with certainty (stage 1) and will therefore lead to more risk-seeking behavior because the probability of missing the aspiration level is eliminated (stage 2). Under a more difficult budget target, however, individuals will strive to achieve the aspiration level, which will more than likely eliminate many risky projects that jeopardize the aspiration level (stage 1) and the selection of projects that meet the aspiration level will only contain less risky options (stage 2).<sup>15</sup> Therefore, the focus on the achievement of the aspiration level leads to more risk-seeking for easy budget targets and more risk-averse behavior for more difficult budget targets. Their results support these predictions and thereby support SP|A theory.

Although Sprinkle et al. (2008) analyzed the applicability of SP|A theory in an accounting context, they did not examine how individuals' reference levels would affect subsequent risky decision making and this limitation was noted by the authors. Therefore, this study will examine how changes in individuals' reference levels affects subsequent risky decision making behavior. It could be that over time individuals reference levels change, which would affect subsequent decision making. A multi-period examination will provide further evidence.

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<sup>15</sup> This statement assumes that there are projects that will guarantee the attainment of the budget target under a moderately difficult budget target. In scenarios where this is not the case, individuals will be forced to be risk-seeking in order to increase their probability of attaining the budget target, as is the case with difficult but attainable budget targets.

## 2.4 Reference Levels

Although there is empirical evidence supporting both prospect theory and SP|A theory, there is a limitation that applies to both theories. This limitation, noted by Kahneman and Tversky (1979) and other researchers (e.g. Koszegi and Rabin 2006; Wakker 2010) relates to the psychological feature of reference dependence. Prospect theory suggests that individuals judge outcomes relative to some comparison point, which divides possible outcomes into regions of gain and loss. In prospect theory, this comparison point is known as the reference point. When prospect theory was first developed, Kahneman and Tversky (1979) recognized that an individual's reference point may shift due to one's expectations or aspiration level (p. 286). SP|A theory suggests that alternatives are evaluated based on whether or not they meet the aspiration level, which also makes SP|A theory a reference-dependent theory.<sup>16</sup>

Most of the research related to prospect theory and to SP|A theory, however, generally assumes that individuals' reference levels have already been determined and are fixed (Wakker 2010). This assumption may be especially true in single-period settings, yet Tversky and Kahneman (1992) recognized that reference levels may shift due to prior experiences, which suggests that over multiple periods individuals' reference level may not remain fixed. Therefore the assumption of a fixed and predetermined reference level does not allow for the fact that individuals' reference levels may shift over

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<sup>16</sup> Reference level, as used in this study, incorporates both reference points (prospect theory) and aspiration levels (security-potential/aspiration level theory).

time, thus leading to possible changes in risk behavior that have not been accounted for in prior accounting literature.<sup>17</sup>

The reliance on the assumption of a fixed and predetermined reference level also revolved around the lack of theory positing how individuals' reference levels were determined. Without a testable theory describing how to identify the reference level the assumption of the reference level as the status quo was adequate. Early theories of decision making pointed out that there was no theory for the location of reference levels and considered this to be a weak point of decision theory (Markowitz 1952).

At prospect theory's conception, Kahneman and Tversky (1979) proposed that an individual's reference level could be related to a number of external or internal factors. These factors include an individual's expectations, aspiration level, exogenously set contract parameters, prior outcomes, etc. (Kahneman and Tversky 1979; Thaler and Johnson 1990). Tversky and Kahneman (1991) developed a theory of reference-dependence for consumer behavior that attempts to explain how an individual's preferences would change when their reference levels change, but did not identify how a reference level is determined.<sup>18</sup> The evolution of prospect theory has led academics to develop a theory relating to how reference levels are determined. This development now

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<sup>17</sup> Although Ruchala (1999) and Drake and Kohlmeyer (2010) examined prior outcomes and the effects on behavior, both studies were single period and prior outcomes were manipulated and not based on actual decisions made by individuals which removes some level of individual control from the experiments, especially in a multi-period experiment. Additionally, neither study measured individuals' reference levels and cannot attribute the change in behavior to a change in reference level. Sprinkle et al. (2008) examined a single period setting and whether SP|A theory could explain individual risk-taking behavior. The current study extends this line of research by examining a multi-period setting where individuals make their own decisions and reference levels are recorded.

<sup>18</sup> Tversky and Kahneman's (1991) reference-dependent theory was able to account for two well established violations of prospect theory, the status quo bias and the endowment effect. The status quo bias occurs when individual decision makers attach additional value to their default options or status quo choice (Ortoleva 2010). The endowment effect refers to the fact that individuals demand much more to give up an object that they own than they are willing to spend in order to acquire the same object (Huck, Kirchsteiger, and Oechssler 2005)

allows researchers to examine how possible changes in reference levels can affect behaviors in a number of settings.

Additionally, many researchers in economics are hesitant to apply prospect theory because they are forced to specify a reference level yet psychological principles about plausible reference levels provide little guidance (Hastie 2001). Various authors have proposed that norms, expectations, levels of aspiration, foregone alternatives, and social comparisons can function as an individual's reference level (Luce, Mellers, and Change 1993; Heath, Larrick, and Wu 1999; Thaler 1999).

Prior to the development of a testable theory, a number of studies began to analyze possible factors that could affect an individual's reference level. McCusker and Carnevale (1995) investigated a resource allocation dilemma and found that expectations driven by a sanction system shifted reference levels, subsequently effecting individuals' contributions.<sup>19</sup> These results suggest that exogenous factors, such as a sanction system, as well as expectations derived from exogenous factors, can influence reference levels. Carnevale (2008) and Seo, Goldfarb, and Barrett (2010) analyzed how affect could impact reference levels. Both studies indicate that affect can influence the location of a reference level in evaluating prospective outcomes by altering individuals risk attitudes depending on their affective reactions to prior events.<sup>20</sup>

Research in finance has analyzed reference levels for stocks and stock valuations. Shefrin and Statman (1985) illustrated that the purchase price of a security serves as a

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<sup>19</sup> The sanction system provided rewards and penalties for individual's contributions to the dilemma, either a public goods dilemma or a common dilemma.

<sup>20</sup> In general, Seo et al. (2010) find a moderating effect of affect on risk taking. Specifically, when individuals have pleasant (unpleasant) affect in the gain domain they are more (less) likely to take on risk. Conversely, individuals in the loss domain are less (more) likely to be risk-seeking when they have pleasant (unpleasant) affect.

reference level for individuals. This contention was supported by Odean (1998), who also suggested that an individual's reference price for securities can change over time, albeit sluggishly. Gneezy (2005) extended this line of research by examining the most likely reference price individuals use in valuing stocks. The experimental results suggest that individuals are most likely to use the historical peak price of the stock as a reference price.

More recently, Arkes et al. (2008, 2010) and Baucells, Weber, and Welfens (2011) began answering questions about how reference prices for stocks changed based on whether stock prices increased or decreased. Using questionnaire data and real monetary incentives, Arkes et al. (2008, 2010) noted that individuals integrated increases in stock price into their reference levels faster than they integrated decreases in the stock price. Specifically, after participants viewed changes in stock prices, they incorporated gains into their reference levels more than losses, and this was especially true when individuals were forced to sell the stock and realize the gain or loss.

Extending Arkes et al. (2008, 2010), Baucells et al. (2011) estimated a model for the formulation of reference levels relating to stock prices. Their model incorporates a number of factors that they find influence individual's reference price: purchase price, most recent price, and the intermediate prices seen by individuals. The purchase price and most recent price in their experiment and model development carried the most weight in the formulation of reference prices while intermediate weights (prices seen during the course of the experiment) received smaller weight. Baucells et al. (2011) is an important development in reference level research, as it is the first article to develop an actual model representing how reference levels are developed. Baucells et al. (2011) conclude

that the model developed is a reasonably good fit for the data and provides an avenue for future research to examine how reference levels are determined in domains other than stock valuations.

Although research has examined reference levels in the stock price domain, there are a number of differences between a stock investment setting and a budget-based compensation setting. In stock investment settings, individuals expect constant fluctuations in prices, and the results from that study may not generalize to an economic setting using budget targets and wages. Another key difference between the two settings is controllability. Individuals have more control over budget target attainment than they do over the stock price. Although individuals are able to select stocks in which to invest, they have no control over whether the stock price will increase or decrease. In an economic setting with budget targets and wages, individuals have control over which alternatives to select and the selection of alternatives has a direct effect on the attainment (failure to attain) of the budget target. In addition, individuals do not ‘expect’ to *not* attain their budget target, and therefore, the failure to attain the budget target may have more of an effect in this setting compared to a stock investment setting where there is an expectation that stock prices can fluctuate both up and down.

Additionally, mental accounting theory suggests that individuals categorize gains and losses into various mental accounts (Thaler 1985, 1999). Research has suggested that the mental accounts individuals use for investments is separate and distinct from the accounts used for income (Thaler 1999). Specifically, prior research has demonstrated that investors leave their mental accounts open indefinitely when their investment has paper losses so that they can avoid the pain associated with a realized loss (Arkes et al.

2008, 2010; Fennema and Koonce 2011). This finding suggests that in a stock investment setting, individuals have the ability to put off closing their mental account until gains and losses are actually realized. In a budget-based compensation setting, however, individuals will realize their gain (attainment of budget target) or loss (failure to attain budget target) in the period of their investment decision.<sup>21</sup> In other words, individuals do not have the option to leave their mental accounts open for an indefinite period of time to avoid the pain associated with realized losses like they would in a stock investment setting.

Prior research in accounting has suggested that attaining or not attaining a budget target or performance goal can affect subsequent risk decisions (Ruchala 1999; Drake and Kohlmeyer 2010). Both of these studies manipulated the attainment of the budget goal so that individuals' decisions did not dictate whether the budget goal was attained or not. One possibility not examined in prior research is that prior performance and concomitantly the success or failure of attaining the budget target can affect individuals' reference levels. This study will extend this line of research by investigating not only how attaining (not attaining) a budget target affects future behavior but also how attaining (not attaining) the target is impounded into reference levels over multiple periods.

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<sup>21</sup> The experimental setting provides feedback for economic outcomes each period. Every investment decision lasts for one year (a single period) and then another investment decision is made in the following period, which lasts for one year.



### **2.4.1 Expectations-Based Reference-Dependent Preferences Theory**

One of the shortcomings of decision theory is the lack of a theory relating to how reference levels are determined.<sup>22</sup> Tversky and Kahneman (1991) developed a reference dependent theory but address how individuals react to deviations from the reference level, not how reference levels are determined. They treat the reference level as exogenously determined, which is adequate for explaining most experimental and survey data, but limits the applicability of the theory. In an attempt at addressing this, Koszegi and Rabin (2006, 2007) developed expectations-based reference-dependent preferences, which is a reference dependent theory that extends prior work in prospect theory.<sup>23</sup>

Reference-dependent preferences assumes that an individual's reference level is developed based on his or her rational expectations, rather than the status-quo. This does not imply that the reference level is not determined, at least in part, by exogenous factors. On the contrary, if an individual has no prior rational expectations, then their reference level should be determined mostly on exogenous factors, such as a budget target. An individual's rational expectations are based on beliefs and perceptions developed in the recent past about outcomes. For instance, rational expectations for future periods could be based on economic outcomes received in a prior period, such as wages paid. In other words, an individual's expectations are used to develop the reference level. Reference-dependent preferences specifies that an individual's reference level is determined endogenously by the economic environment. Therefore, exogenous features, such as contract parameters, are internalized and used in conjunction with an individual's rational

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<sup>22</sup> The lack of specification of how reference levels are developed applies to SP/A theory and aspiration levels as well as prospect theory and reference points.

<sup>23</sup> For the remainder of the study, expectations-based reference-dependent preferences will be referred to only as reference-dependent preferences.

expectations to set the reference level (Koszegi and Rabin 2006). It should be noted that reference-dependent preferences makes an extreme assumption that the reference level is fully determined by the *expectations* a person held in the recent past.

The idea that expectations can determine the reference level is not new. Tversky and Kahneman (1981) stated that “a diversity of factors determine the reference outcome in everyday life. The reference outcome is usually a state to which one has adapted; it is sometimes set by social norms and expectations; it sometimes corresponds to a level of aspiration, which may or may not be realistic,” (p. 456). The importance of reference-dependent preferences is the formalization of a model that describes general rules on how individuals set their reference levels in a number of settings.

Reference-dependent preferences model has a number of appealing features. First, the model indicates that an individual’s utility function has two components, standard consumption utility and gain-loss utility (Koszegi and Rabin 2006; Parra 2010). Standard consumption utility relates to the prospect theory idea that utility is derived from current payments and current efforts. This can be thought of as the material payoff (Daido and Itoh 2010). The additional form of utility, gain-loss utility is derived from departures from a reference level. To illustrate, consider the following example. A worker is expecting to get paid \$50,000 this year, which is based on his/her rational expectations from prior outcomes. Instead of \$50,000, the worker receives \$40,000.<sup>24</sup> In terms of standard consumption utility, the worker would evaluate utility based on the receipt of \$40,000, in accordance with standard prospect theory. Gain-loss utility, on the other hand, captures differences in an individual’s expectations (reference level) and

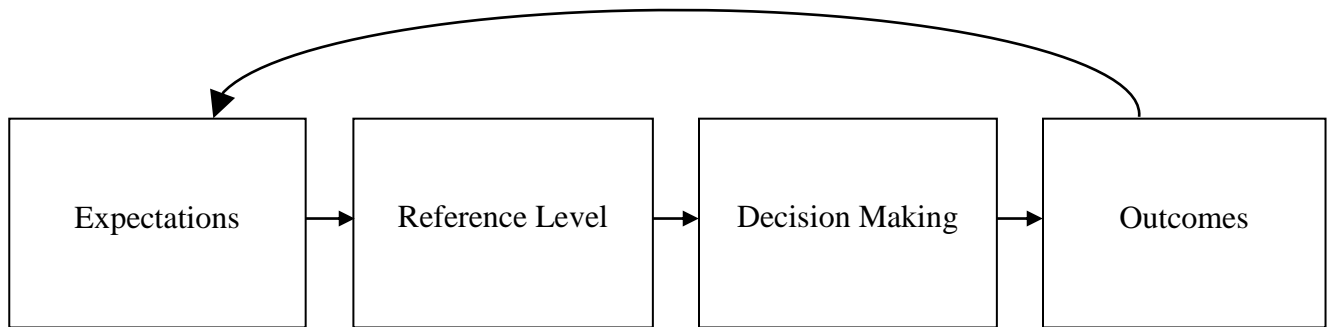
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<sup>24</sup> The reason for the decrease in salary is irrelevant for this example highlighting the difference between the two utility functions.

realized outcomes. In this case, an individual would perceive the \$40,000 as a \$10,000 loss based on the expectation of receiving \$50,000.

In addition to incorporating an additional form of utility, reference-dependent preferences also makes a number of assumptions. Particularly, Koszegi and Rabin (2006) specify the notion of personal equilibrium, which assumes an individual correctly interprets the environment he/she is in and correctly predicts his/her own reaction to the environment given the reference level generated by his/her expectations. Personal equilibrium means that individuals know their reference level, and given that reference level will select an option that is consistent with expectations. Koszegi and Rabin (2006) extend upon the idea of personal equilibrium and introduce the concept of preferred personal equilibrium, which in essence requires the decision maker to select the personal equilibrium plan with the highest *ex ante* expected utility.

The reference-dependent preferences model was developed and applied analytically to consumer behavior and labor market supply by Koszegi and Rabin (2006). In general, by specifying the determination of the reference level based on expectations, and not the status quo, Koszegi and Rabin (2006) demonstrate that there is a relationship between an individual's expectations of purchase (a reference level), price expectations (a reference level) and willingness to purchase (behavior). Specifically, they analytically demonstrate that as an individual's expectation of purchase and price expectations conditional on purchase increase, so too does the willingness to pay for a good. If an individual expects to purchase a good and has certain expectations of the price, these expectations influence an individual's willingness to purchase a good.



**FIGURE 2.** Expectations-Based Reference-Dependent Preferences Theory

Applying the reference-dependent preferences model to a labor supply decision, Koszegi and Rabin (2006) demonstrate that expectations of earned income affect individuals' decisions to work. They show that if income earned is unexpectedly high, a worker is less likely to continue to work because their expectations have already been met. Specifically, they examine cab driver labor supply and apply reference-dependent preferences by inferring that cab drivers have endogenously set income targets. For instance, a driver who averages \$200 a day will have an endogenously set reference level close to \$200. Therefore, a driver with a \$200 reference level who makes \$1,000 in the morning will be less likely to continue working because their reference level has already been met. Additionally, if expected income is high, for example \$400, an individual is more likely to show up for work and continue to work, due to the expectation of high income for the day.

Koszegi and Rabin (2006) demonstrated analytically the applicability of reference-dependent preferences. Since its development, reference-dependent preferences has been analytically applied to a number of domains. For instance, research

has examined price competition among firms with loss-averse consumers and assumes in these models that consumers are loss-averse relative to a reference level, which is determined based on consumers' recent expectations about purchases (Heidhues and Koszegi 2008). More importantly for this study, reference-dependent preferences has been analytically modeled in a principal-agent, moral hazard context. Daido and Itoh (2010) analyze the interaction between reference-dependent preferences and incentives with the main focus revolving around an agent's effort. They show analytically that an agent's higher expectations allow the principal to use lower-powered incentives while still receiving high levels of effort from the agent. An agent with high expectations about his/her performance can be induced to choose high levels of effort with low-powered incentives, which illustrates how expectations of performance can affect individuals' behaviors.

One of the interesting contributions of Daido and Itoh (2010) is the proposition of how individual's reference levels are determined in a principal-agent context. The authors propose that an agent's reference level is determined by his or her expectations about the effort level chosen and the resulting success probability of the project. This specification focuses the analysis more on effort than monetary payoffs.

In addition to analytical analysis, recent empirical work has demonstrated that expectations can and do serve some function in the development of reference levels. Smith (2008) examined experimentally whether individuals' expectations could explain the endowment effect and found that expectations can provide a rational explanation for the endowment effect. Specifically, individuals who are told they "own" an object develop expectations of keeping the object. The expectation of keeping the object

increases the value individuals place on the object, thus leading to a higher reference level than if the reference level was just the status quo.<sup>25</sup> Ericson and Fuster (2011) expand on this line of research and show that increasing individuals' expectations of ownership affects exchange behavior and valuation. The results support the assertion that expectations, at least in part, influence the determination of the reference level.

Extending the empirical tests of reference-dependent preferences, Gill and Prowse (2010) conduct a sequential move tournament experiment and demonstrate that during competition (tournament incentive scheme) individuals have reference levels that are determined by their monetary payoffs and these reference levels are also affected by the choices and outcomes of other competitors.<sup>26</sup> This evidence suggests that monetary payoffs may in fact be incorporated into individual's reference levels. However, these results also suggest that the incorporation of monetary payoffs into reference levels may be contingent on competition.<sup>27</sup>

There is additional empirical evidence that contract parameters may play a role in the determination of reference levels. Abeler, Falk, Goette, and Huffman (2011) analyze individuals' effort levels based on two different forms of contracts. The authors manipulated the amount of fixed wage being offered to participants and informed participants that there is a 50 percent probability they will receive the fixed wage or a 50 percent probability they will receive a piece-rate wage that is determined by their output. Reference-dependent preferences would suggest that if expectations are influential in the

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<sup>25</sup> In the current study, the status quo would be the base wage associated with not attaining the budget target in the initial period.

<sup>26</sup> Gill and Prowse (2010) focus on disappointment aversion in a real effort tournament. Focus on whether individuals who exert effort at a task for a prize reveal disappointment aversion in subsequent tasks.

<sup>27</sup> This is based on social comparison theory (Festinger 1954). Under social comparison theory, individuals compare their outcomes to other's outcomes. Competition exacerbates this comparison.

determination of the reference level, individuals would stay closer to the fixed wage amount because they do not want to exert effort to earn the piece rate when there is a 50 percent probability they will be paid a fixed wage. The results of the experiment demonstrated that individuals in the two distinct fixed wage conditions remained close to the fixed wage amount, suggesting that expectations of future economic outcomes, either the receipt of the fixed wage or the receipt of the piece rate, influence the formulation of individuals' reference levels.

The evidence presented above suggests that expectations play at least a part in the formulation of reference levels. One of the open questions remaining in this literature stream is what constitutes recent expectations. Daido and Itoh (2010) suggest that recent expectations relate to effort and the probability of success related to the outcome. Koszegi and Rabin (2006) suggest recent expectations relating to purchases. This study will extend this literature by examining recent expectations relating to economic payments based on a budget-target compensation contract that incorporates a bonus for attaining the budget target. Specifically, this study will analyze whether individuals' reference levels adjust over time based on prior performance relative to their assigned budget target (economic outcomes), which may impact the effectiveness of budget-based contracts.

### **3.0 HYPOTHESIS DEVELOPMENT**

#### **3.1 Single Period Risky Decision Making Behavior**

Despite all of the evidence supporting SP|A theory, there is only one study in accounting that analyzes the applicability of SP|A theory in a budgeting context. Sprinkle et al. (2008) analyze the trade-off between risk taking and effort in the presence of budget-based contracts in a single period investment decision setting. Their application of SP|A suggests that individuals with easy budget targets will be more risk-seeking than individuals with more difficult budget targets. Specifically, they suggest that easy budget targets will increase the likelihood that more projects will meet the aspiration level with certainty (Stage 1 of SP|A theory) and will therefore lead to more risk-seeking behavior because the probability of missing the aspiration level is eliminated (Lopes and Oden 1999; Sprinkle et al. 2008). Under easy budget targets there will be more projects that allow for the guaranteed attainment of the budget target, which implies that more projects will pass stage 1 of the decision making process. This suggests that individuals place a great deal of weight on the overall probability of success, illustrated here by the guaranteed attainment of the aspiration level (Payne 2005). Therefore, in stage 2, when individuals are suggested to behave in a more risk-seeking manner, there will be more projects from which a selection can be made and individuals will tend to select the alternative with the highest possible payoff.



Under a moderate budget target, individuals will also strive to attain their aspiration level, which will more than likely eliminate many risky projects that will jeopardize the attainment of the aspiration level (stage 1 of SP|A theory) and the selection of alternatives that meet the aspiration level will only contain less risky options (stage 2). Therefore, the focus on the achievement of the aspiration level leads to more risk-seeking behavior for easy budget targets compared to moderate budget targets.

Sprinkle et al. (2008) incorporate a cost of effort component to analyze whether there is a trade-off between risky decision making and effort selection. In the current study, the cost of effort is removed. Therefore, the following hypothesis is necessary to test whether SP|A predictions are applicable to situations where the only consideration is risk and not the cost of effort. Based on SP|A theory, the following hypothesis predicts that individuals under easy budget targets will exhibit more risk-seeking behavior because more projects will pass stage 1 of the decision making process, thus leaving more alternatives in stage 2 where individuals will switch their focus to alternatives with the highest possible outcomes. Under moderate budget targets there will be fewer alternatives that pass stage 1, and the alternatives that do pass stage 1 will generally be the ones with smaller variances, and thus contain less risk, thus leading to more risk-averse selections.<sup>28</sup> Therefore, I hypothesize the following:

**H1:** In an initial task undertaking, individuals with easy budget targets will exhibit more risk taking than individuals with moderate budget targets.

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<sup>28</sup> This argument and the accompanying hypothesis is based purely on SP|A theoretical predictions. In most situations, there will be few, if any projects that guarantee the attainment of a moderate or difficult budget target.

### **3.2 Changes in Reference Levels and Decision Making over Multiple Periods**

A significant caveat in the application of decision theory is the assumption that reference levels are constant and fixed (Koszegi and Rabin 2006; Wakker 2010). This assumption is not supported by theory, however, as Kahneman and Tversky (1979) recognized that individuals' reference levels may shift over time due to expectations or aspiration levels. The assumption of fixed and constant reference levels may hold true in single period settings where individuals make a single decision based on some reference level that is determined based on exogenous factors, whereby expectations of future performance are not yet formulated.

In multiple periods, however, individuals tend to develop expectations of future outcomes. Prior research has noted that expectations, such as expectations of purchase, expectations of daily income, consumers' recent expectations of purchases, employees' expectations of performance, expectations of ownership serve as important inputs to the formulation of individuals' reference levels (Koszegi and Rabin 2006; Heidhues and Koszegi 2008; Smith 2008; Daido and Itoh 2010). Therefore, reference-dependent preferences theory postulates that expectations play a vital role in the formulation of individuals' reference levels.

One of the open questions remaining in this literature stream is what constitutes recent expectations. Daido and Itoh (2010) suggest that recent expectations relate to effort and the probability of success related to the outcome. Koszegi and Rabin (2006) suggest that recent expectations can relate to consumer expectations of purchases. This study will extend this literature by examining recent expectations relating to economic payments based on a budget-based compensation contract that incorporates budget

targets. Specifically, this study will analyze whether individuals' reference levels adjust over time based on prior performance relative to their assigned budget target (economic outcomes), which may impact the effectiveness of budget-based contracts.

A key question relating to reference levels is how the reference level is determined in different contexts. For example, in a budget target setting, an individual could rely on a number of outcomes or options in setting their reference level. Specifically, an individual, particularly in an initial task undertaking, could have a reference level that directly corresponds to the budget target level.<sup>29</sup> In most budget-based compensation contracts, financial incentives are tied to the budget target. It is therefore likely that in a budget-based contract individuals will use the budget target as their reference level. Indeed, prior research suggests that individuals use budget targets as their reference levels in initial task undertakings (Heath et al. 1999; Sprinkle et al. 2008; Larrick et al. 2009). This suggests the possibility that individuals may not adjust their reference levels but rather may adopt their budget target as their reference level and retain the budget target level as their status quo reference level.

On the other hand, over time individuals also receive wages in the form of base salaries and possible bonuses relating to the attainment of budget targets. Therefore, it is possible that individuals will begin to develop expectations of future payment that could affect their reference level. Subsequently, individuals who continually achieve the budget target may adjust their reference level to incorporate their expectations of future payments based on recent prior outcomes. Indeed, prior research suggests that prior outcomes have an effect on individuals' subsequent risk decisions, and the change in

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<sup>29</sup> This would imply a reference level that is equal to the monetary amount for exactly meeting the budget target, which would be the annual base salary.

risky behavior may be due to changes in individuals' reference level (Ruchala 1999; Drake and Kohlmeier 2010). This research suggests it is plausible that individuals incorporate their expectations of future economic payments into their reference levels based on outcomes of prior periods.

Based on the preceding discussion, reference-dependent preferences theory would suggest that individuals' reference levels are at least in part formulated based on endogenously created rational expectations. In an economic setting, these rational expectations can be based on expectations of future economic outcomes, for instance compensation. Therefore, the following hypotheses will examine whether individuals in an economic setting set their reference level based on expectations developed from recent prior experiences relating to their actual financial outcomes or whether they simply rely on a status quo reference level, which in this case should be the budget target. If individuals adjust their reference levels over time in response to expectations of future economic outcomes based on prior experience, then individuals who attain their budget target and receive their base salary plus some amount of variable bonus payment would be expected to show the greatest reference level adjustment. The probability of attaining the budget target is more likely under an easy budget target, yet individuals in the moderate budget condition can select projects that also allow guaranteed attainment of the budget target. Therefore, hypothesis two predicts that individuals who continually attain the budget target will exhibit a greater shift in their reference level because they have received higher levels of payment and have a greater possibility of impounding their expectations of future economic outcomes into their reference levels. To test whether individuals' reference levels change over time the following hypothesis is presented.

**H2:** The greater the frequency by which individuals attain the budget target, the greater the increase in their reference level.

The above hypothesis is designed to test whether reference levels change over time. It does not specify how changes in individuals' reference levels will change behavior. If hypothesis two is not supported, that would suggest that individuals anchor on the designated budget target and expectations do not affect their reference level or risk taking decisions. If, however, reference levels do change over time, this change allows for additional examination of how individuals adjust their behavior with respect to changes in their reference level.

If individuals follow SP|A theory's predictions, then an upward shift in an individual's reference level will lead to more risk-averse behavior. According to SP|A, when an aspiration level increases, the number of alternatives which ensure the aspiration level will be achieved will decrease, most likely eliminating more risky projects in the first stage of project evaluation.<sup>30</sup> Individuals who continually attain the budget target are more likely to impound their expectations of future economic outcomes into their reference levels. Therefore, in the second stage of project evaluation individuals will have fewer risky options to select from, thus leading them to exhibit more risk-averse behavior than if their aspiration levels did not change. In order to test this prediction based on SP|A, the following hypothesis is presented.

**H3:** With knowledge of prior economic outcomes, individuals who have continually attained the budget target will exhibit less risk taking in a task repetition than in an initial task undertaking.

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<sup>30</sup> Recall, under SP|A individuals evaluate projects in two stages. In the first stage the focus is on the attainment of the aspiration level. In the second stage, the focus is on maximizing potential payoffs.

## **4.0 METHOD**

The experimental design is a 1 X 2 between-subjects design which incorporates five experimental periods. The between-subjects variable, budget target is manipulated at two levels: easy and moderate. Participants were randomly assigned to one of the two manipulated conditions. All experimental sessions were conducted in a controlled laboratory setting. The experimental task is a modification of Sprinkle et al. (2008).

### **4.1 Experimental Participants**

Participants for this experiment were from a large southeastern United States university. The participant pool was upper-level undergraduate accounting students. Due to the nature of the task, upper-level undergraduate accounting students were suitable participants. Remus (1986) suggests that students are adequate proxies for managers in experiments involving decision-making tasks. This finding is further supported by research that suggests that students are likely to be better surrogates for managers in experiments involving decision-making tasks than in experiments that examine attitudes and attitude changes (Ashton and Kramer 1980; Houghton and Hronsky 1993). In addition, Trottier and Gordon (2011) suggest that the magnitude of the effect may differ between student proxies and managers but the inferences from the experimental results generally remain unchanged. This suggests that differences between student proxies and managers may have differences in absolute magnitude but do not change the inferences from the study itself.

In addition, experience in selecting projects is consistent with individuals selecting from a series of lotteries. In selecting projects to invest in or lotteries, individuals consider the downside risk, upside risk, and then make a selection (Shapira, 1994). Therefore, upper-level undergraduate accounting students were an appropriate participant pool for this experiment because experience in the task was not expected to interact with any variables of interest (Peecher and Solomon 2001).

## **4.2 Experimental Variables**

### **4.2.1 Independent Variables**

The independent variable in this study is budget target difficulty which was manipulated at two levels: easy and moderate. Budget target difficulty was manipulated in two ways. The first manipulation relates the amount of base salary that individuals receive in the budget target conditions. In the easy budget target condition individuals receive a base salary of 15,000 Lira. The base salary in the moderate budget target condition is 30,000 Lira. The difference in base salary incorporates the notion of uncertainty in pay for the moderate budget target condition, thus leading to a higher base salary. In the moderate budget condition there are fewer projects that allow guaranteed attainment of the budget target. Therefore, the moderate budget target condition incorporates a higher base salary due to the greater uncertainty in pay, which is consistent with the compensation literature, which suggests that increases in the variability of compensation should be somewhat offset by increases in the base salary (Milgrom and Roberts 1992).

The main manipulation of budget target difficulty relates to the differences in the probability of attaining the budget target between the conditions. In the easy budget

target condition five of the seven projects allow guaranteed attainment of the budget target. Only the two riskiest projects do not allow guaranteed attainment of the budget target. In the moderate budget target condition, on the other hand, only two of the seven projects allow guaranteed attainment of the budget target. Only the two least risky projects allow for guaranteed attainment of the budget target. Therefore, this manipulation incorporates the idea that when budget targets are not set to easily attainable levels, there will be fewer alternatives that allow guaranteed attainment of the budget target.

#### **4.2.2 Dependent Variables**

There are a number of dependent variables used to test the hypotheses. The dependent variable for hypothesis one is based on the project that individuals select in the first period. Each project presented has a variance, which represents the level of risk that a particular project has. The use of variance as a proxy for project risk is analogous to prior research (Chow and Haddad 1991; Sayre, Rankin, and Fargher 1998; Chow et al. 2007; Drake and Kohlmeier 2010) and is based on the vast literatures in finance dealing with decision making under risk and uncertainty. The variance of each project, which is operationalized as the difference between the highest and lowest amounts paid if the budget is met, is impacted by a number of components. The variance in the amount of payments that can be received from attaining the budget target are impacted by three components: (1) the amount of base salary an individual will receive if the budget target is missed, (2) the lowest amount paid if the budget target is met, and (3) the probability of attaining the budget target.



The amount of base salary is determined by the budget condition: 15,000 in the easy budget condition and 30,000 in the moderate budget target condition. This amount remains consistent for all projects within a particular budget target condition. The lowest amount paid if the budget target is met is consistent across conditions and decreases as the amount of risk in a project increases. Specifically, the lowest amount paid if the budget target is met for the least risky project is 182,500 Lira, while the lowest amount paid if the budget target is met for the most risky project is 40,000 Lira.

The last component of the variance is the probability of attaining the budget target. This component simulates downside risk, which is the probability of the worst case scenario occurring, in this case missing the budget target (Shapira 1994). The probability of attaining the budget target impacts the highest amount that can be received if the budget target is attained. Specifically, all projects presented have equivalent expected values of 185,000 Lira. Therefore, the components mentioned above all impact the value of the highest amount that can be received if the budget target is met. The probability of attaining the budget target, in particular, dictates the percentage chance that an individual will or will not attain the budget target. This, in turn, dictates whether the individual will receive the base salary if the budget target is not attained, or some equally likely number within the range of the lowest and highest amounts paid if the budget target is met.

The variance, as described above, is measured as the difference between the lowest and highest amounts paid if the budget target is attained because this difference captures the parameters that are used to define risk in this study. Therefore, the variance of a particular project selected is used as the dependent variable for hypothesis one.

Although the variances of projects differ across the experimental conditions, the variances are designed to bias against finding results for hypothesis one. Attempts were made to create equal variances for each project, however, this led to unequal expected values of the projects. Therefore, the decision was made to include variances that differ between experimental conditions, which bias against results, rather than to present projects that varied in expected value.

The dependent variable for hypothesis two is the change in an individual's reference level. Before the main experiment, individuals answered the following question, "At what level of payment would you have neither positive nor negative emotion?" The answer to this question serves as an individual's baseline reference level, or reference level at time  $t = 0$ . This question was asked after participants were informed of their compensation contract. After each period of the main experiment individuals answered this question again, thus creating reference levels at times,  $t = 1, 2, 3, 4, 5$ . The dependent variable, change in reference level, is measured as the difference between an individual's reference level at  $t = 5$  and the baseline reference level,  $t = 0$ . Additional measures were created for sensitivity analysis but the results of hypothesis two are presented based on the measurement described above.

The dependent variable for hypothesis three assesses whether individuals exhibit a change in risk-taking behavior over time. This variable is measured as the difference between an individual's project selection in period 1 versus the project selection in period 5. Thus, this measure will capture the difference in the level of risk an individual was willing to take over time.

### 4.2.3 Control Variables

There are a number of control variables that were measured during the experiment. The first control variable was individuals' innate risk preferences. Individuals can have differing attitudes towards risk, which may impact their selection of risky alternatives. Therefore, a risk preference task from Holt and Laury (2002) was included to capture individual risk preferences. This scale requires individuals to select between two alternatives. One of the alternatives was more "safe" while another was more "risky." In total ten selections were made. Individuals' innate risk preference was measured as the number of risky choices made out of the ten selections. Therefore, a higher score on the risk preference scale indicated that the individual is more risk-seeking.

A loss-aversion scale from Brink and Rankin (2011) was included to measure individuals' innate loss aversion. The scale is similar to the risk preference scale and required individuals to select between two alternatives. The difference, however, is that the alternatives in the loss aversion scale vary the amount of possible loss that an individual could incur. Specifically, one option presented a small gain versus a small loss, and the expected value of the outcome was zero. The other option presented a positive gain of \$6.67 versus increasing levels of losses. As participants moved down the scale, the possible loss from this option increased to the point where the loss was larger than the possible gain of \$6.67. An individual's innate loss-aversion was measured as the number of loss-averse selections made. Therefore, a higher score on the loss-aversion scale indicates that the individual is more loss-averse. An individual who is extremely averse to losses may only select less risky projects. On the other hand, individuals who

are not averse to losses may select riskier projects. Therefore, this measure was included to rule out this possibility.

In the proposed statistical analysis of hypothesis two and hypothesis three, a control variable for future expectations was included in the analysis. To assess future expectations, individuals were asked the following question: “What do you think the outcome of your decision in the next period will be?” This question was asked after every period of the main experimental task. This question was included to capture individual’s expectations of future economic outcomes, that is, their expectation of the outcome in the next period. According to expectations-based reference dependent preferences, expectations of future economic events influence the setting of individuals’ reference levels. Therefore, it is necessary to control for individuals’ future expectations of economic outcomes.<sup>31</sup>

In the analysis, future expectations are always related to the period before the reference level period. For example, in hypothesis two, future expectations recorded after period four were included in the statistical tests. The dependent variable for hypothesis two is the change in reference level comparing the baseline reference level in period zero to the reference level reported in period five. Therefore, the future expectations from the period before the final reference level measure were included in the statistical analysis. Participants’ future expectations for a particular period always lagged one period behind the reference level period.

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<sup>31</sup> Future expectations were not significant in any hypothesis test. Therefore, it is not presented in the tests of hypotheses.

<b>Variable Name</b>	<b>Question/Definition</b>
<b>Dependent Variables</b>	
Project Selection Variance	The variance of the project a participant selects
Change in Project Selection Variance	The difference between the project variance in period 5 and the project variance in period 1
Reference Level	At what level of payment would you have neither positive nor negative emotion?
Change in Reference Level	Difference between current period reference level and the baseline reference level at $t = 0$
<b>Independent Variable</b>	
Budget Condition	Two budget target levels: easy and moderate. Manipulated through annual base salary (15,000 – easy, 30,000 – moderate) and probability of meeting the budget target.
Attained Budget Target	Count variable which adds the number of times an individual has attained the budget target. Different depending on the period of interest
<b>Covariates</b>	
Risk Preference	Measured using the Holt and Laury (2002) risk preference task which captures individual's innate risk preferences. Measure ranges from 0 – 10, with higher scores representing more risk-seeking.
Loss Aversion	Measured using the Brink and Rankin (2011) loss aversion task which captures individual's innate loss aversion. Measure ranges from 0 – 10, with higher scores representing more loss aversion.
Economic Outcome	Participant compensation for a period, presented in Lira
Attained Budget Target <sub>t=i</sub>	Dichotomous variable equal to one if participant attained the budget target in period $I$ and equal to zero if not.
Future Expectations	What do you think the outcome of your decision in the next period will be?

**FIGURE 3.** Variable Definition

The last control variable is economic outcome. This variable was also included as a control variable for hypothesis two and hypothesis three. Economic outcome relates to

the outcome an individual had in a prior period. According to expectations-based reference dependent preferences, outcomes of prior decisions impact the setting of individuals' reference levels. In the statistical analysis, economic outcomes are always related to the reference level period. For example, if change in reference level is comparing the reference level from period zero to period five, then economic outcomes would be measured as the economic outcome from an individual's decision in period five.

An alternative measure for economic outcomes was based on whether or not an individual attained the budget target in the prior period. Therefore, Attained Budget Target was a dichotomous variable equal to one if an individual attained the budget target and zero if they failed to attain the budget target. Both measures of economic outcomes were included in the appropriate hypotheses tests.

### **4.3 Experimental Task and Procedure**

The experimental procedures described in this section are modified from Sprinkle et al. (2008). The business context of the experiment is modified from Chow et al. (2007). The experiment was conducted using a web-based software program. When participants entered the experimental site they were seated at individual computers. The session leader then informed participants that they would be completing several activities and that the entire experiment would last approximately one hour. Before beginning any tasks relating to the experiment participants read an instruction page that thanks them for their participation and also serves as IRB informed consent.

Participants then logged onto their computers and entered the URL address providing a link to the experimental materials. Upon entering the URL address,

participants read instructions related to a letter decoding task that was similar to a task derived from Chow (1983). The purpose of the letter decoding task was not to garner information related to the dependent variables of interest. Instead, the letter decoding task enabled participants to earn the right to continue on in the experiment and make selections between lotteries, rather than being endowed the right to select between lotteries.<sup>32</sup> Prior research has demonstrated that participants make different choices depending on whether they earn or are endowed with their choice (Hoffman and Spitzer 1985; Hoffman, McCabe, Shachat, and Smith 1994; Boylan and Sprinkle 2001).

In the letter decoding task participants were shown a decoding key that assigns specific numbers to letters. For example, twenty-six could be assigned to A, and fourteen to letter B, etc.<sup>33</sup> In order to answer a particular problem, individuals had to look up a particular letter and then enter in the corresponding number. In addition to providing information on how the letter decoding task works, the instructions also informed participants they would earn \$2 for completing this portion of the experiment. Additionally, participants were informed that they must decode fifty-five letters in the main decoding session to earn the right to continue participating in the experiment. They were also informed they have the opportunity to earn significantly more money in the latter stages of the experiment. Participants who did not meet the performance requirement were paid \$2 and asked to leave the experiment.

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<sup>32</sup> Tasks after the letter decoding task require participants select between lotteries. Additionally, the main experimental task could be viewed as a lottery selection. Therefore, it was important to ensure participants earned the right to choose between lotteries rather than be endowed with the right to choose between lotteries.

<sup>33</sup> An example letter decoding key is presented in Appendix B.

After reading the instructions for the letter decoding task participants performed a one-minute training session to familiarize themselves with the task. Feedback related to individual performance was provided following the completion of the one-minute training session. The feedback contained the correct number of letters decoded as well as the number of incorrect letters decoded.

Participants then completed one main letter decoding session that lasted for three minutes. After the main decoding session participants received feedback highlighting the number of correctly and incorrectly decoded letters to numbers. Once the main letter decoding session was complete, any participant who did not meet the minimal performance requirement was paid \$2 and asked to leave the experiment.<sup>34</sup>

Participants were then asked to complete a risk preference task (Holt and Laury 2002) and a loss aversion task (Brink and Rankin 2011). These tasks were included to capture individuals' risk preferences, which indicate individuals' propensity for risk, whereas the loss aversion task captured how individuals react to possible losses. Before completing the risk preference and loss aversion tasks participants were informed that they would be compensated based on one randomly selected lottery from each task, thus placing monetary incentives on their selections of lotteries.

Before participants completed the risk preference and loss aversion tasks they were asked a question to ensure they understood how they were being compensated for these two tasks. Participants had five chances to answer this question correctly. After a fifth attempt to answer the question correctly participants were informed of the correct

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<sup>34</sup> A similar effort-intensive exercise was used in Sprinkle et al. (2008) and no participants failed to meet the performance requirement. Decoding fifty-five letters in a three session was not considered to be a difficult achievement. However, a number of participants failed the letter decoding performance requirement.



answer. This provided assurance that participants understood the compensation aspect of these two tasks. Participants were informed of their earnings from the completion of these two tasks at the end of the experiment.<sup>35</sup>

After completing the risk preference and loss aversion tasks participants were shown an introduction page for the main experimental task. The page informed participants that they would be compensated based on two randomly selected periods from the main experimental sessions.<sup>36</sup> Participants were also told that their actual payments based on their selections in the main experimental session would be calculated based on a conversion of experimental currency (Lira) to U.S. dollars at a rate of 20,000 Lira to \$1 U.S. dollar. The average compensation per participant was \$24.54 for all participants and \$30.30 for those participants who passed the letter decoding performance requirement.

Although the main experimental task was modified from Sprinkle et al. (2008) it was set in the context of the Chow et al. (2007) study. Participants were shown a narrative describing ABC Company. ABC Company was described as a manufacturing firm that produces a wide array of products in any given year. Participants were asked to assume the role of a product manager for ABC Company and were told that as product manager they are responsible for selecting which product to produce. Participants were informed that ABC Company has more than one product manager and that all products they select to manufacture and market are short-term in nature and that each products'

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<sup>35</sup> Participants were informed of their compensation from the risk preference and loss aversion tasks at the end of the experiment so that money earned from these tasks was not included in individuals reference levels, avoiding any potential impact on individuals decision making in the main experiment task.

<sup>36</sup> Participants were not informed of how many periods were in the main experimental task to avoid strategic decision making and end-game effects.

duration will be one year. The materials stated that each product manager is allocated funds each year to select and manufacture one product out of a myriad of options that will be provided and all products have equivalent costs to manufacture and market.

The background page also contained information relating to the budget target manipulation. Specifically, participants were told that ABC Company pays its product managers an annual base salary plus a bonus based on returns above a budget threshold.<sup>37</sup> In the easy (moderate) budget target condition, participants were informed that their annual base salary is 15,000 (30,000) Lira and the budget threshold level was set such that most (few) alternatives guarantee the attainment of the budget target. Accordingly, in the easy budget target condition five out of the seven alternatives guarantee the attainment of the budget target while in the moderate budget target condition only two of the seven alternatives guarantee the attainment of the budget target.

After reading the description of ABC Company and being informed of the budget target condition, the materials described how managers are compensated. Participants were then shown two examples that describe in detail all information relating to the project information presented.<sup>38,39</sup> The examples presented four pieces of information to participants: probability of meeting the budget, amount paid if budget is **not** met, lowest amount paid if budget **is** met, and highest amount paid if budget **is** met. If the budget is met, participants will be paid an amount between the lowest and highest amount paid if the budget **is** met, with each value having an equal probability of selection.

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<sup>37</sup> In the experimental materials, budget targets were referred to as budget thresholds (Sprinkle et al. 2008).

<sup>38</sup> The term product and project are used interchangeably. Participants saw the term product in the experiment. The term project is in most cases for ease of reading and interpretation.

<sup>39</sup> The product examples followed procedure similar to Sprinkle et al. (2008) who used two demo projects as examples for participants. Both of the two examples had expected values that were significantly lower than the projects that are presented in the main experimental sessions. The explanation will explain what each piece of information represents and how to calculate average payments.

The information that is presented is consistent with prior literature that suggests managers make risky decisions by taking into account the worst case scenario (not meeting the budget, amount paid if budget **not** met), the probability of meeting a target (probability of meeting budget target), and the best case scenarios (lowest and highest amounts paid if budget **is** met) (Shapira 1994). The presentation format is identical to Sprinkle et al. (2008) and is different from most studies of risky decision making that generally rely on presenting participants with probability distributions (e.g., Chow et al. 2007).

The information presented in the easy (moderate) budget target condition for the two example problems was consistent with the manipulations of budget target. Specifically, the amount paid if the budget is not met was equivalent to the annual base salary that participants were informed they would receive. The example problems for both budget target conditions had equivalent expected values. Based on the information presented in Figure 4, this project has a 65 percent chance of meeting the budget and therefore has a 35 percent chance of missing the budget. If the budget target is not met then the manager would be paid his/her annual base salary, 15,000. If, however, the budget target is attained, then the manager would be paid some amount ranging between 170,000 and 268,462, with each value having an equal probability of occurring. Therefore, the average pay for attaining the budget, based on Figure 4, would be 219,231.

<b>Product A – Low Budget Condition</b>	
Probability of Meeting the Budget	65%
Amount Paid if Budget is <b>Not</b> Met	15,000
Lowest Amount Paid if Budget <b>Is</b> Met	170,000
Highest Amount Paid if Budget <b>Is</b> Met	268,462

**FIGURE 4.** Example Project Problem

There is a second project example that illustrates the same information using different parameters. Specifically, the second project example guaranteed the attainment of the budget target. Once participants were satisfied with the first two example projects, they were shown two additional example projects that did not include any descriptions and were asked a number of questions. For each example project there were three questions. The three questions were: (1) For Product A (B), what is the probability the budget will not be met? (2) For Product A (B), what amount will the manager earn if the budget threshold is not met? (3) For Product A (B), what is the expected average payoff if the budget threshold is met? These questions were designed to ascertain whether participants understood the project information that was presented and how managers are compensated based on their project selection.

Once participants answered the understanding questions satisfactorily,<sup>40</sup> they were reminded that they would be compensated based on two randomly selected rounds of the main experimental task and that they were to assume the role of a product manager. Additionally, participants were shown their annual base salary and how their budget target level was set (easy or moderate). Before beginning the actual experimental task,

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<sup>40</sup> Participants who answered the understanding questions incorrectly the first time were asked to answer them again. If they did not correctly answer the questions after two attempts the correct answer was provided. The number of attempts to correctly answer these questions was recorded.

participants answered a number of questions. They answered a reference level question, which asked participants, “At what level of payment would you have neither positive nor negative emotion?” The reference level question was asked prior to the main experimental task in order to ascertain individuals’ reference levels that were used in making the initial period project selection and served as the baseline reference level to ascertain whether reference levels change over the course of the experiment.

Additionally, participants were asked a question relating to the main experiment compensation. Specifically, participants were asked, “Of all the product decisions you will make, how many will be randomly selected and used as a basis for your experimental compensation?” Participants had five attempts to answer this question correctly. After a fifth attempt participants were informed of the correct answer. This question provided assurance that participants understood how they were to be compensated for their decisions in the main experimental task.

After answering the reference level and compensation question, participants began the main experiment. During each session the computer program displayed the same seven projects in varying order, thereby controlling for ordering effects. The seven projects were designed to simulate a risk-return relationship. Specifically, taking lower risks generally entails “safer” returns, whereby there is a smaller variance between the lowest and highest amounts that could be received. Taking higher risks, on the other hand, generally provides the opportunity for higher returns, yet provides the possibility of lower returns (Unser 2000; Klos, Weber, and Weber 2005; Rossi and Timmerman 2010). The simulation of the risk-return relationship was incorporated in the variance of payments between the lowest and highest amounts paid if the budget is met. As can be

seen in Figure 5, the variance incorporated in each project increases going from project one to project seven. For example, the variance for project one was 5,000 while the variance for project two was 10,000.

In both budget target conditions, the lowest amount paid if the budget is met was held constant. The highest amount paid if the budget is met, however, varied between budget target conditions because of a number of differences between the budget target conditions. One of the differences was the amount of annual base pay. In the easy budget target condition, the annual base salary was 15,000, which corresponds to the amount paid if the budget is not met. In the moderate budget target condition, the annual base salary was 30,000. In order to maintain equivalent expected values between conditions, the highest amount paid if the budget target is attained was different for all projects except projects one and two.

Another reason for differences in the highest amount paid was the manipulation of the probability of meeting the budget target. The probability of meeting the budget target was also a factor of risk, in addition to the variance of each project. Prior research has suggested that measures such as variance do not adequately capture risk because variance, for example in a probability distribution, captures positive returns as well as negative returns (Unser 2000). Therefore, the probability of meeting the budget was included as a measure of downside risk, which research suggests is used by managers in risky decision making (Shapira 1994). The downside risk in this case was the possibility of missing the budget target. The probability of meeting the budget target was manipulated for certain projects to simulate differences between moderate and easy budget targets. For projects one, two, six, and seven, the probability of meeting the

budget target remained the same in both budget target conditions. In the easy budget target condition, the probability of meeting the budget for projects three, four, and five was 100 percent.

<b>Easy Budget Target</b>		1	2	3	4	5	6	7
Probability of Meeting the Budget		100%	100%	100%	100%	100%	60%	55%
Amount Paid if Budget is Not Met		N/A	N/A	N/A	N/A	N/A	15,000	15,000
Lowest Amount Paid if the Budget is Met		182,500	180,000	167,500	95,000	80,000	65,000	40,000
Highest Amount Paid if the Budget is Met		187,500	190,000	202,500	275,000	290,000	531,667	608,182
Expected Value		185,000	185,000	185,000	185,000	185,000	185,000	185,000
Variance		5,000	10,000	35,000	180,000	210,000	466,667	568,182

<b>Moderate Budget Target</b>		1	2	3	4	5	6	7
Probability of Meeting the Budget		100%	100%	75%	70%	65%	60%	55%
Amount Paid if Budget is Not Met		N/A	N/A	30,000	30,000	30,000	30,000	30,000
Lowest Amount Paid if the Budget is Met		182,500	180,000	167,500	95,000	80,000	65,000	40,000
Highest Amount Paid if the Budget is Met		187,500	190,000	305,833	407,857	456,923	511,667	583,636
Expected Value		185,000	185,000	185,000	185,000	185,000	185,000	185,000
Variance		5,000	10,000	138,333	312,857	376,923	446,667	543,636

**FIGURE 5.** Projects to Select from for Easy and Moderate Budget Target Conditions

In the moderate budget target condition, however, the percentages of attaining the budget target were the same or lower, simulating a more difficult budget target to attain. For project three, the probability of attaining the budget target was 75 percent in the moderate budget target condition, compared to 100 percent in the easy budget target condition. For project 4 the percentage falls to 70 percent (100 percent in easy budget target condition) and for project five the percentage falls to 65 percent (100 percent in the

easy budget target condition). The decrease in the percentage chance of attaining the budget also corresponded to an increase in variance. Thus both indicators of risk (variance and probability of attaining the budget) increased from project three to project seven in the moderate budget target condition. The probability of attaining the budget target was 60 percent and 55 percent respectively for projects 6 and 7.

In the main experimental sessions participants selected which project they wished to produce, which entailed manufacturing and marketing a product. The variance of the project selected served as one of the main dependent variables in the study. This dependent variable identified the level of risk participants were willing to take in their initial project selection decision. After the first project selection, participants were shown whether or not they attained the budget target and the economic outcome of their decision in Lira. Then participants answered questions about their reference level and their expectations of future economic outcomes for the next period. For future expectations, participants answered the following question, “What do you think the outcome of your decision in the next period will be?” Answers to the question relating to reference levels served as a main dependent variable for hypothesis two. The rest of the main experimental sessions continued in the same fashion. For each period, the projects presented were the same. The order in which the projects were presented, however, varied each period so that no participant saw the same order of projects twice.<sup>41</sup>

After completing the five experimental periods participants were asked to complete a post-experimental questionnaire. The post experimental questionnaire contained a manipulation check question for budget target level and general demographic

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<sup>41</sup> There were five different orders of projects, one for each period. The sequences of the five specific orders of projects were also varied between participants.



questions. In addition to demographic questions, the post experimental questionnaire asked participants how important it was to meet their budget target. There were also questions addressing whether participants made their project selection decisions in the experiment as if they were facing a real world situation. Additional questions ascertained the degree to which participants' decision making was influenced by their budget target and how important it was for the participant to attain the budget target. Once participants completed the post-experimental questionnaire they were debriefed, paid, and dismissed.

## 5.0 RESULTS

The results section begins with a discussion of the study's participants, which includes information on the participants and identifying those participants excluded from statistical analysis. I then present descriptive statistics on variables of interest in the study. The assumptions applicable to the statistical tests used are analyzed, following which I present the results of the tests of hypotheses. I then conclude this section by discussing supplemental analysis.

### 5.1 Analysis of Participant Demographic Information and Responses

Fifty-five individuals participated in the experiment. The participants were recruited from upper-level accounting courses at a large university in the Southeastern United States. Due to the nature of the task, upper-level accounting students were suitable participants. As per Table 5.1 Panel A, there were fifty-five participants who participated in the experiment. Of the fifty-five participants, twenty-seven participants in the experiment were in the easy budget target condition and twenty-eight participants were in the moderate budget target condition.

In the easy budget target condition, four of the twenty-seven individuals failed the letter-decoding performance requirement. The requirement was to decode fifty-five letters into numbers during a three minute session. In addition, three individuals in the easy budget target condition provided irrational answers to the risk preference scale.<sup>42</sup>

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<sup>42</sup> The three individuals continually switched decisions between risk-averse and risk-seeking.

**TABLE 5.1.** Participant Demographic Statistics

<b>Panel A: Description of Participant Sample</b>				
	Easy Budget <u>Target</u>	Moderate Budget <u>Target</u>	<u>Total</u>	
Total Participants	27	28	55	
Failed Performance Requirement	4	8	12	
Irrational Risk Preference Behavior	3	0	3	
Participants Used in Subsequent Analysis	20	20	40	
<b>Panel B: Participant Demographic Statistics</b>				
	Easy Budget <u>Target</u> <u>(s.d.)</u>	Moderate Budget <u>Target</u> <u>(s.d.)</u>	<u>Total</u> <u>(s.d.)</u>	<u>Significance</u> <u>level</u> <u>(p-value)</u>
Gender	30%	75%	52.5%	3.192 (0.01) <sup>a</sup>
Age	23.2 (4.086)	23.5 (3.502)	23.35 (3.759)	0.062 (0.80) <sup>b</sup>
Work Experience	2.5 (3.487)	2.6 (3.912)	2.55 (3.658)	0.007 (0.93) <sup>b</sup>

<sup>a</sup> Tested using Chi-Square analysis. Percentages presented as the percentage of men in each condition. Significance of Chi-Square value.

<sup>b</sup> Tested using univariate comparison of means. Significance of F-Value.

Therefore these three individuals were not included in the analysis as risk preference is an important control variable. Eight participants in the moderate budget target condition failed the letter-decoding performance requirement. These exclusions left twenty observations in the easy budget target condition and twenty observations in the moderate budget target condition for subsequent statistical analysis.

Panel B of Table 5.1 illustrates that there were no statistically significant differences of participants in the easy budget target condition and the moderate budget

target condition regarding age and work experience. There was, however, a statistically significant difference in gender across conditions ( $p = 0.01$ ). As can be seen in Table 5.1 Panel B only 30 percent (6 participants) were male in the easy budget target condition while 75 percent (15 participants) were male in the moderate budget target condition. Because this variable is different across conditions a dichotomous variable controlling for gender was included in all hypotheses tests.

Every participant answered a post-experimental questionnaire that asked numerous questions. All of the questions were answered on a nine-point Likert scale (1 = Not at all, 9 = Completely). As can be seen in Table 5.2 participants in the easy budget target condition ( $\bar{x} = 7.25$ ) perceived that their budget target was easier to attain than individuals in the moderate budget target ( $\bar{x} = 6.10$ ) and this difference is statistically significant ( $p = 0.06$ ). Additionally, the table shows a significant difference ( $p = 0.08$ ) in how the budget target impacted participants' evaluation of the projects.

Table 5.2 also illustrates that overall participants felt the budget target was important ( $\bar{x} = 7.93$ ), that the budget target affected project selection ( $\bar{x} = 7.48$ ), that the experiment was easy to understand ( $\bar{x} = 8.28$ ), and there were not too many projects to select from ( $\bar{x} = 2.98$ ).

Participants in both budget target conditions perceived that their budget target was not difficult to attain ( $\bar{x} = 3.35$ ).<sup>43</sup> Although participants in the easy budget target condition had a lower overall response ( $\bar{x} = 3.00$ ) than the moderate budget target condition ( $\bar{x} = 3.70$ ) there was no statistically significant difference between the budget target conditions. This could imply that individuals felt the budget target was not

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<sup>43</sup> All response means were significantly different from the 9-point Likert scale neutral point of four and a half at  $p < 0.01$ .

difficult to attain because in both budget target conditions there were projects that guaranteed the attainment of the budget target. To further examine whether individuals perceived a difference between budget targets conditions, a composite variable was created. The composite variable contained responses to “Budget target was easy to attain” and reverse coded responses to “Budget target was difficult to attain”. As can be seen in Table 5.2, there is a statistically significant difference between conditions ( $p = 0.02$ ), which suggests the manipulation of budget target difficulty was successful.

**TABLE 5.2.** Participants Perceptions Regarding the Experiment

Participant Responses to Post Experimental Questionnaire				
	Easy Budget Target n = 20 (s.d.)	Moderate Budget Target n = 20 (s.d.)	Total N = 40 (s.d.)	p-value <sup>a</sup>
Budget target was easy to attain	7.25 (1.65)	6.10 (2.15)	6.68 (1.979)	0.06
Evaluation of alternatives depended upon my budget target	7.40 (1.759)	6.20 (2.462)	6.80 (2.198)	0.08
The budget target was important to me	8.00 (2.152)	7.85 (1.599)	7.93 (1.873)	0.80
Budget target affected my product selection	7.25 (1.773)	7.70 (1.525)	7.48 (1.648)	0.39
Budget target was difficult to attain	3.00 (1.892)	3.70 (2.003)	3.35 (1.955)	0.26
Experiment was easy to understand	8.25 (1.251)	8.30 (1.302)	8.28 (1.261)	0.90
There were too many projects to select from	2.95 (1.849)	3.00 (1.947)	2.98 (1.874)	0.93
Combination of Easy to Attain and Difficult to Attain <sup>b</sup>	14.45 (2.564)	12.40 (2.780)	13.43 (2.836)	0.02

<sup>a</sup> One-way ANOVAs were conducted for all comparisons between conditions.

<sup>b</sup> This variable is a combination of (1) budget target was easy to attain and the reverse coding of (2) budget target was difficult to attain.

## 5.2 Experiment Understanding, Manipulation Check Question, and Compensation Check Questions

Participants were also asked a number of questions regarding their understanding of the project information that was presented every period. Figure 6 contains the questions that were asked to ascertain participants understanding relating to two example problems.<sup>44</sup> Table 5.3 contains the results of these questions. Three of the six questions were answered correctly by all of the participants. Question three for Product A pertained to the average expected payoff if the budget threshold is met. Thirty-three of the forty participants (82.5 percent) answered this question correctly on the first attempt and there was no statistically significant difference between the budget target conditions. Of the seven (17.5 percent) who missed this question on the first attempt, five (12.5 percent) answered correctly on their second attempt. Only two (5 percent) participants failed to answer this question correctly in two attempts.

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### **Product A**

For Product A, the probability of not meeting the budget is...

For Product A, the amount paid if the budget threshold is not met is...

For Product A, what is the average expected payoff if the budget threshold is met?

### **Product B**

For Product B, the probability of not meeting the budget is...

For Product B, the amount paid if the budget threshold is not met is...

For Product B, what is the average expected payoff if the budget threshold is met?

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**FIGURE 6.** Experiment Understanding Questions

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<sup>44</sup> Participants answered questions relating to two products, A and B. These products had equal expected values across budget target conditions. Product A did not guarantee the attainment of the budget target. Product B did guarantee the attainment of the budget target. The expected value of both Product A and Product B were lower than the expected values of the projects presented in the main experiment.

**TABLE 5.3. Experimental Task Understanding**

Participant Task Understanding Questions <sup>a</sup>			
	<u>Easy Budget Target</u>	<u>Moderate Budget Target</u>	<u>Overall</u>
Product A Question 1 <sup>b</sup>	100%	100%	100%
Product A Question 2 <sup>c</sup>	100%	100%	100%
Product A Question 3 <sup>d</sup>	90%	75%	82.5%
Product B Question 1 <sup>b</sup>	100%	100%	100%
Product B Question 2 <sup>c</sup>	95%	90%	92.5%
Product B Question 3 <sup>d</sup>	95%	100%	97.5%

<sup>a</sup> Percentages presented as percent who answered correctly on the first attempt. Participants were given two attempts to answer correctly. After the second attempt the correct answer was shown

<sup>b</sup> Question about the probability of not meeting the budget for example products A and B

<sup>c</sup> Question about the amount paid if the budget threshold is not met for example products A and B

<sup>d</sup> Question about the *average* expected payoff if the budget threshold is met for example products A and B

For Product B, question two, thirty-seven (92.5 percent) of the participants answered correctly on the first attempt and the remaining three participants (7.5 percent) answered correctly on the second attempt. For Product B question three, thirty-nine (97.5 percent) answered correctly on the first attempt and one participant (2.5 percent) answered correctly on the second attempt. There were no statistically significant differences between the budget target conditions. These results suggest that participants had a thorough understanding of the project information that was presented to them. The two participants (5 percent) who failed to answer the questions correctly were shown the correct answer before they were allowed to move forward in the experiment.<sup>45</sup>

Contained in the post experiment questionnaire there was one manipulation check question to ensure that the experimental manipulation was successful. In addition there were two compensation related questions asked during the experiment to ensure that participants understood how they were being compensated for their decisions. Figure 7

<sup>45</sup> Results of the hypotheses tests are qualitatively unchanged when they are removed from the statistical analysis.

contains the experiment manipulation check question as well as the two compensation related questions.

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<b>Experiment Manipulation Question</b>	
Of the seven products presented, how many guaranteed the budget target would be attained?	Most, Few
<b>Compensation Check Questions</b>	
<i>Risk Preference/Loss Aversion</i>	
Each task you are about to complete contains ten sets of options. For an individual task (ten sets of options), how many rows will be randomly selected for compensation?	1, 2, 3, 5, 7
<i>Main Experiment</i>	
Of all the product selection decisions you will make, how many will be randomly selected and used as a basis for your experimental compensation?	1, 2, 3, 5, 10

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**FIGURE 7.** Experiment Manipulation Check Question and Compensation Check Questions

The results of these manipulation checks are presented in Table 5.4. Nineteen of the twenty participants in the easy budget target condition correctly answered the experiment manipulation check question. However, only fourteen of the twenty participants in the moderate budget target condition answered the question correctly. A Chi-square test to assess whether the percentages of passing/failing were different across budget target conditions reveals there is a statistically significant difference ( $\chi^2 = 4.329, p = 0.04$ ). Additional analysis, however, reveals no statistically significant differences in the reference levels between the participants who passed and failed the manipulation check ( $F = 0.892, p = 0.51$ ). There is also no significant difference in product selection



variance ( $F = 0.568, p = 0.72$ ).<sup>46</sup> The hypotheses tests and sensitivity analysis compares statistical results with and without those who passed the manipulation check question.

The results for the two compensation related checks are presented in Table 5.4 Panels B and C. In these questions participants were given as many attempts as necessary to answer the questions correctly and the experiment program tracked the number of attempts per participant. As can be seen in Panel B Table 5.4, twenty (50 percent) of the participants correctly answered the risk preference/loss aversion compensation question correctly on the first attempt. In total, twenty-nine (72.5 percent) of the participants answered this question correctly in the first two attempts. One participant (2.5 percent) took three attempts, five participants (12.5 percent) took four attempts, four participants (10 percent) took five attempts, and one participant (2.5 percent) took six attempts. There are no statistically significant differences between the budget target conditions ( $\chi^2 = 5.711, p = 0.34$ ) in the number of attempts for the risk preference/loss aversion question. There is also no significant difference in the risk preference measure based on the number of attempts to answer this question correctly ( $F = 0.495, p = 0.49$ ). However, there is a statistically significant difference in the loss aversion measure based on whether a participant answered this question correctly on the first attempt or not ( $F = 4.179, p = 0.05$ ).<sup>47</sup>

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<sup>46</sup> Both tests were conducted using MANOVA due to the correlation between the reference levels and the correlation between the product selection variances. Results of a univariate analysis are qualitatively the same.

<sup>47</sup> For both of these tests the independent variable was a dichotomous variable equal to one if a participant answered correctly on the first attempt and equal to zero if not answered correctly on the first attempt. This increases the power of the statistical tests.

**TABLE 5.4.** Experiment Manipulation Check Question and Compensation Check Questions

Panel A: Manipulation Check Question				
		Easy Budget Target	Moderate Budget Target	Overall
Experiment Manipulation Check <sup>a</sup>	Pass	19 (95%)	14 (70%)	33 <sup>b</sup> (82.5%)
	Fail	1 (5%)	6 (30%)	7 <sup>b</sup> (17.5%)
Panel B: Risk Preference and Loss Aversion Compensation Question				
		Easy Budget Target	Moderate Budget Target	Overall
Risk Preference and Loss Aversion Compensation Question: Number of Attempts <sup>c</sup>	1	8 (40%)	12 (60%)	20 (50%)
	2	5 (25%)	4 (20%)	9 (22.5%)
	3	0 (0%)	1 (5%)	1 (2.5%)
	4	4 (20%)	1 (5%)	5 (12.5%)
	5	3 (15%)	1 (5%)	4 (10%)
	6	0 (0%)	1 (5%)	1 (2.5%)
	Total	<b>20</b>	<b>20</b>	<b>40</b>
Panel C: Main Experiment Compensation Question				
		Easy Budget Target	Moderate Budget Target	Overall
Main Experiment Compensation Question: Number of Attempts <sup>d</sup>	1	10 (50%)	14 (70%)	24 (60%)
	2	7 (35%)	4 (20%)	11 (27.5%)
	3	1 (5%)	0 (0%)	1 (2.5%)
	4	1 (5%)	1 (5%)	2 (5%)
	5	1 (5%)	1 (5%)	2 (5%)
Total	<b>20</b>	<b>20</b>	<b>40</b>	

<sup>a</sup> Of the seven products presented, how many guaranteed the budget target would be attained?  
<sup>b</sup> Chi-Square test suggests a significant difference between the easy budget target condition and moderate budget target condition ( $\chi^2 = 4.329, p = 0.04$ ). Two cells in this analysis, however, have expected values less than five which could bias the Chi-Square value. This variable was controlled for in statistical analysis.  
<sup>c</sup> Each task you are about to complete contains ten sets of options. For an individual task (ten sets of options), how many rows will be randomly selected for compensation?  
<sup>d</sup> Of all the product decisions you will make, how many will be randomly selected and used as a basis for your experimental compensation?

The data for the main experiment compensation question, which can be seen in Table 5.4 Panel C, reveals that twenty-four (60 percent) participants correctly answered this question on the first attempt. An additional eleven (27.5 percent) answered this question correctly on their second attempt. Therefore, thirty-five (87.5 percent) participants answered this question correctly in the first two attempts. One participant (2.5 percent) took three attempts, two participants (5 percent) took four attempts and two more participants (5 percent) took five attempts to answer this question correctly. Multiple tests were conducted to ascertain whether individuals who answered this question correctly on the first attempt provided significantly different answers for the dependent variables than individuals who did not answer this question correctly on the first attempt.<sup>48</sup> The results suggest that there is no statistically significant difference between the two groups for product selection variance ( $F = 1.226, p = 0.32$ ) or reference levels ( $F = 0.492, p = 0.81$ ).<sup>49</sup>

### **5.3 Descriptive Statistics Regarding Dependent Variables and Control Variables of Interest**

There were a number of control variables that were captured during the experiment. Participants provided their choices on a risk preference and loss aversion scale. Table 5.5 contains the descriptive statistics for these two control variables. The

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<sup>48</sup> The independent variable in the tests was a dichotomous variable equal to one if an individual passed on the first attempt and zero if they did not pass on the first attempt. Using all levels of the number of attempts creates power issues in the statistical tests and highly unbalanced cell sizes. The results are qualitatively the same.

<sup>49</sup> Both tested using a MANOVA due to the correlations in projects selected between periods. Results of a univariate analysis are qualitatively the same. The overall omnibus test is statistically insignificant.

table illustrates that there are no statistically significant differences between the budget target conditions for either risk preference or loss aversion.<sup>50,51</sup>

**TABLE 5.5. Risk Preference and Loss Aversion Statistics**

Risk Preference and Loss Aversion by Budget Target Condition				
	Easy Budget Target n = 20 (s.d.)	Moderate Budget Target n = 20 (s.d.)	Total N = 40 (s.d.)	<i>p</i> -value
Risk Preference	3.75 (2.124)	3.50 (1.933)	3.63 (2.009)	0.70
Loss Aversion	3.20 (3.037)	2.65 (2.254)	2.92 (2.654)	0.52

There were two main dependent variables used in the statistical analysis, reference levels and product selection variance. Reference levels were measured using the following question: “At what level of payment would you have neither positive nor negative emotion?” Participants answered this question before beginning the main experiment and every period after they had received information regarding the economic outcomes of the period before. Therefore, there are six reference level measures. The descriptive statistics for reference levels based on budget target condition and by period are presented in Table 5.6.

<sup>50</sup> The risk preference measure is on a 10-point scale, with higher scores indicating a risk-seeking attitude and lower scores indicating a risk-averse attitude. A score of five would indicate risk neutrality. All values presented are significantly different than the mid-point of five by  $p \leq 0.05$ .

<sup>51</sup> The loss aversion measure is a 10-point scale with higher scores indicating greater loss aversion and lower scores indicating lower loss aversion. A score of five is the mid-point. All values presented are significantly different than the mid-point of five by  $p \leq 0.05$ .

**TABLE 5.6.** Descriptive Statistics for Reference Level

Period	Reference Level			<i>p</i> -value
	Easy Budget Target (s.d.)	Moderate Budget Target (s.d.)	Total (s.d.)	
0	54,250.00 (68,906.40)	37,000.00 (28,672.38)	45,625.00 (52,820.30)	0.31
1	131,581.00 (94,812.21)	78,750.00 (68,784.08)	105,165.50 (86,023.65)	0.05
2	124,375.00 (68,594.32)	76,000 (67,621.24)	100,187.50 (71,554.15)	0.03
3	127,850.00 (65,749.35)	77,000 (64,571.46)	102,425.00 (69,284.58)	0.01
4	129,125.00 (75,877.65)	80,750.00 (63,126.34)	104,937.50 (73,118.47)	0.03
5	140,500.00 (88,732.30)	108,250.00 (82,130.75)	124,375.00 (85,957.56)	0.24
Total	117,946.83 (81,573.59)	76,291.67 (66,568.02)	97,119.25 (77,169.86)	0.00

Table 5.6 shows that individuals in the easy budget target condition had a higher baseline reference level ( $\bar{x} = 54,250.00$ ) than in the moderate budget target condition ( $\bar{x} = 37,000.00$ ). The difference is not statistically significant but is unexpected. Before a task has begun, an individual should have no expectations of future economic outcomes.

When there are no expectations, an individual's reference level should theoretically be based on exogenous factors, such as contract parameters. In this case, individuals in the easy budget target condition should have reference levels around 15,000 and individuals in the moderate budget target condition should have reference levels around 30,000.

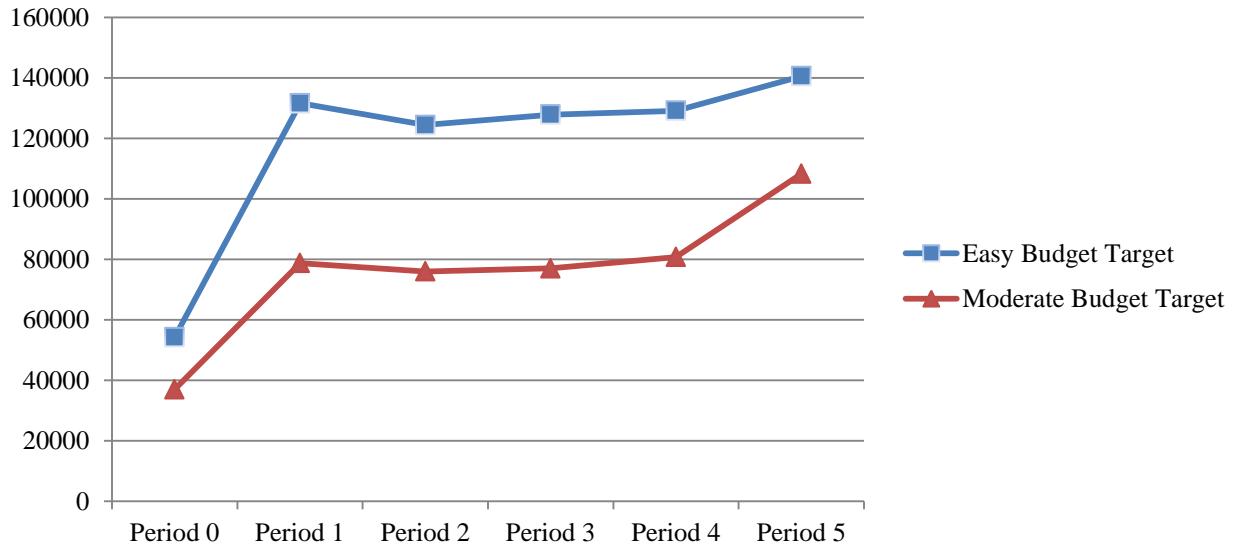
In the easy budget target condition, eleven out of twenty participants (55 percent) reported a reference level of 15,000. Four (20 percent) reported a reference level of 100,000. In the moderate budget target condition, fourteen out of twenty participants (70

percent) reported an initial reference level of 30,000. Three participants (15 percent) reported a reference level of 100,000. It could be that after individuals were informed of their compensation contracts, they began to formulate expectations. Specifically, in the easy budget target condition, participants were informed that their budget target had been set so that a majority of the projects presented allowed them to attain their budget target with certainty. Therefore, individuals could have impounded this information into their expectations, which could be reflected in the slightly higher baseline reference level for those in the easy budget target condition.

Table 5.6 also shows there are significant univariate differences between easy and moderate budget target conditions for periods one, two, three, and four, as well as significant differences in the overall means between the easy and moderate budget target conditions.<sup>52</sup> Although there are no hypotheses relating to reference level and budget target condition, it is interesting to see how reference levels shifted over time based on budget target condition. Figure 8 suggests the largest change in reference level occurs from the initial reference level (before the main experiment) and period 1. After period 1 the reference levels of participants appears to flatten out from period 1 to period 5. This pattern suggests that participants adjust their expectations after the conclusion of the first period, and any adjustments after the first period were of much smaller magnitude on average.

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<sup>52</sup> In period zero, the expectation is that a majority of participants would have a reference level equal to the base annual salary. In the easy budget target condition, eleven out of twenty participants reported a reference level of 15,000. Four reported a reference level of 100,000. In the moderate budget target condition, fourteen out of twenty participants reported an initial reference level of 30,000. Three participants reported a reference level of 100,000.



**FIGURE 8.** Mean Reference Level over Time

Table 5.7 presents descriptive statistics with regards to project selection variance. Panel A of Table 5.7 presents information relating to the actual projects selected, by budget target condition. Overall, the total row suggests that individuals selected different products depending on which budget target condition they were in. Specifically, there are pronounced differences with respect to projects B, D, E, and F. The data for project B, which is a low risk project, illustrates that fewer participants selected this project in the easy budget target condition than in the moderate budget target condition. Participants in the moderate budget target condition appear to select project D more often than participants in the easy budget target condition. For products E and F, which are both higher risk projects, participants in the easy budget target condition appear more likely to select these projects than participants in the moderate budget target condition.

**TABLE 5.7.** Descriptive Statistics for Project Selection

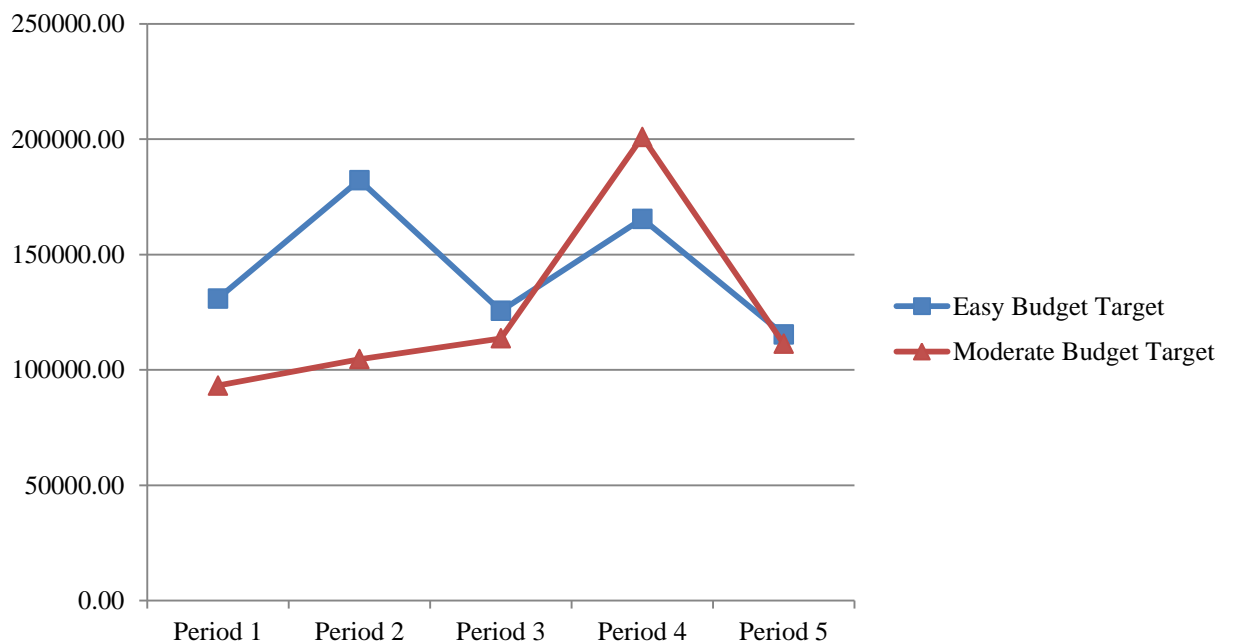
Panel A: Project Selection by Budget Condition and Period									
Period	Condition	Project Selected							Total
		A	B	C	D	E	F	G	
1	Easy	6	2	6	1	1	3	1	20
	Moderate	7	7	2	3	0	0	1	20
2	Easy	2	4	4	1	4	4	1	20
	Moderate	6	6	4	2	1	1	0	20
3	Easy	5	3	5	2	2	2	1	20
	Moderate	5	7	3	3	1	1	0	20
4	Easy	3	4	4	2	2	5	0	20
	Moderate	2	5	4	5	2	0	2	20
5	Easy	7	3	4	1	2	2	1	20
	Moderate	5	6	5	2	1	1	0	20
Total	Easy	<b>23</b>	<b>16</b>	<b>23</b>	<b>7</b>	<b>11</b>	<b>16</b>	<b>4</b>	<b>100</b>
	Moderate	<b>25</b>	<b>31</b>	<b>18</b>	<b>15</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>100</b>

Panel B: Project Selection Variance by Period and Budget Target Condition				
Period	Project Selection Variance			<i>p</i> -value
	Easy Budget Target (s.d.)	Moderate Budget Target (s.d.)	Total (s.d.)	
1	130,909.15 (194,343.83)	93,193.65 (154,685.51)	111,551.40 (173,403.00)	0.510
2	182,242.50 (197,863.13)	104,631.80 (144,309.45)	143,437.15 (175,394.06)	0.165
3	125,575.80 (178,082.08)	113,608.00 (151,365.43)	122,913.33 (165,836.11)	0.728
4	165,416.75 (191,944.54)	200,936.75 (182,699.37)	182,676.75 (185,076.61)	0.540
5	115,325.80 (180,403.23)	111,298.45 (142,533.39)	113,312.13 (142,533.39)	0.938
Total	143,894.00 (186,609.14)	124,733.70 (157,506.60)	134,313.90 (172,505.30)	0.217



Panel B presents information relating to the variances of the products selected. The univariate statistics suggest that there is no statistically significant difference between any of the periods or in total for product selection variance. Product selection variance, however, is not consistent across budget target conditions. In order to maintain equal expected values, the variances of the projects presented in the easy budget target differed from those in the moderate budget target (see Figure 4.2). The descriptive statistics presented in Table 5.7 Panel B illustrate that on average participants in the easy budget target condition selected projects with higher project variances in the first period ( $\bar{x} = 130,909.15$ ) than participants in the moderate budget target condition ( $\bar{x} = 93,193.65$ ). These descriptive statistics provide preliminary evidence that participants in the easy budget target condition were willing to take more risk in their project selection than participants in the moderate budget target condition.



**FIGURE 9.** Mean Project Selection Variance over Time

## **5.4 Assumption Testing**

### **5.4.1 Assumptions for Hypothesis One and Two**

Hypothesis one and two are tested using linear regression. This section presents the analysis of linear regression assumptions. There are four basic assumptions of linear regression: (1) the mean probability distribution of the error term is zero, (2) the error term has constant variance for all levels of the independent variables, (3) the probability distribution of the error term is normal, and (4) the error terms are independent.

The first assumption was examined by plotting the residuals versus the independent variable, budget condition. The dependent variable in hypothesis one is product selection variance in the first period. There were no patterns observed in the data and the pattern of residuals did not appear to be systematically different between the two budget conditions. Therefore the first assumption is satisfied for hypothesis one.

For hypothesis two, the dependent variable is the change in reference level from period zero to period five. To assess the probability distribution of the error term, a scatterplot of the residuals versus the independent variable, number of times the budget target was attained, was examined. The scatterplot revealed no patterns in the data and the pattern of residuals did not appear to be systematically different. Therefore, the assumption of a mean of zero for the error term is satisfied.

The next assumption is that the error term has a constant variance for all levels of the independent variable. To examine this assumption for both hypothesis one and two a scatterplot of the residuals versus the predicted dependent variable values was created. For both hypothesis one and two, there appeared to be no patterns which would indicate unequal variance detected in the scatterplot. To further test the assumption of constant

variance a Levene's test was conducted. For both hypothesis one and two, the Levene's test revealed the assumption of constant variance was satisfied ( $p > 0.30$ ).

The third assumption examined was whether the error term was normally distributed. For both hypothesis one and two a histogram of the residuals was examined. The histogram for hypothesis one reveals a violation of this assumption. Specifically the distribution is skewed to the left. Regression, however, is robust to violations of this assumption (Jahan and Khan 2012). Hypothesis one is tested using equal cell sizes. Therefore, even though the assumption of a normally distributed error term is violated for hypothesis one, I will rely on the robustness of regression.<sup>53</sup> The normality assumption for hypothesis two appears to be satisfied from examining the histogram of residuals as the distribution of the error term appears to be normal.

The last assumption relates to the independence of the error terms. For hypothesis one, this data is not dependent on time and therefore residual correlation is highly unlikely. The independence of error terms for hypothesis two is more likely, given that the dependent variable, change in reference level, is a change score. The Durbin-Watson statistic, however, reveals there is little to no autocorrelation in the error terms (2.111). A Durbin-Watson score of 2.00 indicates no autocorrelation.

#### **5.4.2 Assumptions for Hypothesis Three**

Hypothesis three is tested using independent one-sample t-tests. Before running the t-tests an analysis was conducted to determine whether there were any significant covariates that must be accounted for. The analysis, which is fully discussed later in this section, revealed that there were no covariates that were significantly correlated with the

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<sup>53</sup> A non-parametric Mann-Whitney test was conducted as additional analysis of hypothesis one. The results for hypothesis one are qualitatively the same.

dependent variable, the change in product selection variance. Therefore, independent one-sample t-tests were conducted.

There are a number of assumptions of independent small-sample t-tests. The samples being compared should follow a normal distribution, have constant variance, and the observations should be independent. To assess the normal distribution of the dependent variable change in product selection, a Shapiro-Wilks test was performed. The results of this test reveal that the dependent variable for hypothesis three is non-normal. Therefore, the other assumptions mentioned previously were not analyzed and hypothesis three was tested using a Wilcoxon signed rank test, a non-parametric test.

## **5.5 Test of Hypotheses**

### **5.5.1 Test of Hypothesis One**

Hypothesis one predicts that participants in the easy budget target condition will exhibit more risk taking in the first period than participants in the moderate budget target condition. A regression analysis was conducted to test this hypothesis. Table 5.8 presents the results of the regression analysis. Models one and two are run with the entire sample ( $N = 40$ ) while models three and four are run with only those participants who passed the experiment manipulation check ( $N = 33$ ). As can be seen, no models are significant in the analysis. Additionally, the coefficient for budget target condition is not significant. Therefore, this test does not provide support for hypothesis one.<sup>54</sup>

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<sup>54</sup> One-sample independent t-test have qualitatively similar results,  $t = 0.679$ ,  $p = 0.25$ . Additionally, non-parametric tests for differences also have qualitatively similar results,  $p = 0.16$ .

**TABLE 5.8.** Regression Analysis for Hypothesis One

<b>Regression Models of Project Selection Variance: Period 1<sup>a</sup></b>					
<i>Project Selection Variance<sub>t=1</sub> = <math>\alpha_0 + \alpha_1</math>Budget Target Condition + <math>\alpha_2</math>Risk Preference + <math>\alpha_3</math>Loss Aversion + <math>\alpha_4</math>Baseline Reference Level + <math>\alpha_5</math>Gender + <math>\varepsilon</math></i>					
Variable	Predicted Sign	1 <sup>b</sup>	2 <sup>b</sup>	3 <sup>c</sup>	4 <sup>c</sup>
Model		1.631 (0.188)	1.569 (0.195)	1.141 (0.358)	1.216 (0.329)
Intercept		0.107	0.199	0.262	0.427
Independent Variable (H1)					
<i>Budget Target Condition<sup>d</sup></i>	-	-0.420	0.227	-0.402	0.307
Control Variables					
<i>Risk Preference<sup>e</sup></i>	+	1.960**	2.053**	1.412*	1.458*
<i>Loss Aversion<sup>f</sup></i>	-	-0.282	-0.381	-0.497	-0.645
<i>Baseline Reference Level<sup>g</sup></i>		1.064	1.423	1.064	1.472
<i>Gender<sup>h</sup></i>			-1.127		-1.201
Adjusted R <sup>2</sup>		0.061	0.068	0.017	0.033
Sample Size		40	40	33	33

\*, \*\*, \*\*\* One-tailed significance at the 0.10, 0.05, and 0.01 levels, respectively, for predicted effects.

<sup>a</sup> *Project Selection Variance*: The variance associated with the project that participants selected in period 1. A Tobit regression was run and the results are qualitatively the same.

<sup>b</sup> Full sample of observations.

<sup>c</sup> Sample includes only those who passed the experiment manipulation check.

<sup>d</sup> *Budget Target Condition*: Coded as zero for participants in the easy budget target condition and one for those in the moderate budget target condition.

<sup>e</sup> *Risk Preference*: Based on the Holt and Laury (2002) risk preference scale. Values range from zero to ten. Higher scores indicate more risk-seeking, lower scores indicate more risk-aversion.

<sup>f</sup> *Loss Aversion*: Based on the Brink and Rankin (2011) loss aversion scale. Values range from zero to ten. Higher scores indicate more loss aversion. Lower scores indicate less loss aversion.

<sup>g</sup> *Baseline Reference Level*: The response to the following statement: “At what level of payment would you have neither positive nor negative emotion?” The baseline reference level was ascertained before the first period of the main experiment.

<sup>h</sup> *Gender*: Coded as 0 for females and 1 for males.

Due to the small sample size of the experiment and the differences in product selection variance between the budget target conditions, further analysis of hypothesis one is warranted. Referring back to Table 5.7, there was a sizeable difference in the product selection variance between the easy ( $\bar{x} = 130,909.15$ ) and moderate ( $\bar{x} = 93,193.65$ ) budget target conditions. However, the standard deviations relating to the means of easy and moderate budget target condition are both larger than the means, suggesting large variation in the data, which could impact the statistical tests.

Therefore, a qualitative analysis of the frequency of the projects selected by budget target condition was conducted. Table 5.9 reports the results of a number of Chi-Square frequency tests to assess whether the proportion of products selected is different between the easy and moderate budget target conditions. Table 5.9 presents frequency tables and Chi-square analysis for hypothesis one.

Panel A of Table 5.9 presents the results of a Chi-square analysis analyzing each project as a separate category. The overall Chi-Square is not significant ( $\chi^2 = 9.855$ ,  $p = 0.13$ ) and the Gamma correlational coefficient ( $t = -1.283$ ,  $p = 0.20$ ) is also not significant.<sup>55</sup> This analysis, however, is performed where twelve of the fourteen cells (85.7 percent) have expected values less than five, and the minimum count is 0.50. To alleviate some of the expected count concerns, Panel B of Table 5.9 presents a two-by-two classification.

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<sup>55</sup> The gamma statistic is preferred over Spearman's Rho and Cramer's V when working with collapsed ordinal data that have a limited number of categories and when data have many tied observations (SAS 1999). Gamma is designed to determine how effectively information about an individual's ranking in one variable is at predicting that individuals ranking in the other variable. The gamma statistic computes the level of association between two variables.

**TABLE 5.9. Full Sample Frequency Distribution and Chi-Square Analysis<sup>a</sup>**

Panel A: All Projects Included as Categories <sup>b</sup>					
Project	Easy Budget Target	Moderate Budget Target	Total	Chi-Square Value (significance) <sup>c</sup>	Gamma (significance) <sup>d</sup>
A	6	7	13		
B	2	7	9		
C	6	2	8		
D	1	3	4	9.855	-0.274
E	1	0	1	(0.13)	(0.20)
F	3	0	3		
G	1	1	2		

Panel B: Projects Split into Two Categories (A, B, C) and (E, F, G) <sup>c</sup>					
Category	Easy Budget Target	Moderate Budget Target	Total	Chi-Square Value (significance) <sup>c</sup>	Gamma (significance) <sup>d</sup>
Less Risk (A, B, C)	14	16	30	2.697	-0.702
More Risk (E, F, G)	5	1	6	(0.11)	(0.08)

Panel C: Projects Split into Three Categories (A, B), (C, D, E) and (F, G) <sup>f</sup>					
Category	Easy Budget Target	Moderate Budget Target	Total	Chi-Square Value (significance) <sup>c</sup>	Gamma (significance) <sup>d</sup>
Low Risk (A, B)	8	14	22		
Moderate Risk (C, D, E)	8	5	13	4.129	-0.541
High Risk (F, G)	4	1	5	(0.13)	(0.03)

\*, \*\*, \*\*\* Two-tailed significance at the 0.10, 0.05, and 0.01 levels, respectively.  
+, ++, +++ One-tailed significance at the 0.10, 0.05, and 0.01 levels, respectively.  
<sup>a</sup> Analysis with only those who passed the manipulation check are generally the same. Results for Panel B become insignificant at  $p = 0.14$ . This is most likely due to the decreased sample size and less statistical power. Results for Panel C are similar ( $\gamma = -1.847, 0.06$ ).  
<sup>b</sup> 85.7% of the products contain expected counts less than five. The minimum count is 0.50.  
<sup>c</sup> Chi-Square value is two-tailed and cannot be divided because the distribution is not symmetric.  
<sup>d</sup> A correlational coefficient related to a directional prediction and is presented as a one-tailed significance level. Tests the correlation between budget target condition and project risk selection. The approximate T-statistic is not reported in the table.  
<sup>e</sup> To get an approximate Chi-Square, created a 2 X 2 frequency table. Classified projects A, B, and C as less risk and projects E, F, G as more risk. Enables a Fischer's Exact test. The significance of the Chi-Square is the Fischer's exact test statistic.  
<sup>f</sup> Created smaller groups to alleviate some issues with expected counts. Classified projects A and B as low risk, projects C, D, and E as moderate risk, and projects F and G as high risk. Only 33.3% of the cells had expected counts less than five. The minimum count is 2.5.

A two-by-two classification allows for a Fischer's Chi-square exact test, which does not take into account expected cell counts. The classifications divided projects into two groups, less risk and more risk. Projects A, B, and C were classified as less risk while projects E, F, and G were classified as more risk. The Chi-square is not significant ( $\chi^2 = 2.697$ ,  $p = 0.11$ ) but the Gamma correlational coefficient is marginally significant ( $t = -1.760$ ,  $p = 0.08$ ). The Gamma correlational coefficient measures the correlation between the two variables in a contingency table. In Panel B of Table 5.9, the negative Gamma indicates that more risky projects are more likely to be selected by participants in the easy budget target condition, rather than the moderate budget target condition.

Panel C of Table 5.9 presents a split of the projects that incorporates all of the available projects. Projects A and B are classified as low risk, projects C, D, and E are classified as moderate risk, and projects F and G are classified as high risk. The overall Chi-square is not significant ( $\chi^2 = 4.129$ ,  $p = 0.13$ ) but the Gamma correlational coefficient is statistically significant ( $t = -2.172$ ,  $p = 0.03$ ). This again suggests that as project risk increases, participants in the easy budget target are more likely to select higher risk projects than participants in the moderate budget target condition. The results of Panel B and Panel C of Table 5.9 both provide partial support for hypothesis one.<sup>56</sup>

Given the results of the regression analysis, combined with the evidence presented in Table 5.9, there is mixed support for hypothesis one. The regression results, reported using a quantitative dependent variable, project selection variance, revealed no statistically significant differences between easy and moderate budget target conditions. This test followed prior literature that relied on project variance as a measure of risk (e.g.,

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<sup>56</sup> The classifications of projects presented are the most logical classifications. Classifying projects based on other specifications generally provide qualitatively similar results.



Chow et al. 2007). The Chi-square analysis suggests that participants in the easy budget target condition are more likely to select a more risky project than participants in the moderate budget target condition, consistent with SP|A predictions. This analysis is similar to what was conducted by Sprinkle et al. (2008), who created classifications of the projects presented to compare projects selected by participants. Based on the above analysis, there is mixed support for hypothesis one.

### **5.5.2 Test of Hypothesis Two**

Hypothesis two predicts that participants who continually attain their budget target will exhibit a greater change in their reference level than those who do not continually attain their budget target. To test this hypothesis a regression analysis was conducted. The bivariate correlations for the variables included in the model are presented in Table 5.10.

The independent variable, attained budget target, is significantly correlated with the dependent variable, change in reference level. Additionally, the covariates loss aversion and gender are also significantly correlated with the dependent variable. Although risk preference and attained budget target period 4 and period 5 are not correlated with the dependent variable, they are left in the model because they were predicted to affect the level of reference level change. As shown in Table 5.10, there are no concerns for multicollinearity. None of the independent variables are highly correlated with other independent variables above. Specifically, the highest correlation between the independent variable, attained budget target, and a control variable, attained budget target in period five is 0.41 ( $p = 0.02$ ).

**TABLE 5.10.** Bivariate Correlations for Hypothesis Two

<b>Bivariate Correlations for Variables in the Regression Models of Change in Reference Level*</b>							
<b>Variable</b>	<b><i>Change in Reference Level</i></b>	<b><i>Attained Budget Target</i></b>	<b><i>Risk Preference</i></b>	<b><i>Loss Aversion</i></b>	<b><i>Attained Budget Target Period 4</i></b>	<b><i>Attained Budget Target Period 5</i></b>	<b><i>Gender</i></b>
<i>Change in Reference Level</i> <sup>a</sup>	1.00	0.36 (0.04)	0.03 (0.87)	-0.26 (0.14)	0.05 (0.79)	0.15 (0.39)	-0.33 (0.06)
<i>Times Attained Budget Target</i> <sup>b</sup>	0.38 (0.03)	1.00	-0.07 (0.71)	0.09 (0.61)	0.37 (0.04)	0.38 (0.03)	-0.33 (0.07)
<i>Risk Preference</i> <sup>c</sup>	0.01 (0.96)	0.01 (0.96)	1.00	-0.15 (0.40)	0.25 (0.16)	-0.02 (0.91)	0.10 (0.59)
<i>Loss Aversion</i> <sup>d</sup>	-0.46 (0.01)	-0.08 (0.66)	0.08 (0.67)	1.00	0.14 (0.44)	-0.05 (0.77)	-0.13 (0.47)
<i>Attained Budget Target Period 4</i> <sup>e</sup>	0.04 (0.82)	0.36 (0.04)	0.30 (0.09)	0.16 (0.36)	1.00	-0.08 (0.66)	-0.25 (0.17)
<i>Attained Budget Target Period 5</i> <sup>f</sup>	0.16 (0.38)	0.41 (0.02)	0.02 (0.93)	-0.18 (0.33)	-0.08 (0.66)	1.00	-0.10 (0.60)
<i>Gender</i> <sup>g</sup>	-0.31 (0.08)	-0.284 (0.11)	0.05 (0.78)	0.06 (0.73)	-0.246 (0.17)	-0.01 (0.60)	1.00

\* Pearson correlation statistics are reported above the diagonal and nonparametric Spearman correlation statistics are reported below the diagonal. Two-tailed p-values are in the parentheses.

<sup>a</sup> *Change in Reference Level*: The response to the following statement: “At what level of payment would you have neither positive nor negative emotion?” This question was answered before the first period of the main experiment and every period thereafter, up to period 5. *Change in Reference Level* in this table is the difference in responses to the aforementioned question between period 5 and period 0.

<sup>b</sup> *Times Attained Budget Target*: A count variable that counts the number of times an individual attained the budget target up to period 5. Values range as follows (number of participants): three (four), four (eight), and five (twenty-one).

<sup>c</sup> *Risk Preference*: Based on the Holt and Laury (2002) risk preference scale. Values range from zero to ten. Higher scores indicate more risk-seeking, lower scores indicate more risk-aversion.

<sup>d</sup> *Loss Aversion*: Based on the Brink and Rankin (2011) loss aversion scale. Values range from zero to ten. Higher scores indicate more loss aversion. Lower scores indicate less loss aversion.

<sup>e</sup> *Attained Budget Target Period 4*: Coded as 0 if the participant missed the budget target in period four and 1 if the participant attained the budget target in period four.

<sup>f</sup> *Attained Budget Target Period 5*: Coded as 0 if the participant missed the budget target in period five and 1 if the participant attained the budget target in period five.

<sup>g</sup> *Gender*: Coded as 0 for females and 1 for males.

The means for change in reference level from period zero to period five are presented in Table 5.11. The means are presented based on the number of times a participant attained the budget target. As expected, participants who attained the budget target three times show a mean change in reference level of 17,500 while participants who attained the budget target four times show a mean change of 21,125. Both of these amounts appear to be significantly lower than the mean change of 93,333.33 for participants who attained the budget target in every period. There is a moderately significant difference between the three groups ( $F = 2.601$ ,  $p = 0.09$ ).

**TABLE 5.11.** Change in Reference Level by Number of Times the Budget Target was Attained

	Change in Reference Level				p - value
	Number of Times Attained				
	Three (s.d.) [n]	Four (s.d.) [n]	Five (s.d.) [n]	Total (s.d.) [n]	
Mean	17,500 (88,835.05) [4]	21,125.00 (45,272.00) [8]	93,333.33 (97,805.08) [21]	67,121.21 (91,702.90) [33]	0.09

The regression models for hypothesis two are presented in Table 5.12. In all four models, the coefficient on *Times Attained Budget Target* is positive and statistically significant (one-tailed  $p < 0.05$ ).<sup>57</sup> The positive, significant coefficient indicates that the more times a participant attains the budget target, the greater the change in their reference level. This suggests the more times an individual attains the budget target, the greater

<sup>57</sup> Results for hypothesis two are qualitatively similar when Times Attained Budget Target is coded as a dichotomous variable. Variable coded as one for those who attained the budget target every period and zero for those who missed the budget target at least once.

their expectations of future economic outcomes. This relationship remains when *Gender* is added into the model. Therefore, Table 5.12 provides support for hypothesis two.<sup>58</sup>

Additional analysis in models three and four analyze whether there is a recency effect whereby individuals take into account whether they have attained the budget target in the two most recent periods and whether there is an impact on the change in reference level. Although this effect is not hypothesized, the analysis was conducted to ensure the change in reference level was not caused by the most recent period's outcome. As can be seen in Table 5.12 there does not appear to be a recency effect. Overall, the results reported provide support for hypothesis two.<sup>59</sup>

### **5.5.3 Test of Hypothesis Three**

Hypothesis three predicts that participants who continually attain the budget target will exhibit less risk taking after multiple periods than they did in the initial period. This prediction is based on SP|A theory, in which increases in a participant's reference level would suggest that fewer risky projects allow for the attainment of their aspiration level. Therefore, in order to guarantee the attainment of the aspiration level, participants will have to select from less risky projects.

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<sup>58</sup> Additional analysis identified two outliers in the sample. The results for hypothesis two are qualitatively the same without these observations included in the sample. Results are presented with the observations kept in the sample.

<sup>59</sup> Results for hypothesis two are qualitatively similar when the quantitative economic outcomes from period four and period five are used in place of the dichotomous variables attained budget target period four and period five.

**TABLE 5.12.** Regression Analysis for Hypothesis Two

**Regression Models of Change in Reference Level:  
Period 5 compared to Period 0<sup>a</sup>**

$$\begin{aligned} \text{Change in Reference Level} = & \alpha_0 + \alpha_1 \text{Times Attained Budget Target} + \alpha_2 \text{Risk} \\ & \text{Preference} + \alpha_3 \text{Loss Aversion} + \alpha_4 \text{Attained Budget Target in Period 4} \\ & + \alpha_5 \text{Attained Budget Target in Period 5} + \alpha_6 \text{Gender} + \varepsilon \end{aligned}$$

Variable	Predicted Sign	Predicted			
		1	2	3	4
Model <sup>b</sup>		2.656	2.759	1.526	1.817
(Significance) <sup>c</sup>		(0.067)	(0.047)	(0.215)	(0.135)
Intercept		-1.236	-0.483	-1.105	-0.313
Independent Variable (H2)					
<i>Times Attained Budget Target</i> <sup>d</sup>	+	2.336***	1.771**	2.060**	1.743**
Control Variables					
<i>Risk Preference</i>		0.060	0.170	0.187	0.388
<i>Loss Aversion</i>		-1.766 <sup>+</sup>	-1.960 <sup>+</sup>	-1.630	-1.791 <sup>+</sup>
<i>Attained Budget Target- P4</i>				-0.081	-0.682
<i>Attained Budget Target- P5</i>				-0.031	-0.204
<i>Gender</i>			-1.620		-1.664
Adjusted R <sup>2</sup>		0.134	0.18	0.076	0.133
Sample Size		33	33	33	33

\*, \*\*, \*\*\* One-tailed significance at the 0.10, 0.05, and 0.01 levels, respectively, for predicted effects.

<sup>+</sup>, <sup>++</sup>, <sup>+++</sup> Two-tailed significance at the 0.10, 0.05, and 0.01 levels, respectively.

<sup>a</sup> *Change in Reference Level*: The response to the following statement: “At what level of payment would you have neither positive nor negative emotion?” This question was answered before the first period of the main experiment began and every period thereafter, up to period 5. *Change in Reference Level* in this table is the difference in responses to the aforementioned question between period 5 and period 0.

<sup>b</sup> Sample includes only those who passed the experiment manipulation check. Results are qualitatively different for the entire sample. Those who passed the manipulation check had significantly different values for change in reference level than those who did not pass the manipulation check ( $F = 3.097$ ,  $p = 0.09$ ). Therefore, this analysis only includes those who passed the manipulation check question.

<sup>c</sup> P-value relating to the significance of the model.

<sup>d</sup> *Times Attained Budget Target*: Count variable equal to the number of times an individual has attained the budget target up to period 5. Values range as follows (number of participants): three (four), four (eight) and five (twenty-one).

Before testing this hypothesis, an analysis of *a priori* control variables is performed. Specifically, I analyze whether any control variables are significantly correlated with the dependent variable. The correlations are presented in Table 5.13. The correlation table reveals that none of the *a priori* covariates are significantly correlated with the dependent variable change in project selection. Economic outcome period 4 is not significantly correlated based on Pearson correlation, but is based on the Spearman correlation. For this variable, which is continuous, the Pearson correlation is a more appropriate correlation to analyze. Based on the correlation table, the test for hypothesis three will be a series of one-sample t-tests assessing whether the change in project selection variance is different than zero in the negative direction.

**TABLE 5.13.** Bivariate Correlations for Hypothesis Three

<b>Bivariate Correlations for Variables in the Regression Models of Change in Project Selection*</b>							
<b>Variable</b>	<b><i>Change in Project Selection Variance</i></b>	<b><i>Risk Preference</i></b>	<b><i>Loss Aversion</i></b>	<b><i>Reference Level Period 4</i></b>	<b><i>Future Expectation Period 4</i></b>	<b><i>Economic Outcome Period 4</i></b>	<b><i>Gender</i></b>
<i>Change in Project Selection Variance<sup>a</sup></i>	1	0.113 (0.60)	-0.57 (0.79)	-0.122 (0.57)	-0.207 (0.33)	-0.333 (0.11)	0.204 (0.34)
<i>Risk Preference<sup>b</sup></i>	-0.061 (0.78)	1	-0.287 (0.17)	0.108 (0.62)	0.159 (0.46)	-0.225 (0.29)	-0.061 (0.78)
<i>Loss Aversion<sup>c</sup></i>	0.106 (0.62)	-0.130 (0.55)	1	-0.141 (0.51)	-0.188 (0.38)	-0.197 (0.36)	-0.154 (0.47)
<i>Reference Level Period 4<sup>d</sup></i>	-0.198 (0.35)	0.105 (0.62)	-0.183 (0.39)	1	0.377 (0.07)	-0.101 (0.64)	-0.314 (0.14)
<i>Future Expectations Period 4<sup>e</sup></i>	0.105 (0.63)	0.448 (0.03)	-0.150 (0.48)	0.281 (0.18)	1	-0.125 (0.56)	-0.069 (0.75)
<i>Economic Outcome Period 4<sup>f</sup></i>	-0.378 (0.07)	-0.207 (0.33)	-0.122 (0.57)	-0.182 (0.39)	-0.148 (0.49)	1	0.134 (0.53)
<i>Gender<sup>g</sup></i>	0.223 (0.30)	-0.087 (0.69)	-0.141 (0.51)	-0.310 (0.14)	-0.025 (0.91)	-0.151 (0.48)	1

\* Pearson correlation statistics are reported above the diagonal and nonparametric Spearman correlation statistics are reported below the diagonal.

Two-tailed p-values are in the parentheses.

<sup>a</sup> *Change in Product Selection Variance*: Difference in project selection variance from period five to period one.

<sup>b</sup> *Risk Preference*: Based on the Holt and Laury (2002) risk preference scale. Values range from zero to ten. Higher scores indicate more risk-seeking, lower scores indicate more risk-aversion.

<sup>c</sup> *Loss Aversion*: Based on the Brink and Rankin (2011) loss aversion scale. Values range from zero to ten. Higher scores indicate more loss aversion. Lower scores indicate less loss aversion.

<sup>d</sup> *Reference Level Period 4*: The reference level reported after period four. Answer to the question: “At what level of payment would you have neither positive nor negative emotion?”

<sup>e</sup> *Future Expectations Period 4*: Answer to the question: “What do you think the outcome of your decision in the next period will be?” Answered at the end of period 4.

<sup>f</sup> *Economic Outcome Period 4*: The actual economic outcome of the project selected in period 4, expressed in Lira.

<sup>g</sup> *Gender*: Coded as 0 for females and 1 for males.

**TABLE 5.14.** Descriptive Statistics for Change in Project Selection Variance<sup>a</sup>

Panel A: Change in Project Selection Variance by Attained Budget Target <sup>b</sup> and Budget Target Condition: Full Sample				
	Number of Times the Budget Target was Attained			
	Three (s.d.) [n]	Four (s.d.) [n]	Five (s.d.) [n]	Total (s.d.) [N]
Easy Budget Target Condition <sup>c</sup>	-441,667.00 (N/A) [1]	1,000 (74,381.77) [5]	10,357.14 (47,856.53) [14]	-14,583.35 (113,375.68) [20]
Moderate Budget Target Condition	-75,714.25 (151,428.50) [4]	68,047.83 (285,047.40) [6]	25,666.60 (54,212.52) [10]	18,104.80 (170,486.69) [20]
Panel B: Change in Project Selection Variance by Attained Budget Target and Budget Target Condition: Only Participants who Passed the Manipulation Check				
	Number of Times the Budget Target was Attained			
	Three (s.d.) [n]	Four (s.d.) [n]	Five (s.d.) [n]	Total (s.d.) [N]
Easy Budget Target Condition <sup>c</sup>	-441,667.00 (N/A) [1]	1,000.00 (74,381.77) [5]	11,153.85 (49,713.93) [13]	-15,350.89 (116,429.04) [19]
Moderate Budget Target Condition	0.00 (0.00) [3]	-90,656.67 (280,528.36) [3]	32,708.25 (59,106.54) [8]	-736.00 (128,618.20) [14]

<sup>a</sup> Tests of hypothesis three relate only to those who attained the budget target in every period.  
<sup>b</sup> *Attained Budget Target*: Count variable equal to the number of times an individual has attained the budget target up to period 5.  
<sup>c</sup> *Change in Project Selection*: Difference between the variances in the project selected in period five versus the project selected in period one

The descriptive statistics for the dependent variable change in project selection variance are presented in Table 5.14. The statistics indicate that there are differences in project selection variance between the easy and moderate budget target conditions. This could be partially due to the differences in project selection variance between the budget target conditions. Therefore, tests of hypothesis three are conducted for the entire sample, the easy budget target condition, and the moderate budget target condition. Hypothesis three is tested using only the participants who continually attained their



budget target. Therefore, only those who attained the budget target five times are included in the statistical analysis. As can be seen in Table 5.14, the change in project selection variance for those who attained the budget target in every period is positive, which is opposite of what hypothesis three predicted. The positive change in project selection variance appears to not support SP|A theory predictions about risk taking behavior.

To further analyze the prior assessment, Table 5.15 presents the tests of hypothesis three. The tests presented are Wilcoxon signed rank tests because the assumption of normality is violated. The results presented provide no support for hypothesis three. On the contrary, the results suggest an opposite effect than what was theorized. Hypothesis three was based on behavioral predictions of SP|A theory. However, the results suggest that participants behaved in accordance with prospect theory predictions.

Prospect theory would predict that as individuals reference levels increase, more projects would be perceived in a loss frame. Increasing reference levels would mean that more projects place the attainment of the budget target in jeopardy. Therefore, more projects would be viewed as possible losses because individuals would have a greater chance of missing the budget target. Thusly, prospect theory predicts that individuals in a loss frame tend to make more risk-seeking decisions (Kahneman and Tversky 1979; Chow et al. 2007). The results presented in Table 5.15 tend to support this prediction.

Statistical tests to support this assertion, however, are not significant using Wilcoxon signed rank tests.<sup>60</sup>

The results presented in Table 5.15 do not provide support for hypothesis three. Specifically, the prediction based on SP|A theory is not supported. To analyze whether individuals followed the process proposed by SP|A theory, supplemental analysis will examine which projects participants eliminated in each period prior to making their project selections.

**TABLE 5.15.** Wilcoxon Signed Rank Tests for Hypothesis Three

Panel A: Full Sample of Participants Who Attained Budget Target in Every Period					
	N	Mean	Standard Deviation	Z-Score	Asymptotic Significance <sup>a</sup>
All observations	24	16,736.08	50,039.72	-0.905	0.36
Easy Only	14	10,357.14	47,856.53	0.000	1.00
Moderate Only	10	25,666.60	54,212.52	-1.190	0.23

<sup>a</sup> Two-tailed significance level.

### 5.6 Supplemental Analysis: Project Elimination

During each time period in the experiment participants were asked to eliminate projects from consideration if they felt they would not consider them when making the final project selection. This experimental procedure provided insights into the process through which participants made their risky decisions. Table 5.16 presents the

<sup>60</sup> The assertion is supported using parametric two-sample t-tests. The results, however, should be interpreted with caution. For the entire sample (n=24) [n = 21], p-value = 0.06 [0.05] there is marginal statistical significance. For the easy budget target condition (n = 14) [n = 13], there is no support for either SP|A or Prospect Theory. For the moderate budget target condition (n = 10) [n = 8], there is a marginally significant effect (p = 0.08) [p = 0.08].

**TABLE 5.16.** Projects Eliminated from Consideration by Budget Target Condition and Period

Period	Budget Target Condition <sup>a</sup>	Products Eliminated							
		A	B	C	D	E	F	G	None
1	Easy	2 (10%)	2 (10%)	2 (10%)	4 (20%)	4 (20%)	10 (50%)	17 (85%)	1 (5%)
	Moderate	3 (15%)	1 (5%)	6 (30%)	4 (20%)	12 (60%)	14 (70%)	16 (80%)	2 (10%)
2	Easy	5 (25%)	4 (20%)	4 (20%)	5 (25%)	4 (20%)	10 (50%)	16 (80%)	1 (5%)
	Moderate	4 (20%)	3 (15%)	7 (35%)	7 (35%)	10 (50%)	14 (70%)	17 (85%)	0 (0%)
3	Easy	2 (10%)	4 (20%)	3 (15%)	5 (25%)	5 (25%)	14 (70%)	18 (90%)	1 (5%)
	Moderate	2 (10%)	2 (10%)	7 (35%)	10 (50%)	12 (60%)	14 (70%)	18 (90%)	0 (0%)
4	Easy	5 (25%)	4 (20%)	4 (20%)	5 (25%)	5 (25%)	14 (70%)	16 (80%)	1 (5%)
	Moderate	3 (15%)	2 (10%)	7 (35%)	7 (35%)	13 (65%)	13 (65%)	17 (85%)	1 (5%)
5	Easy	3 (15%)	3 (15%)	2 (10%)	6 (30%)	6 (30%)	15 (75%)	16 (80%)	1 (5%)
	Moderate	4 (20%)	4 (20%)	6 (30%)	6 (30%)	12 (60%)	14 (70%)	19 (95%)	0 (0%)

<sup>a</sup> There are twenty participants in the easy budget target condition and twenty participants in the moderate budget target condition.

descriptive statistics for this data. SP|A predicts that individuals eliminate alternatives from consideration that place their aspiration level in jeopardy. If SP|A correctly specifies the process that individuals follow, then I would expect there to be a difference in which projects participants eliminated between budget target conditions.

In both conditions, projects F and G did not allow for guaranteed attainment of the budget target, thusly placing the attainment of the aspiration level in jeopardy. Therefore, I would expect no differences between the two budget target conditions. Projects C, D, and E, however, are different between the budget target conditions. Specifically, in the moderate budget target condition projects C, D, and E do not allow for the guaranteed attainment of the budget target whereas in the easy budget target condition they do. To examine whether participants project elimination depended upon their budget target condition, a series of 2 X 2 contingency tables were examined to assess whether there is a significant difference in which projects were eliminated by budget condition.

For each 2 X 2 contingency table, budget target was one of the variables. The other variable was the number of projects eliminated. For example, in period one, project A would be examined to assess if there was a difference in the probability of dropping that project by budget target condition. This analysis would continue until period five, project G. The results of this analysis are presented in Table 5.17. The *a priori* expectations were that the probability of dropping projects C, D, and E would be different between budget target conditions. The expectation is that participants in the moderate budget target condition will eliminate these projects more than participants in the easy budget target condition because these projects place the reference level in jeopardy in the

moderate budget target condition. Projects C, D, and E are the projects that differ between budget target conditions in terms of whether or not they guarantee the attainment of the budget target.<sup>61</sup>

The results presented in Table 5.17 suggest that participants in the moderate budget target condition were more likely to eliminate Project E in every period compared to participants in the easy budget target condition, providing some support for SP|A predictions. Results for Project C and Project D, however, are not significant and do not provide support for SP|A predictions. Therefore, the supplemental analysis suggests that participants do eliminate projects differently based on their reference levels, but the data do not support all *a priori* expectations.

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<sup>61</sup> Analysis with only those participants who passed the manipulation check has slightly different results. All relationships presented in Table 5.17 remain. Some additional significant differences are found however. Period one, project C ( $\chi^2 = 3.060, 0.09$ ), period three, project D ( $\chi^2 = 4.758, 0.03$ ), period five, project C ( $\chi^2 = 3.060, 0.09$ ), and period five, project G ( $\chi^2 = 3.354, 0.09$ ).

**TABLE 5.17.** Contingency Tables for Project Elimination<sup>a, b</sup>

<b>Variable</b>	<b>Period 1</b>	<b>Period 2</b>	<b>Period 3</b>	<b>Period 4</b>	<b>Period 5</b>
<i>ProjectA</i> <sup>c</sup>	0.229	0.143	0.000	0.625	0.173
<i>ProjectB</i> <sup>d</sup>	0.360	0.173	0.784	0.784	0.173
<i>ProjectC</i> <sup>e</sup>	2.500	1.129	2.133	1.129	2.500
<i>ProjectD</i> <sup>f</sup>	0.000	0.476	2.667*	0.476	0.000
<i>ProjectE</i> <sup>g</sup>	6.667**	3.956**	5.013**	6.465**	3.636*
<i>ProjectF</i> <sup>h</sup>	1.667	1.667	0.000	0.114	0.125
<i>ProjectG</i> <sup>i</sup>	0.173	0.173	0.000	0.173	2.057
<b>Sample Size</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

\*, \*\*, \*\*\* One-tailed significance at the 0.10, 0.05, and 0.01 levels, respectively.

<sup>a</sup> The table presents Chi-square statistics. Significance related to Fischer's Exact Test. Significance presented is Fischer Exact Test one-sided.

<sup>b</sup> *Budget Condition*: Coded as a zero for easy budget target condition and a one for moderate budget target condition.

<sup>c</sup>*ProjectA*: Coded as a zero if participant did not eliminate and a one if they did eliminate Project A.

<sup>d</sup>*ProjectB*: Coded as a zero if participant did not eliminate and a one if they did eliminate Project B.

<sup>e</sup>*ProjectC*: Coded as a zero if participant did not eliminate and a one if they did eliminate Project C.

<sup>f</sup>*ProjectD*: Coded as a zero if participant did not eliminate and a one if they did eliminate Project D.

<sup>g</sup>*ProjectE*: Coded as a zero if participant did not eliminate and a one if they did eliminate Project E.

<sup>h</sup>*ProjectF*: Coded as a zero if participant did not eliminate and a one if they did eliminate Project F.

<sup>i</sup>*ProjectG*: Coded as a zero if participant did not eliminate and a one if they did eliminate Project G.

## **6.0 SUMMARY AND CONCLUSIONS**

### **6.1 Summary of Key Findings**

Prior research in risky decision making in single-period settings has not provided a definitive answer relating to how budget targets should be set in order to increase employee risk-taking behaviors. Chow et al. (2007) find that difficult budget targets lead to more risk-taking behavior than easy budget targets. Sprinkle et al. (2008), however, find that easy budget targets lead to more risk-seeking behavior than more difficult budget targets. This study provides additional evidence in this line of research. Specifically, the results from this study suggest that individuals make more risk-seeking decisions under easy budget targets compared to moderate budget targets when analyzing the initial project selection period.

Prior field studies have suggested that many organizations use moderate to easily achievable targets in budget-based contracts (Merchant and Manzoni 1989). Although subsequent field research has failed to provide an in-depth analysis of budget target level, it is believed that moderate budget targets, rather than difficult budget targets, are used by many organizations and the use of moderate budget targets is suggested by prior research (Van der Stede 2000; Fisher et al. 2003). Therefore, organizations utilizing moderate budget targets should be aware of the evidence provided in this study that moderate budget targets lead to less risk-taking than easy budget targets.

This result is supported by security-potential/aspiration level theory, which proposes that individuals with easy budget targets have more options that allow the guaranteed attainment of their reference level (Lopes 1987, 1990; Lopes and Oden 1999). Once individuals are guaranteed their reference level can be attained, their attention then focuses on the remaining alternative(s) that gives the highest potential payoff, which will lead them to select riskier alternatives. Under moderate budget targets, fewer alternatives guarantee the attainment of the reference level and therefore, many riskier alternatives are eliminated from consideration, thus leading to less risk-taking behavior.

The aforementioned result suggests firms that want their employees to take more risks should utilize easy budget targets, compared to moderate budget targets. By doing so, firms can encourage employees to make more risky decisions. The results also suggest that firms using moderate budget targets may be stifling employees' risk-taking behavior through the setting of their budget target difficulty. Specifically, the results of this study suggest that individuals with moderate budget targets make less risky decisions than those with easy budget targets.

This study also provides empirical evidence that individuals' reference levels change over time. Prior research in decision making generally analyzes single period settings, in which individuals reference levels are assumed to be fixed and set based on exogenous factors, such as contract parameters (Wakker 2010). Although this assumption may be true in single period settings, researchers have acknowledged that individuals reference levels are not set and tend to change over time (Kahneman and Tversky 1979, 1992). This study provides evidence consistent with the assertion. Specifically, the empirical evidence suggests that reference levels do change over time,



and the magnitude of the change in reference levels is dependent upon the number of times the budget target was attained. This suggests that the change in reference level is dependent upon individuals' expectations of future economic outcomes because those who continually attained the budget target received higher levels of economic payments.

Expectations-based reference-dependent preferences theory suggests that reference levels are at least in part determined based on rational expectations (Koszegi and Rabin 2006). This study applies this theory and extends it by examining whether expectations of future economic outcomes play a role in determining individuals' reference levels. The results provide evidence that individuals' who continually attain their budget target, and thus would have higher economic expectations, have a greater increase in the reference level than individuals who miss their budget target at least once. More specifically, the evidence suggests there is a positive relationship between the number of times the budget target was attained and the resulting change in reference level. This finding provides evidence that expectations of future economic outcomes do play a role in determining individuals' reference levels.

Although the findings of this study provide evidence that individuals under easy budget targets tend to make more risky decisions, the results relating to reference levels suggest firms should be aware that easy budget targets may lead to greater changes in employee reference levels. Specifically, when employees begin to expect they will receive their base pay plus some form of bonus, they are more likely to increase their reference level. Most decision making theories suggest that individuals' reference levels plays a vital role in decision making. Therefore, theoretically, changes in reference level

should impact individual decision making, possibly impacting the effectiveness of an incentive compensation contract.

To counteract changes in reference levels, firms should continually assess their budget target levels to ensure that employees are not beginning to expect they will receive a bonus or high levels of variable pay. Budget based contracts are very effective at focusing employee attention to specific goals embedded in the contract and are designed to aid in directing employee actions that are desirable for the firm (Milgrom and Roberts 1992; Fisher et al. 2008). Based on the empirical evidence in this study, firms should ensure that the goals embedded in their budget based contracts are not too easy, whereby employees' begin to expect the receipt of their bonus, which would result in greater changes in reference levels. Therefore, firms must weigh the difference between expected behavior, more risk-seeking, and future expected behaviors, related to changes in reference levels, to ensure that their budget based contract is having the desired effect on employee behavior.

Decision-making theories suggest that reference levels play a large role in how individuals make decisions (Kahneman and Tversky 1979; Lopes 1987, 1990). Both security-potential/aspiration level theory and prospect theory emphasize the importance of the reference level in decision making. The results of this study, however, do not support this assertion. Specifically, although individuals who attained the budget target every period exhibited a significant increase in their reference level, there was no significant difference in their decision making corresponding to the increase in reference level. Based solely on this result, firms may not have to be as concerned with changes in reference level as there does not appear to be any significant change in behavior related

to the change in reference level. This result should be interpreted with caution, however, as prior empirical work and decision making theories suggest that reference levels play a vital role in individual decision making.

There could be a number of reasons why individuals' decision making did not change in response to changes in reference level. First, individuals viewed the same projects every period for five periods. Although the order of the projects was controlled for, individuals could have become familiar with the projects and therefore continued to select the same or similar projects, on average. Therefore, no change in project selection variance could be a result of fixation by participants on particular projects. Second, although there is a documented change in reference level, the magnitude of the change in reference level may not have been great enough to warrant significant changes in decision making. Third, it may take more than a few periods for changes in decision making to catch up to changes in reference levels. It is possible there is a significant lag between changes in reference levels and changes in decision making behavior.

Another possibility is related to the statistical analysis of changes in project selection. The sample size used to test for changes in project selection were relatively small and more importantly, the standard deviations of the sample tested were three times larger than the mean of the sample. This indicates there was significant variance in the data, which could impact the statistical analysis. Therefore, the power of the statistical test is questionable, as very large standard deviations compared to the mean could lead to erroneous conclusions. Lastly, the literature relating to reference levels and capturing individuals' reference levels is new and still developing. Therefore, the measure used to capture reference was a single question. Although I believe this measure captured

individuals' reference levels, it may not have captured them completely. Therefore, there is the possibility there is a significant amount of noise in the reference level measure, which could have led to the result that changes in reference level do not impact decision making.

Supplemental analysis suggests that individuals partially follow security-potential/aspiration level theory predictions relating to the elimination of alternatives. Security-potential/aspiration level theory suggests that individuals eliminate alternatives from consideration that place their aspiration level in jeopardy. The supplemental analysis shows that individuals making decisions under a moderate budget target were more likely to eliminate a particular project, Project E, compared to individuals making decisions under an easy budget target. All *a priori* expectations, however, were not found in this analysis. The supplemental analysis and other results from the experiment suggest that individuals do consider attaining the budget target to be very important.<sup>62</sup> However, the elimination of projects does not provide overwhelming support for the decision making process proposed by security-potential/aspiration level theory.

Overall, this research applied relatively new theories to the accounting literature. By examining how reference levels are determined, this study opens the door to new research examining how changing reference levels impact contract design. Applying expectations-based reference-dependent preferences, this study finds that expectations of future economic outcomes play a role in determining reference levels. Additionally, this study extends prior work applying security-potential/aspiration level theory by extending prior findings and making predictions about longitudinal behavior in a budgeting setting.

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<sup>62</sup> Participants indicated that the budget target was important to them in the post-experimental questionnaire ( $\bar{x} = 7.93$ ). The question was answered on a 9-point Likert scale.

The results of the study provide partial support for security-potential/aspiration level theory predictions.

This research examined how individuals' reference levels change over time and whether changes in reference level impact decision making behavior. The results of the study provide evidence that individuals reference levels change over time but this change did not significantly impact individuals' decision making. This area of research is ripe with ideas to investigate how different types of compensation contracts effect individuals' reference levels and how shifting reference levels impact incentive contract design and effectiveness.

## **6.2 Contributions**

The major contribution of this study is that I find evidence that reference levels change over time and that individuals expectations play a vital role in the determination of reference levels. Individuals develop expectations of future economic outcomes, based on prior outcomes, and these expectations are used in setting reference levels. This finding contributes to the literature relating to decision making as well as literature relating to reference levels. Research in decision making utilizing budget based contracts is limited, and this study provides additional evidence that individuals making decisions under easy budget targets tend to make riskier decisions than individuals under moderate budget targets when risk and economic payments are the only consideration. Additionally, this study provides evidence that expectations of future economic outcomes play an important role in setting individual's reference level over time.

Another contribution is the application of expectations-based reference-dependent preferences in the accounting literature. Prior to the introduction of expectations-based

reference-dependent preferences, there was a lack of theory that specified how individuals formulated their reference level. Most prior research assumed reference levels were set based on exogenous factors, such as contract parameters (Wakker 2010). Prior research in accounting suggests that management accounting practices can be an important influence on individuals' reference levels (Birnberg et al. 2007). For example, budget targets set by management can be used by employees to set their reference level. This study links the idea of expectations as a vital aspect in the formulation of reference levels and financial economic outcomes.

This study also applies security-potential/aspiration level theory. This theory has seldom been applied in accounting although its implications for accounting are extensive (Sprinkle et al. 2008). Most prior accounting studies analyzing decision making apply prospect theory to examine individual behavior. Although prospect theory has been validated, it does not predict the process of individual decision making, only the decision that will be made. Security-potential/aspiration level theory explicates not only the decision that individuals will make but also the process they go through to get to the decision (Lopes 1990). Therefore, this study attempted to understand not only the decisions that individuals made but the process they took to reach that decision.

These findings have practical application for firms using budget based contracts. First, firms that want their employees to take more risk should consider utilizing easy budget targets, rather than moderate budget targets. Firms use incentive contracts to direct employee behavior. By using easy budget targets firms would be able to increase employee risk taking, thus creating goal congruence between the behaviors of their employees and the goals of the firm.

Second, firms should be aware that employees' reference levels change over time, which could possibly impact employee behaviors. Although the results of this study do not support this contention, almost all theories relating to decision making specify that reference levels impact individual decision making. Based on this theoretical argument, firms should be cognizant of possible changes in reference levels and continually review their incentive compensation contracts to ensure employees are exhibiting the desired behavior. In addition, firms should understand that changes in employee behavior could be a result of changes in reference levels. Firms design incentive compensation contracts to direct employee behaviors. It is possible that changes in reference levels can impact the effectiveness of incentive contracts.

### **6.3 Limitations**

This study's findings and conclusions should be considered in light of its limitations. First, the projects presented to participants were the same in every period to allow for comparisons between periods. Therefore, participants could have become familiar with the projects that were presented. The order of project presentation, however, was varied in order to decrease this possibility and an ordering variable was not statistically significant in any hypotheses tests.

Second, student proxies were used as managers. However, this limitation may not have a large impact on the results. Although prior research suggests using student proxies may result in a different magnitude of results, the interpretation of the results is generally the same (Trottier and Gordon 2011). In addition, prior research suggests that students are likely to be better surrogates for managers involving decision-making tasks (Ashton and Kramer 1980; Houghton and Hronsky 1993). Lastly, experience in selecting

projects is consistent with individuals selecting from a series of lotteries. Therefore, experience in selecting lotteries is not expected to interact with any variables of interest (Peecher and Solomon 2001).

Another limitation is how reference levels were measured. Prior research investigating reference levels is limited. The question used to assess reference levels was derived from prior research examining reference levels in stock valuation decisions (Arkes et al. 2010). Using only one measure to assess reference levels, however, has its drawbacks. Ideally a number of questions would have been asked and a factor score of reference level would have been created. However, validated questions of reference levels are scarce and subsequently only one question was used in this study. Therefore, more research is needed to develop more comprehensive measures of reference levels and future expectations.

The last limitation to note is the measurement of future expectations. This measure was assessed using a single question. Again, this could explain why there were no significant results relating to future expectations as a measure. Also, it is possible that the wording of the question led to confusion among the participants as many participants answered with the same amount for reference level and future expectations. This limitation, however, presents an opportunity for future research, as discussed in the next section.

#### **6.4 Future Research**

The results of this study may provide some future research opportunities. More research is warranted to identify the behavioral impact of budget target difficulty on risk taking behavior. The results of this study and prior research supports the security-



potential/aspiration level theory predictions that easy budget target goals lead to more risk taking behavior than moderate budget target goals (Sprinkle et al. 2008). Research also supports prospect theory predictions that difficult budget targets lead to more risk taking than easy budget target goals (Chow et al. 2007). Research attempting to identify boundary conditions for budget target difficulty and its positive impact on risk taking is warranted, especially considering the number of companies that use budget targets in compensation contracts (Murphy 2001; Sprinkle and Williamson 2004; Fisher et al. 2008).

Future research could also investigate the link between reference levels and decision making. The results of this study do not provide a definite link between reference levels and decision making that is proposed by numerous decision making theories. Specifically, both prospect theory and security-potential/aspiration level theory propose that individual make decisions based upon their reference level. More research investigating this link is warranted.

Future research could also examine the process through which individuals' reference levels change. Specifically, research could investigate whether expectations-based reference-dependent preferences is a descriptive theory of the process through which reference levels change. This study does not have enough data to conduct this analysis but research addressing this issue would be critical to furthering our knowledge about reference levels and their impact on behavior.

An additional avenue for future research would be further examination of how reference levels change. This study provided evidence that expectations of future economic outcomes impact individuals' reference levels. Future studies should examine

whether this is also true in compensation contracts where an explicit reference level is not as apparent as they are in budget-based contracts.

Lastly, future research should also begin to develop more measures of reference levels and future expectations. In this study, reference levels and future expectations were assessed with a single question. More specifically, reference levels were assessed with a one-dimensional measure designed to capture individuals' indifference point. Reference levels, however, are complex in nature and future research could begin to assess multi-dimensional measures. Multi-dimensional measures could be more representative of reference levels as a whole compared to measures that only assess individuals' indifference points. Overall, there is much that is not known about reference levels and future research could begin to investigate reference levels more.

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## APPENDIX A – EXPERIMENTAL PROCEDURES

### Experiment Procedures

- 1. Introduction**
  - a. General Instructions/Informed Consent
  - b. Informed will be paid for participation
  
- 2. Letter Decoding**
  - a. Instructions
  - b. Perform a one minute training session and receive feedback
  - c. Informed of performance requirement to decode fifty-five letters to numbers in the main letter decoding session
  - d. Complete three minute main letter decoding session
  - e. Feedback on performance in main session and whether the performance requirement was satisfied
  
- 3. Risk Preference and Loss Aversion Tasks**
  - a. Informed of compensation for risk preference and loss aversion tasks
  - b. Example of task selection
  - c. Compensation question
  - d. Risk preference task (Holt and Laury 2002)
  - e. Loss aversion task (Brink and Rankin 2011)
  
- 4. Main Experiment Instructions**
  - a. Assume role of product manager
  - b. Two product selections will be randomly chosen and experiment compensation will be based on these selections
  - c. Conversion rate of experimental currency
  
- 5. Background for main experiment**
  - a. Background of ABC Company, compensation contract, manipulation of budget target, and reminder of conversion rate
  
- 6. Product Examples**
  - a. Two examples of product selection with detailed description of information presented
  - b. Two additional examples with three understanding questions for each example
  
- 7. Main Experiment**
  - a. Reminder of role, contract, and budget target level
  - b. Baseline reference level question and compensation

question

- c. Period 1 product elimination phase
- d. Period 1 product selection
- e. Feedback on period 1
- f. Reference level and future expectations questions
- g. Repeat for periods 2 – 5
- h. Post experiment questionnaire

## APPENDIX B – EXPERIMENTAL MATERIALS

### Instructions:

Thank you for your participation in this research study. The purpose of this study is to obtain information about decision makers. You will be asked to assume the role of a **product manager** throughout the entire study. You will be asked to perform multiple tasks and to provide your perceptions based on information provided during the task. The information provided in the set of materials is intended to be representative rather than complete. Please be sure to base your opinions and perceptions **only** on the information provided in this case. There are no right or wrong answers. Please carefully read **all** information provided before responding to the questions.

For your participation you will receive 5 course credit points from your professor. If you choose not to participate in this experiment, you may complete a written assignment for the 5 points. You will also have the opportunity to earn monetary compensation for your participation in this experiment based on the choices you make as a product manager. Your responses are confidential. No identifying information will be used.

Your participation in this study should take approximately one hour. Your participation is voluntary and your responses will be kept confidential.

The person in charge of this research study is Lee Kersting, and he is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. This research is considered minimal risk. The risks from participating in this study are not more than would be encountered in everyday life. Your participation in this study will help advance the body of knowledge regarding the business profession.

You may choose not to participate in this study. Refusal to take part in this study will involve no penalty or loss of benefits to which you would otherwise be entitled. Your decision to participate or not participate, or a decision to withdraw from the study after having agreed to participate, will not affect your student status. You may discontinue participation in this study at any time without penalty or loss of benefits to which you may otherwise be entitled.

This study, titled “Individual Decision Making,” is an approved IRB study. If you have any questions or concerns about this study, please contact Lee Kersting at 813-974-7340. If you have questions about your rights as a participant in this study, general questions, or complaints, concerns or issues you want to discuss with someone outside the research study, call the Division of Research Integrity and Compliance at the University of South Florida at 813-974-5638.

By proceeding to the next page, you are agreeing to participate in this study.

## Letter Decoding Instructions

Your first task involves decoding letters to numbers. Shown below is a screen shot of the application you will be using:

### Decoding Task Screen

---

DECODING KEY -- TRAINING

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
M	T	A	P	L	B	U	J	N	D	F	S	H	W	R	C	X	G	K	Y	E

22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
J	N	D	F	S	H	W	K	Y	E	M	T	A	C	R	G	X	P	L	B	U

---

INPUT WINDOW

Time left:

Number: 29

Letter:

Last result: **Correct!**  
Number correct: 1  
Number wrong: 0

---

As you can see, the screen is split into two frames. In the top frame, you will see a “decoding key,” which indicates the correspondence between letters and numbers. The input window is in the bottom frame, where you see the time remaining and one input box. **Your task is to enter the letter that corresponds to the number in the input box and press ‘Enter’ to submit.**

In the above example, the number **29** corresponds to the letter **k** by referencing the decoding key. So you would put **k** in the text box. You would then press ‘Enter,’ which will result in submitting your input. You will immediately know whether you were correct or wrong. Once you hit ‘Enter’ a new number will appear and you will decode the new number in the same fashion.

Please raise your hand if you have any questions. If you have no questions, click on the link below to proceed (do not attempt to “use” the screen shown above - - it is just a screen shot!). You will be taken to a screen where you will perform the decoding task, as explained above.

[Click Here to Proceed](#)

**Will perform a one-minute letter-decoding task as a training session**

**DECODING TASK TRAINING DONE**

You are done with the training session to become familiar with the decoding task.

Your performance is summarized below:

Number <b>correctly</b> decoded:	<b>7</b>
Number <b>incorrectly</b> decoded:	<b>0</b>

If you do not understand any aspect of the decoding task, please raise your hand.



Now that you have completed the training session and are familiar with the letter decoding task you will complete one more session.

For completing this portion of the experiment you will earn **\$2**. In order to continue in the experiment, you must decode **55** letters over the next *three-minute* letter decoding session. You will have the opportunity to earn significantly more money in the later segments of the experiment.

If you fail to decode **55** letters in the next session you will be asked to leave the experiment and receive **\$2**.

[Click Here to Proceed to First Session](#)

**Main letter decoding session that lasts for three minutes**

**DECODING TASK SESSION ONE DONE**

You are done with session one of the decoding task.

Your performance is summarized below:

Number <b>correctly</b> decoded <u>session one</u> :	<b>77</b>
Number <b>incorrectly</b> decoded <u>session one</u> :	<b>4</b>
Passed Performance Threshold:	<b>YES</b>

[Click here to proceed](#)

## Instructions

Now that you have completed the letter decoding task and successfully passed the requirement to remain in the experiment you will be asked to answer a number of questions.

In the following pages you will be presented with two tasks. These tasks will present options like the example presented below. For each task there will be ten sets of options presented. You will be required to select one of the two options in each row. One of the ten sets of options from each task will be selected for compensation, which means the outcome of your selection will be simulated and you will earn the outcome in \$US Dollars.

Example	<input type="radio"/>	0/10 of \$3.00 + 10/10 of \$2.00	or	<input type="radio"/>	0/10 of \$6.00 + 10/10 of \$.15
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The example above presents two options.

The option on the left has a 0% chance of you winning \$3 and a 100% chance of winning \$2.

The option on the right has a 0% chance of winning \$6 and a 100% chance of winning \$0.15.

If you selected the option on the left, then you would possibly receive \$2 for this selection.

The next two pages contain a number of options similar to the example presented above. For each row select the option you prefer.

For each of the two tasks on the following pages, one **ROW** from each task will be selected and you will be **compensated** based on the outcome of your selection. Therefore, if the above example were the row selected for actual compensation you would earn \$2, which you **WILL** receive at the end of the experiment.

When you are ready to begin click on the Next button below.

Next

Each task you are about to complete contains ten sets of options. For an individual task (ten sets of options), how many rows will be randomly selected for compensation?

1

2

3

5

7

**Risk preferences task (Holt and Laury 2002)**

For **EACH** of the following ten choices (One choice per ROW), please indicate which of the two options you would prefer by selecting your preference.

	<b>OPTION B</b>	<b>OPTION A</b>
Example	$0/10$ of \$3.00 + $10/10$ of \$2.00	or $0/10$ of \$4.00 + $10/10$ of \$.15

You should make **TEN** choices, one for each pair of options.

1	$0/10$ of \$4.00 + $10/10$ of \$3.20	or	$0/10$ of \$7.70 + $10/10$ of \$.20
2	$1/10$ of \$4.00 + $9/10$ of \$3.20	or	$1/10$ of \$7.70 + $9/10$ of \$.20
3	$2/10$ of \$4.00 + $8/10$ of \$3.20	or	$2/10$ of \$7.70 + $8/10$ of \$.20
4	$3/10$ of \$4.00 + $7/10$ of \$3.20	or	$3/10$ of \$7.70 + $7/10$ of \$.20
5	$4/10$ of \$4.00 + $6/10$ of \$3.20	or	$4/10$ of \$7.70 + $6/10$ of \$.20
6	$5/10$ of \$4.00 + $5/10$ of \$3.20	or	$5/10$ of \$7.70 + $5/10$ of \$.20
7	$6/10$ of \$4.00 + $4/10$ of \$3.20	or	$6/10$ of \$7.70 + $4/10$ of \$.20
8	$7/10$ of \$4.00 + $3/10$ of \$3.20	or	$7/10$ of \$7.70 + $3/10$ of \$.20
9	$8/10$ of \$4.00 + $2/10$ of \$3.20	or	$8/10$ of \$7.70 + $2/10$ of \$.20
10	$9/10$ of \$4.00 + $1/10$ of \$3.20	or	$9/10$ of \$7.70 + $1/10$ of \$.20

**Loss aversion task (Brink and Rankin 2011)**

For **EACH** of the following ten choices (One choice per ROW), please indicate which of the two options you would prefer by selecting your preference.

The numbers presented in **parentheses represent negative numbers**. Therefore, if you selected the option on the left in the example below, you would have a 50% change of winning \$5.00 and a 50% chance of losing \$1.50.

**OPTION A**

**OPTION B**

Example	50% of \$5.00 + 50% of (\$1.50)	or	50% of \$1.00 + 50% (\$1.00)
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You should make **TEN** choices, one for each pair of options.

1	50% of \$6.67 + 50% of (\$1.87)	or	50% of \$1.33 + 50% (\$1.33)
2	50% of \$6.67 + 50% of (\$2.00)	or	50% of \$1.33 + 50% (\$1.33)
3	50% of \$6.67 + 50% of (\$2.13)	or	50% of \$1.33 + 50% (\$1.33)
4	50% of \$6.67 + 50% of (\$2.33)	or	50% of \$1.33 + 50% (\$1.33)
5	50% of \$6.67 + 50% of (\$2.53)	or	50% of \$1.33 + 50% (\$1.33)
6	50% of \$6.67 + 50% of (\$2.80)	or	50% of \$1.33 + 50% (\$1.33)
7	50% of \$6.67 + 50% of (\$3.20)	or	50% of \$1.33 + 50% (\$1.33)
8	50% of \$6.67 + 50% of (\$3.87)	or	50% of \$1.33 + 50% (\$1.33)
9	50% of \$6.67 + 50% of (\$5.27)	or	50% of \$1.33 + 50% (\$1.33)
10	50% of \$6.67 + 50% of (\$9.33)	or	50% of \$1.33 + 50% (\$1.33)

## Main experiment instruction page

You will now be asked to read information relating to a Company and assume the role of a product manager for this company. You will be asked to make a number of decisions in this role of product manager.

You will be compensated based on the decisions you make and the resulting outcomes.

Of all the decisions you make relating to ABC Company and the products they produce, **two** of your production decisions will be selected at random. You will be compensated based on these **two** randomly selected decisions in the following segment of the experiment.

All answer you provide related to compensation should be presented in terms of Lira.

All monetary terms are described in terms of Lira, which is an experimental currency. The Lira you earn in the two randomly selected sessions is converted into U.S. dollars at a rate of 20,000 Lira to \$1. Therefore, if you earn \$100,000 Lira in a session this is equivalent to \$5 which you **will receive** at the conclusion of the experiment.

When you are ready to begin the next portion of the experiment, click Next

## **Narrative describing ABC Company - Easy Budget Target (Moderate Budget Target)**

### ***Background***

ABC Company produces and manufactures a wide variety of products. As a product manager, you are tasked with selecting which product ABC Company should manufacture for the year. Following on historical analysis, ABC Company determined that each product selected will be manufactured and sold for one year.

The task of selecting products to manufacture and market is delegated to a number of product managers. Each product manager oversees his/her own staff of product developers, whose job is to design or seek out potential new products. At the beginning of each year, the product development staff for each product manager will propose to their product manager seven products. The proposal for each product will include the staff's estimate relating to the probability of achieving the budget, the amount paid if the budget is not met, and the highest and lowest amounts paid if the budget is met. Historically, the product development staff provides highly accurate estimates.

At the beginning of each year, each product manager is allocated funds to invest in one of the seven products. He/she then uses this allocated amount to manufacture and market one product out of the seven that his/her staff proposes. All products presented cost the same amount to manufacture and market.

ABC Company pays their product managers a base salary plus a bonus for product returns above a budget threshold. ABC Company has determined that you will be paid an annual base salary of **15,000 Lira (30,000 Lira)** and you will be presented with a number of products to choose from. Due to the level of the budget threshold that has been set, a majority of the products presented **will allow (will not allow)** you to attain the budget threshold with certainty.

The experimental currency, Lira, is convertible to U.S. Dollars at a rate of 20,000 Lira to \$1.

When you are ready to begin the next portion of the experiment, click Next



## Product selection examples with detailed description – Moderate Budget Target

### Example of Product Selection

Presented on the next two pages are two example products that a product manager could select from. The information is compiled by the product development staff and is presented in summary format. The format and presentation style will be the same in future exposures to product selection decisions. Recall that the monetary values presented are Lira, a form of experimental currency.

<b>Product X</b>	
Probability of Meeting the Budget	65%
Amount Paid if Budget is <b>Not</b> Met	30,000
Lowest Amount Paid if Budget <b>Is</b> Met	170,000
Highest Amount Paid if Budget <b>Is</b> Met	252,308

For Product X, the probability of not meeting the budget is 35%.

As can be seen for Product X, there is a 65% chance that this project will allow the product manager to meet his/her budget threshold. Therefore, there is a 35% chance that this product will not allow the manager to achieve his/her budget threshold. If the budget threshold is not met then the manager will receive his/her base salary.

For Product X, the amount paid if the budget threshold is not met is 30000.

If the budget threshold is not met then a manager receives only his/her annual base salary. In this case, if the budget threshold is not met, then the manager will receive 30000 Lira.

For Product X, the average expected payoff if the budget threshold is met is 211,154.

If the budget threshold is met, then the product manager will receive some amount of payment ranging from 170,000 Lira (lowest amount paid if budget is met) to 252,308 Lira (highest amount paid if the budget is met) with each amount between the lowest and highest payoff being equally likely. Therefore, if the budget threshold is met, a product manager has equal probability of earning all amounts ranging from 170,000 Lira to 252,308 Lira.

Thus, the average payment for meeting the budget threshold would be 211,154 Lira  $((170,000 + 252,308) / 2)$ .

Additionally, the product manager's base salary is included in the lowest and highest amounts paid if the budget is met.

When you are ready to proceed, hit Next

<b>Product Y</b>	
Probability of Meeting the Budget	100%
Amount Paid if Budget is <b>Not</b> Met	N/A
Lowest Amount Paid if Budget <b>Is</b> Met	125,000
Highest Amount Paid if Budget <b>Is</b> Met	205,000

For Product Y, the probability of **not** meeting the budget is 0%.

As can be seen for Product Y, there is a 100% chance that this project will allow the product manager to meet his/her budget threshold. Therefore, there is a 0% chance that this product will not allow the manager to achieve his/her budget threshold. If the budget threshold is not met then the manager will receive his/her base salary.

For Product Y, the amount paid if the budget threshold is not met is N/A.

If the budget threshold is not met then a manager receives only his/her annual base salary. In this case, because there is a 0% chance that this product will cause a manager to miss their budget threshold, the amount paid if the budget threshold is not met is not available because this will not happen.

For Product Y, the average *expected* payoff if the budget threshold is met is 165000.

Because the budget threshold will be met, the product manager will receive some amount of payment ranging from 125,000 Lira (lowest amount paid if budget is met) to 205,000 Lira (highest amount paid if budget is met) with each amount between the lowest and highest payoff being equally likely. Therefore, because the budget target will be met, a product manager has equal probability of earning all amounts ranging from 125,000 Lira to 205,000 Lira.

Thus, the average payment for meeting the budget threshold would be 165,000 Lira  $((125,000 + 205,000) / 2)$ .

Additionally, the product manager's base salary is included in the lowest and highest amounts paid if the budget is met.

When you are ready to begin the next portion of the experiment, click Next

**Product examples and understanding questions – Moderate Budget Target**

In your answers percentages (%) and commas for Lira are not necessary and may interfere with you correctly answering the questions. Please just enter a number amount (ex, 25 or 100000) or N/A where applicable.

**Example of Project Selection**

<b>Product A</b>	
Probability of Meeting the Budget	70%
Amount Paid if Budget is <b>Not</b> Met	30,000
Lowest Amount Paid if Budget <b>Is</b> Met	180,000
Highest Amount Paid if Budget <b>Is</b> Met	237,144

For Product A, the probability of **not** meeting the budget is  %

For Product A, the amount paid if the budget threshold is not met is  Lira

For Product A, what is the *average* expected payoff if the budget threshold is met?  
 Lira

<b>Product B</b>	
Probability of Meeting the Budget	100%
Amount Paid if Budget is <b>Not</b> Met	N/A
Lowest Amount Paid if Budget <b>Is</b> Met	145,000
Highest Amount Paid if Budget <b>Is</b> Met	185,000

For Product B, the probability of **not** meeting the budget is  %

For Product B, the amount paid if the budget threshold is not met is  Lira

For Product B, what is the *average* expected payoff if the budget threshold is met?  
 Lira

When you are ready to begin the next portion of the experiment, click Next

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## Reminder of instructions, manipulation, and compensation

### *Business Simulation*

Please assume the role of a product manager of the ABC Company. For this simulation you will be asked to make decisions in this role. The decisions you make will impact the amount of compensation you receive. Recall that **two randomly selected decisions** will be chosen that will be the basis of your experimental compensation.

All of the preceding information, including product manager's responsibilities, the company's situation and desires, and how product managers are evaluated and paid, will apply.

The company has allocated funds to you, the product manager, to manufacture and market a product in this period.

ABC Company has determined that you will be paid an annual base salary of **30,000 Lira** and you will be presented with a number of products to choose from. Due to the level of the budget threshold that has been set, a majority of the products presented **will not allow** you to attain the budget threshold with certainty.

Your product development staff has proposed seven new products for this period. The information for each product is presented on the next page.

When you are ready to begin the next portion of the experiment, click Next

When you are ready to begin the next portion of the experiment, click Next

## Baseline reference level question and Experiment Compensation Question

Before beginning the main experiment please answer the following question:

At what level of payment would you have neither positive nor negative emotion?

in Lira

Of all the product selection decisions you will make, how many will be randomly selected and used as a basis for your experimental compensation?

- 1
- 2
- 3
- 5
- 10

When you are ready to begin the next portion of the experiment, click Next

**Product Selection Task - Period 1**

Please indicate which products you would NOT consider selecting by clicking on the box above the products presented.

On the next page you will actually select which product you want to manufacture and market.

On this page you are selecting which products you would not consider selecting.

By clicking on the box above a product you are indicating you WOULD NOT consider selecting that product.

	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
Probability of Meeting the Budget	75%	100%	55%	65%	100%	70%	60%
Amount Paid if Budget is <b><u>Not</u></b> Met	30,000	N/A	30,000	30,000	N/A	30,000	30,000
Lowest Amount Paid if Budget <b><u>Is</u></b> Met	167,500	182,500	40,000	80,000	180,000	95,000	65,000
Highest Amount Paid if Budget <b><u>Is</u></b> Met	305,833	187,500	583,636	456,923	190,000	407,857	511,667

When you are finished selecting which products you would not consider in your selection process hit Next,

### Product Selection Task - Period 1

Please select one of the following products to manufacture and market in the current year:

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
Probability of Meeting the Budget	75%	100%	55%	65%	100%	70%	60%
Amount Paid if Budget is <b><u>Not</u></b> Met	30,000	N/A	30,000	30,000	N/A	30,000	30,000
Lowest Amount Paid if Budget <b><u>Is</u></b> Met	167,500	182,500	40,000	80,000	180,000	95,000	65,000
Highest Amount Paid if Budget <b><u>Is</u></b> Met	305,833	187,500	583,636	456,923	190,000	407,857	511,667

Indicate which product you would like to manufacture and market:

When you are satisfied with your decision, click Next

**Outcome and compensation related information for period 1**

**Outcome and compensation related information for period 1**

Attained budget target **Yes**

**Period 1**

**222161**

Click next when you are ready to proceed to the next page.



**Reference level and future expectations questions ( $t = 1$ )**

**Questions:**

At what level of payment would you have neither positive nor negative emotion?

in Lira

What do you think the outcome of your decision in the next period will be?

in Lira

How confident are you that this outcome will occur?

When you have completed the questions above, click Next

**Periods 2 – 5 will proceed in the same fashion. The order of presentation of the products will be controlled for.**

**Below is an example of the outcome feedback that will be presented in period 3.**

**Outcome and compensation related information for period 3**

Attained budget target **Yes**

Period 1 Period 2 **Period 3**  
222161 184513 **350741**

Click next when you are ready to proceed to the next page.

**Below is an example of the product selection task in Period 4**

**Product Selection Task - Period 4**

**Your compensation from period 3 was 350741**

**Your compensation from period 2 was 184513**

**Your compensation from period 1 was 222161**

Please select one of the following products to manufacture and market in the current year:

	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
Probability of Meeting the Budget	70%	55%	100%	75%	100%	65%
Amount Paid if Budget is <b><u>Not</u></b> Met	30,000	30,000	N/A	30,000	N/A	30,000
Lowest Amount Paid if Budget <b><u>Is</u></b> Met	95,000	40,000	180,000	167,500	182,500	80,000
Highest Amount Paid if Budget <b><u>Is</u></b> Met	407,857	583,636	190,000	305,833	187,500	456,923

**Indicate which product you would like to manufacture and market:**

After the fifth period ended and participants answered the final reference point and future expectation question, they were shown the following screen:

The main experimental task is complete. You have completed five periods, of which two will be

randomly selected for compensation. You will be informed of the rounds selected and your total compensation for your participation at the conclusion of the experiment.

When you are ready to continue click Next

### Post experimental questionnaire

Of the seven products presented, how many guaranteed the budget target would be attained?

Most  Few

Submit Answer

## Demographic Questions

Gender  M  F

Age

Years of full time equivalent work experience  years.

1) The level of my budget threshold allowed me to easily attain my budget threshold.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

2) My evaluation of products depended on the level of my budget threshold.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

3) Meeting the budget threshold was important to me.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

4) To what extent did the level of the budget threshold affect your product selection?

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

5) I felt that meeting the budget threshold was difficult.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

6) I took the experiment seriously.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

7) It was easy to understand the experimental instructions.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

8) There were too many products to select from.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

9) I felt the task was a good representation of the real world.

Not at all                      Moderately                      Completely

1            2   3   4   5            6   7   8   9

## Compensation Page

A summary of your earned compensation is displayed below:

<b>Phase of Experiment</b>	<b>Lira Earned</b>	<b>U.S. Dollars Earned</b>
Letter Decoding	N/A	\$2
Risk Preferences	N/A	\$4.00
Loss Aversion	N/A	\$6.67
Main Experiment Period 5	468144	\$23.41
Main Experiment Period 2	184513	\$9.23
Total Compensation		\$45.31

*Thank you for participating in this experiment.*

*Please print this page and bring it to the experimenter to receive your experimental compensation*





June 19, 2012

Lee Kersting  
School of Accountancy  
4202 E. Fowler Ave., BSN 3413  
Tampa, FL 33620

RE: **Exempt Certification** for IRB#: Pro00007985

Title: The Longitudinal Effectiveness of Incentive Contracts: The Impact of Reference Levels

Dear Mr. Kersting:

On 6/16/2012 the Institutional Review Board (IRB) determined that your research meets USF requirements and Federal Exemption criteria as outlined in the federal regulations at 45CFR46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF IRB policies and procedures. Please note that changes to this protocol may disqualify it from exempt status. Please note that you are responsible for notifying the IRB prior to implementing any changes to the currently approved protocol.

The Institutional Review Board will maintain your exemption application for a period of five years from the date of this letter or for three years after a Final Progress Report is received, whichever is longer. If you wish to continue this protocol beyond five years, you will need to submit a continuing review application at least 60 days prior to the exemption expiration date. Should you complete this study prior to the end of the five-year period, you must submit a request to close the study.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John A. Schinka, Ph.D., Chairperson  
USF Institutional Review Board