DECISION-MAKING UNDER RISK:

FINANCIAL GOAL, WEALTH, AND REFLECTION EFFECT

by

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(Under the Direction of Joan K. Moss)

ABSTRACT

Using three experiments, this study investigated how different kinds of financial goals influenced participants' decisions under risk and how participants adjusted their risk strategies when the wealth level changed. All participants in the study were recruited from the undergraduate students in the University of Georgia. Using an investment game, it was found that participants became more risk seeking when wealth level increased in the gain domain. In the loss domain, participants became more risk averse as wealth level decreased. In addition, participants showed a risk preference reversal when they were very close to the preset well-defined financial goals. Unclear financial goals did not trigger the similar risk preference reversal pattern and participants in the groups without financial goals did not show risk preference reversal pattern.

INDEX WORDS: risk tolerance, financial goal, wealth level, decision stage, risk preference reversal

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CHAPTER 1

INTRODUCTION

Consumers' decisions under uncertainty have been studied extensively for over half a century in both behavioral science and economics. The decision under uncertainty has to take four elements into consideration: 1) the amount of possible gain, 2) the probability of the gain, 3) the amount of possible loss, and 4) the probability of the loss. The final decision under risk is the result of weighting these four elements. Based on the simple weight of the four elements, the expected utility theory (Von Neumann & Morgenstern, 1947) was proposed to explain consumers' behavior under risk. A so-called "rational" decision is choosing the option with the highest expected value. However, such a rational decision is what consumers should choose rather than what they would choose. The rational decision requires consumers to be risk neutral, which is obviously not realistic. Therefore, many "irrational" behaviors (e.g., Allais Paradox--- people choose the option with the lower expected value rather than the one with the highest expected value) that could not be explained by the expected utility theory were observed. New theories were developed to explain such behaviors, each incorporating new findings and improving previous theories. Meanwhile, empirical studies were also conducted to test the hypotheses proposed in these theories.

Based on the expected utility theory, which assumes that people have consistent risk preferences, three major theories proposed inconsistent risk preferences: 1) Friedman and Savage's theory (1948), 2) Fishburn's "target return" theory (1977), and 3) Kahneman and Tversky's prospect theory (1979). All three theories have a reflection point, at which people

reverse their risk preferences. In Friedman and Savage's theory, the reflection point is current wealth level. If a potential gain could improve people's economic status to a higher level (e.g., from low-income to middle class), then they would be willing to take the risk. If a potential loss could decrease people's economic status to a lower level, then they would be risk averse. In Fishburn's "target value" theory, the reflection point is the target return set before making the decision. People are risk seeking before reaching the target return, and once the target return has been reached, they will become risk averse. If the target return is set to zero, the "target return" theory coincides with the prospect theory. The major point of the prospect theory is that people are risk seeking in the loss domain and risk averse in the gain domain, which is called the "reflection effect".

Both Friedman and Savage's theory (1948) and Fishburn's "target return" theory (1977) incorporated the psychological effect of motivation and aspiration, though not explicitly stated. In Friedman and Savage's theory, the motivation is to raise economic and financial status. In Fishburn's theory, the motivation is to achieve a target return. Both motivations could make consumers willing to take more risk. In both theories, attainment of goals brings achievement and feeling of success. On the other hand, when a potential loss is severe and a financial goal is impossible to achieve by taking the risk, the goal of security is prevalent. For example, consumers are willing to purchase homeowner's insurance policies to gain financial security rather than to save on premium payments.

Besides the four basic elements (the amount of possible gain, the probability of the gain, the amount of possible loss, and the probability of the loss), the influence of other factors, such as control and competence, have also been investigated in recent years (Langer, 1979; Heath & Tversky, 1991; Goodie, 2003). These studies showed that people were more willing to take risks

on things in which they have confidence or knowledge. The findings of all these theories and research have greatly improved the understanding of consumers' financial behaviors, such as purchasing lottery tickets, insurance, savings and investments.

All theories and empirical research have shown that financial decision-making under risk is an extremely complicated cognitive process, which involves both subjective and objective aspects. Each of the theories discussed above captures a couple of important aspects of this process. However, none of them alone can explain consumers' financial decision-making satisfactorily. The present study will examine the relative importance and interaction of three aspects proposed by three theories: wealth level, target return and risk domain (detailed discussion of theories in the subsequent chapter). Although many studies have been done to investigate the effect of these three aspects on risk decision-making, nearly all of them were in a static setting and participants received no feedback (e.g., Heath & Tversky, 1991; Hershey & Schoemaker, 1980). Therefore, some manipulation might have a weaker effect. It might be impossible to observe how participants adjust their decision-making strategy as the three aspects are changing because of their previous decisions. In real life, all decisions are interdependent. The consequences of previous decisions may provide information and set constraints for later decisions. Later decisions may reinforce good results of previous decisions or make up for the loss from previous decisions. In the present study, an investment game was used to study participants' dynamic decision-making process.

CHAPTER 2

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Expected Utility Theory

The earliest theory concerning choice involving risk is the expected utility theory

proposed by Von Neumann & Morgenstern (1947). The main idea of this theory is that

consumers will select the choice with the highest expected value. The expected utility function is

given by: $U(\underline{x}, \underline{p}) = \Sigma p_i U(x_i)$, where x_i is the value of the ith outcome, p_i is the probability of the

i^{th} outcome and $\Sigma p_i = 1$. Since the utility of an outcome is unobservable, it is set to be equal to

the value of the outcome. It may be more appropriate to call this theory the "expected value"

theory rather than the "expected utility" theory.

Expected utility theory, as most other economic theories, assumes that consumers are

rational, which leads them to the option of the highest expected value. When two or more

choices offer the same expected value, consumers should be indifferent. Suppose a consumer has

to choose between 1) a sure gain of $500 or 2) a 50% chance of no gain and a 50% chance of

$1,000 gain. Since the expected value of both options is $500, the consumer should feel no

difference in choosing either of them although the second choice is obviously more risky than

the first one.

The above example demonstrates an assumption that consumers are risk neutral under the

expected utility theory. The theory assumes that consumers are concerned only with the expected

value of each choice rather than the risk. For an aggregate analysis, this assumption might be

appropriate and can simplify the problem because if consumers' risk preferences are normally

distributed, most of them will concentrate on the risk neutral region. However, this assumption blurs individual differences. In the above example, some consumers may choose the first option while the others may choose the second one. The expected utility theory cannot be used to explain the different choices of different consumers. Consumers' different choices reveal that individual differences do exist and consumers do have different risk preferences, which contradict the assumption under the expected utility theory.

As demonstrated above, when the expected value of both choices is the same, consumers' risk preferences play a critical role in their decisions. Would consumers' decisions only depend on the expected values of options if the values are not the same? Would all consumers choose the one with the highest expected value as predicted by the expected utility theory? Now, reconsider the above example with the only change being a sure gain of $400 rather than a sure gain of $500. The expected value of the risky option is higher than the expected value of the risk-free option. It is obviously not reasonable to assert that all consumers will choose the risky option.

Allais Paradox illustrates some irrational behaviors that this theory fails to explain. An example of this paradox occurred when a game show observed by the researcher offered the last contestant left on stage two choices. One was the sure gain of $10,000, and the other was a one-fifth chance of winning $100,000 and a four-fifths chance of leaving with nothing. Most contestants chose the sure gain. Obviously, the expected value of the second choice is twice the expected value of the first one. According to the expected utility theory, $U_1 = \$10,000$ and $U_2 = 20\% (100,000) + 80\% (0) = \$20,000$, contestants should have chosen the second one. This observation shows explicitly that consumers are not always rational (according to the expected utility theory) when facing risk.

However, are consumers really irrational? The irrational problem seems to arise from the assumption that the unobservable expected utility equals the observable expected value. As in all other economic models, a consumer's utility function should reflect his/her preferences as well as the value of an option. By setting the expected utility equal to the expected value, the theory ignores consumers' preferences and makes the expected utility totally objective. In this theory, the criterion to judge whether a decision is rational or not should be whether the decision maximizes the expected utility instead of expected value. If a consumer is risk averse then the sure gain of $500 gives him/her more utility than the 50% chance of no gain and 50% chance of $1,000 gain because the former involves no risk. In such case, the consumer is not indifferent between both options, and it is rational to choose the sure gain. From this example, it is easy to see that the expected utility of an option involves not only the probability and value of each outcome but also the perceived risk of the option. For a sure outcome, the expected utility equals the expected value; for an uncertain outcome, the expected utility is the expected value adjusted by the perceived risk.

A consumer's risk preference can be represented by one of the three types of expected utility functions. He/she is risk averse if $U\left(\Sigma x_i\, p_i\right) > \Sigma p_i\, U\left(x_i\right)$, which is represented by a concave expected utility function (Figure 1). He/she is risk seeking if $U\left(\Sigma x_i\, p_i\right) < \Sigma p_i\, U\left(x_i\right)$, which is represented by a convex expected utility function (Figure 2). He/she is risk neutral if $U\left(\Sigma x_i\, p_i\right) = \Sigma p_i\, U\left(x_i\right)$, which is represented by a linear expected utility function (Figure 3). For each risky option, there is a cash equivalent that has the same expected utility as that of the risky option. The cash equivalent is unique for each risk preference curve. A consumer will be indifferent between the cash equivalent and the risky option.
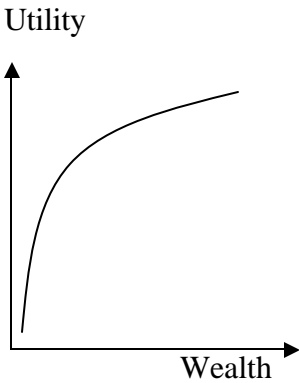
Utility

Utility

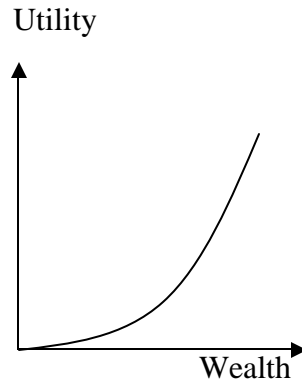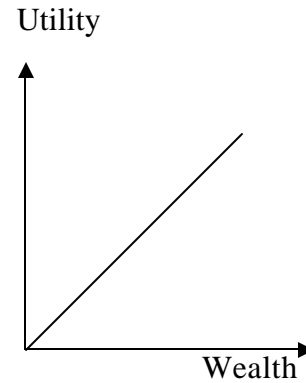Utility

Figure 1: Risk averse

Figure 2: Risk seeking

Figure 3: Risk neutral

The Allais Paradox can be explained by the above risk preference curves. If risk-free option A has a lower expected value than risky option B but a consumer chooses A, it is because the consumer is risk averse (Figure 1). However, it does not mean the consumer will always choose risk-free options. Once the cash equivalent of the risky choice is higher than the value of the risk free option ($U (\Sigma x_i p_i) < U (\text{cash equivalent}) = \Sigma p_i U (x_i)$), the consumer will select the risky option. For example, there are two options. One is a sure gain of $500, and the other is a 50% chance of no gain and 50% chance of $1,000 gain. For a consumer who has a unique risk preference curve, suppose the cash equivalent of the risky option is $400 (i.e., the utility provided by the risky option is the same as the utility provided by $400 cash). Obviously, the utility of the $500 sure gain is larger than the utility of $400 cash, so the consumer will choose the sure gain. Now, suppose the risky option is a 20% chance of $2,000 gain and an 80% chance of $125 gain with expected value of $500. If the cash equivalent of this risky option is $600, then the utility of the $500 sure gain is certainly lower than the utility of $600 cash equivalent. In this case, the same consumer will choose the risky option. Although this consumer's risk preference does not change, his/her choices do change under different circumstances. Thus, it is impossible to predict consumers' financial decisions just based on their general risk preferences.

Although the risk preference curves explain the Allais Paradox by allowing the expected utility of an option to differ from its expected value, it still holds the assumption that consumers' risk preferences are consistent. Many studies have challenged this assumption and numerous empirical studies have shown that consumers' risk preferences do change under different circumstances (McDougal, 1995; Pratt, 1964; Schneider & Lopes, 1986; Tversky & Kahneman, 1981). Friedman & Savage (1948), Fishburn (1977) and Tversky & Kahneman (1979) proposed different theories incorporating the results from the empirical studies. All these theories agree that risk preferences are not consistent, but they disagree on the pattern of the change in risk preferences.

Friedman and Savage's Theory

Friedman & Savage (1948) expanded the expected utility theory to explain the observation that low-income families are willing to purchase both insurance and lottery tickets. This observation is obviously an example of inconsistent risk preferences. By purchasing homeowner's insurance against the loss from fire, a consumer pays a premium to obtain protection from a very small chance of a very large loss. The consumer is risk averse in this case. By purchasing lottery tickets, the consumer has a very large chance of a very small loss and a very small chance of a very large gain so he/she is risk seeking. From this observation, an inconsistent risk preference utility function was proposed (Figure 4).

This utility function has two parts. The first part is concave and the second part is convex. The reflection point is on the consumer's current wealth. The expected utility of every point to the right of the reflection point is higher than the utility of the reflection point, whereas the expected utility of every point to the left of the reflection point is lower than the utility of the reflection point.

Utility

Current wealth   Wealth
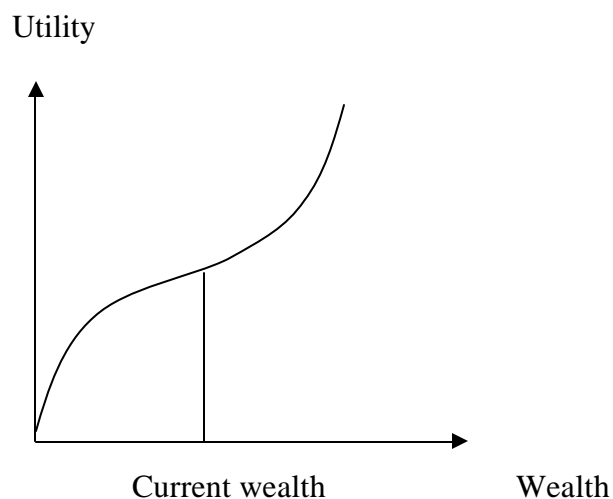
Figure 4: Friedman & Savage's Theory

This utility function has two parts. The first part is concave and the second part is convex. The reflection point is on the consumer's current wealth. The expected utility of every point to the right of the reflection point is higher than the utility of the reflection point, whereas the expected utility of every point to the left of the reflection point is lower than the utility of the reflection point.

This theory rejects the law of diminishing marginal utility that is a widely accepted assumption in all other economic models. The theory suggests that the marginal utility of an increase in wealth depend on the significance of the increase. If an increase in wealth shifts the consumer to a new economic status then the increase yields increasing marginal utility, otherwise an increase in wealth diminishes marginal utility. Thus, the law of diminishing marginal utility is not rejected. For example, the lottery offers a low-income family a very small chance of a very large gain, which may raise the family to a much higher economic status. As a result, the family would purchase lottery tickets because the marginal utility is increasing. However, if an

investment offers the family a large chance of a small gain, the family may refuse to invest because the marginal utility of such a gain is diminishing.

<div align="center">"Target Return" Theory</div>

In Friedman & Savage's theory, the critical point for the risk preference reversal is the current wealth. Whereas in Fishburn's (1977) theory, the critical point for the reversal is the "target return". The mean-risk dominance model was used in Fishburn's study. Risk is the function of deviation from the target return (t) and its impact on consumers' feelings (a) when the return is below the target return by various amounts. The function of risk is given by:

$$r(F) = \int_{-\infty}^{r(F)} |x - t|^a dF(x),$$ where x is the possible return of an option.

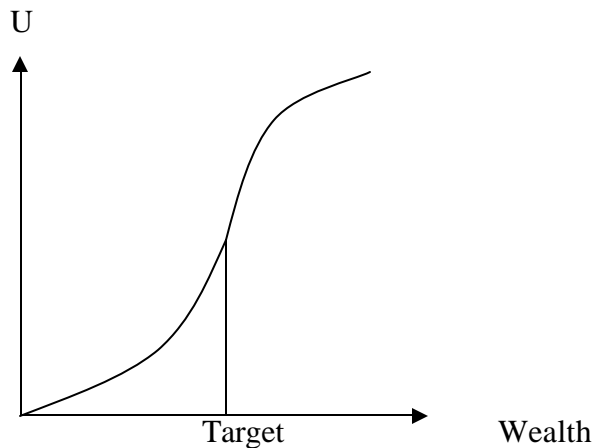The main idea of this theory is demonstrated in Figure 5.

Figure 5: "Target Return" Theory

1)   If all possible returns for all options are at or below the target return, then consumers will be risk seeking;

2)   If all possible returns for all options are above the target return, then consumers will try to maximize the expected value; and

3)   If one option offers a chance of an above-target return while at least one possible return for the other options is below the target return, then the consumer will try to avoid the latter options.

Depending on circumstances and choice characteristics, the target return can be zero, the return of a risk-free investment, average market return, etc. Consumers' feelings about failure to achieve the target return are reflected by a. If a consumer is only concerned about the failure to achieve the target return with no regard to the amount, then a small a is appropriate. If a consumer is concerned about the amount below the target return, then a large a is appropriate. A consumer is risk neutral if a=1; he/she is risk seeking if a<1, and he/she is risk averse if a>1. If all possible returns of the risky choice are below the target return and the sure thing offers the same expected value as the risky choice, a consumer's choice depends completely on a. However, if the risky option has the possibility of earning the above-target return while the sure thing does not, the consumer will choose the risky one. The theory suggests that the utility for the below-target return takes the form of x-k (t-x) ^{a} and the utility functions observed above the target value have risk-neutral, risk-seeking and risk-averse shapes.

Cox & Munsinger's (1985) finding confirmed the above hypothesis. They found that investors' risk preferences changed when the expected value of an option moved from above the "target return" to below the "target return", ignoring whether the outcome was a gain or loss. In the long run, the target return theory is consistent with Friedman and Savage's (1948) theory because most people's long-term target return is an increase in economic status.

Prospect Theory

Both Friedman & Savage's theory and Fishburn's theory suggest that one's risk preferences change when his/her current wealth or target return is taken into account. However, neither of them explicitly considers the impact of the frame of options. It is often observed that consumers treat gain differently from loss. "Target value" theory implies that consumers will be risk seeking in the loss domain and risk neutral in the gain domain if the target return is a zero gain or loss. The law of diminishing marginal utility suggests that the negative impact on utility from a loss is larger than the positive impact on utility from the same amount of gain. Using several experiments, Tversky & Kahneman (1979) found that people were risk averse on the gain side and risk seeking on the loss side, which is consistent with the "target return" theory on the loss side. This may be explained by people's intention to at least gain something combined with an intention to minimize their loss. According to this finding, Tversky & Kahneman (1979) proposed the prospect theory, which has an S-shape function nearly symmetric around zero (Figure 6).
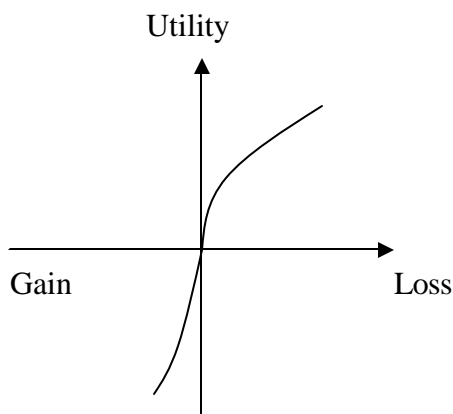

Figure 6: Prospect theory

The value of an option is similar to the expected utility of that option. The differences between the "target return" theory and the prospect theory lie in the weight function and value function. In prospect theory, a decision weight p (p) associated with the probability (p) of each outcome takes the place of the true probability of each outcome, and the value of an outcome is not necessarily the true value of the outcome. The value of an option is given by: $v = S \, p \, (p_i) \, v \, (x_i)$, where the sum of $p \, (p_i)$ is not necessarily one. Previous research (Peterson & Beach, 1967) found that people tend to underestimate high probability and overestimate low probability. For example, when the true probability that an event will happen is 0.99, people usually think that the probability of this event's occurrence is not so high. On the contrary, when the true probability that an event will happen is only 0.05, people usually estimate that the probability is higher than that. This means $p \, (p_i) > p_i$ if p_i is low and $p \, (p_i) < p_i$ if p_i is high. But, the latter effect is smaller than the former one, as observed in Tversky & Kahneman's study, so $S \, p \, (p_i)$ does not necessarily add up to one. The above properties of $p \, (p_i)$ make the S-shape function not perfectly symmetric around zero. The part on the gain side is less steep than the part on the loss side.

Although many studies showed that in some cases people did reverse risk preferences from the gain side to the loss side, it was not always true. Hershey & Schoemaker (1980) conducted both a within-subject and between-subject experiment with various combinations of outcomes and probabilities to test the prospect theory. The reflection effect occurred when 1) a small amount of gain/loss, 2) large probabilities, or 3) a very large amount of gain/loss, were involved. In other situations, the reflection effect was weak. The follow-up questionnaire showed that the most important reason mentioned for the subjects' decisions was probabilities, followed by the sure amount. No one mentioned the target return as the reason for his or her decisions, which was not surprising. Generally, people don't have a clear target return determined before

making decisions, instead, they only have a vague goal such as maximizing the gain or minimizing the loss or both unless the target return has been specified for them or they are forced to set the target return.

Using multi-outcome lotteries with different combinations of probabilities and potential returns, Schneider and Lopes (1986) found that, besides the properties of options, the reflection effect depended on subjects' personality as well. As the expected utility increased, risk averse subjects became increasingly risk averse in the gain domain, while risk-seeking subjects became increasingly risk seeking in the loss domain. This finding suggests that there is an interaction between the properties of options and people's general risk preferences. However, this study only tested the reflection effect on risk averse and risk seeking subjects. In general, risk averse people tend to be risk averse in both the gain and the loss domains and risk-seeking people tend to be risk seeking in both domains. Those who are more likely to show the reflection effect are risk neutral people, who were not examined in Schneider and Lopes's study. Thus, it is not surprising that the subjects in this study failed to show the reflection effect or only showed a weak reflection effect.

Being unsatisfied with the prospect theory, which cannot explain when and why people do not show the reflection effect, Gonzalez-Vallejo, Reid and Schiltz (2003) proposed a proportional difference model to explain how people make trade-offs between attributes that result in different risk preferences in the gain and the loss domains. Instead of two value functions for the gain and loss domains respectively, this model proposed only one function, which considered both advantages and disadvantages of an option to make the decision. It was proposed that people made decisions by comparing a normalized attribute value difference to a threshold, which captured sensitivity to different outcomes. To test the model, this study used

questions similar to those used by Hershey and Schoemaker (1980). This study added another feature to the test. In order to see whether their current financial situation would influence subjects' decisions, the subjects were divided into high-wealth and low-wealth groups. It was found that high-wealth subjects were more risk seeking than low-wealth subjects.

All the above studies tested the reflection effect and found that besides the domain of options, other factors, such as personality and wealth level influenced people's decisions. Gonzalez-Vallejo, et al's (2003) study showed that higher wealth level made people more risk tolerant because they could afford a relatively large loss. On the other hand, a higher wealth level could also make people more risk averse because the extra return was not as attractive to high-wealth people as to low-wealth people. Therefore, high-wealth people could be more risk-averse in the gain domain than low-wealth people; but they could be more risk seeking in the loss domain than low-wealth people.

<center>Motivational Factors</center>

In financial decision-making, there are two conflicting motivations. One is to secure current financial status, which leads to loss aversion proposed by Tversky & Kahneman's prospect theory (1979). The other is to achieve higher financial status or goals, which leads to risk-seeking behaviors proposed by Friedman and Savage's theory (1948) and Fishburn's "target return" theory (1977). A financial decision does not only result in financial consequences but also psychological consequences. Attaining financial goals will increase decision-makers' feelings of achievement and success. Financial loss or failing to achieve financial goals will bring feelings of disappointment or regret. Therefore, when making decisions, consumers have to consider both possible positive and negative feelings in addition to financial outcomes. Focusing

on different motivations, Atkinson (1957) proposed achievement motivation theory and Lopes (1987) proposed two-factor theory.

According to Atkinson's achievement theory, people choose the alternative that will maximize their feelings of achievement. Difficult tasks will bring stronger feelings of achievement than easy tasks, so people will prefer the alternative with half of the chance to succeed, at which point the expected satisfaction from achievement is optimal. However, not everyone has the same level of concern about achievement (McClelland, 1951). Generally risk averse people are more concerned about loss or failure, while generally risk seeking people are more concerned about gain or success. For those who are more concerned about failure, they will avoid failure or minimize feelings of failure by taking the alternative with the certain outcome (probability of success is one) or the alternative with the lowest probability of success (probability of success is zero). If it is certain to succeed, then there will be no failure. If it is impossible to succeed, people will also have no feeling of failure because everybody fails and the failure is not due to their incompetence. The achievement theory is suitable to predict people's decisions when the outcomes are associated with their performance and effort. When outcomes are random or people have little control over the outcome, the feeling of achievement will be weak.

Lopes' (1987) two-factor theory incorporated both situational and dispositional components. The dispositional factor was people's primary motives. There were two conflicting motivations. One was to seek safety, and the other was to seek potential. When making choices, people had both motives in their mind, but one was stronger than the other. For risk averse people, the security motive was stronger than the motive for potential. For risk seeking people, the motive for potential was stronger than the motive for security. Having different primary

motives in minds, people weighted probabilities and possible outcomes differently and such weight reflected their goals.

The dispositional factor reflected people's general risk preferences, however, even risk seeking people might be risk averse in certain situations and risk averse people might be willing to take risk sometimes. The conflict between people's choices and their disposition was from the interaction between the dispositional factor and the situational factor---aspiration level. Aspiration level was the size of the outcome people were seeking. Aspiration level involved both opportunities and environmental constraints. First, it reflected the base line, which was the amount of gain/loss people thought was reasonable. People would not take risks unless the base line was guaranteed. However, aspiration level did not stay the same. Depending on the probabilities and possible outcomes of other alternatives, aspiration level might shift. A favorable option when compared to one alternative might become unfavorable when compared to another alternative because of aspiration level shifting.

Aspiration level depended on both the value of the specific outcome itself and outcomes of other alternatives. In addition, outside situations aside from probabilities and outcomes of all alternatives posed environmental constraints. Lopes (1987) found that people were more likely to take risks when goals could hardly be achieved through safe moves. The dispositional factor and situational factor worked together to shape people's choices. In the gain domain, aspiration level is positively correlated with the security motive and negatively correlated with the achievement motive; in the loss domain, aspiration level conflicts with the security motive but is consistent with the achievement motive.

In Fishburn's (1977) target return theory, the target return would act as the level of aspiration. Target return on the gain side will force people to focus more on the desire for

potential. Target return on the loss side will force people to focus more on the desire for safety.

In both the gain and the loss domains, aspiration level conflicts with motives. In this theory,

target return is an achievement goal. How far away from the target return poses an environmental

constraint on people's choices. Attaining the target return will give people a feeling of success.

In financial decision-making, sometimes the level of aspiration is determined externally and

other times it is determined internally. For example, if a consumer needs $10,000 to pay the

down payment on a house, he/she has to accept it and makes financial decisions accordingly. In

other situations, different consumers can set different levels of aspiration according to their

financial status or specific needs. In real life, the level of aspiration is usually not clear. Aside

from level of aspiration, need for security also plays an important role in decision-making. Those

who have a high need for security focus more on the worst outcomes in alternatives, which lead

to risk averse decisions. Those who have a low need for security focus more on the best

outcomes in alternatives, which lead to risk seeking decisions.

<div align="center">The Influence of Confidence and Knowledge</div>

So far, all theories focus on the features of the basic four elements of options (the amount

of possible gain, the probability of the gain, the amount of possible loss, and the probability of

the loss). It seems that consumer decisions depend only on the weighted utilities. However, in

real life, an option involving risk includes more than these four basic elements. For example,

when a consumer considers an investment choice between a mutual fund and real assets, he/she

may not only consider the amount of the gain/loss and probability of the gain/loss, but also

his/her knowledge, previous experiences, available information and liquidity in both investment

instruments. Many studies have investigated the role of such factors in decision-making in recent

years. Langer (1979) found that familiarity with situations and involvement in activities in the

experiments would result in an illusion of control. Heath & Tversky (1991) and Goodie (2003) also found that people tend to bet on things in which they have more confidence and knowledge even though they have no control over the outcome. If a consumer has had a successful investment experience with mutual funds and has been actively trading mutual funds, he/she may have the illusion that he/she has some power to reduce the risk. On the other hand, if he/she has never invested in real assets, he/she feels unfamiliar with such investments. Under such circumstances, he/she will be more likely to choose mutual funds over real assets even if mutual funds are more risky and the expected value of mutual funds is lower. This is considered an irrational decision. When consumers experience illusion of control and incorrectly estimate the risk of options, the irrationality should be and can be corrected.

<div align="center">Purpose and Hypotheses</div>

Based on the above theories and previous empirical studies, the current study incorporated three major theories (Friedman and Savage's theory, 1948; Fishburn's "target return" theory, 1977; and Kahneman and Tversky's prospect theory, 1979). The following question was examined: How do current wealth level and target return influence people's decision-making in the gain and the loss domains? Previous studies all examined static decision-making under risk (e.g., Heath & Tversky, 1991; Hershey & Schoemaker, 1980). These studies have several limitations. Research that explored the correlation between wealth level and risk preference had the serious problem of cause-and-effect ambiguity. It was impossible to tell whether high wealth level led to a high level of risk tolerance or risk-seeking investments increased wealth level. In other studies that manipulated wealth levels, wealth levels were fixed and subjects' choices would not cause any consequences.

However, in real life every financial decision will cause serious consequences, which may drive people to spend more time processing relevant information more carefully. In addition, previous studies manipulated the wealth level as a between-subject factor, which could not reveal how people adjust strategies according to the change in their wealth levels. In the current study, in order to capture people's decision-making process in the real world, a simulated investment game was used. In this game, participants' choices caused either gains or losses. Their account balances were adjusted upward or downward accordingly. Thus, the wealth level became a within-subject factor. In Hershey and Schoemaker's (1980) study, they examined the influence of the target return by only asking participants to name the reasons for their choices. Since most people usually don't have a very clear target return and the researchers did not specify the target return for participants, this study did not find the target return to be an influential reason for their choices involving risk. A clear target return was specified for participants in the current study and an extra credit incentive was given to those who reached the target return.

This study mainly examined the interactions between participants' wealth level, target return, and loss/gain domain. It aimed to answer three research questions and examine six hypotheses:

1. What is the role of a clear financial goal in consumers' decision-making process?

Although it is widely recognized among personal financial planners and educators that a good financial goal is an essential step in financial management, the focus of financial goals is on the initiation and facilitation of other financial behaviors such as budgeting, saving and investing. How financial goals influence consumers' risk preferences has only been studied through simple observations (Cox & Munsinger, 1985), so the result was not very convincing

considering numerous other factors that might contaminate the results. In this study, financial goals were manipulated in the experiments and other factors were controlled.

In the gain domain, the financial goal is usually an achievement goal specified as a certain amount that consumers need to obtain. According to Fishburn's (1977) "target return" theory and Atkinson's (1957) achievement motivation theory, people will be more risk seeking if they have a goal than if they don't have a goal.

Hypothesis 1: In the gain domain, people with financial goals will be more risk seeking than people without financial goals before reaching their goals, when wealth level and general risk preferences are controlled.

Fishburn's (1977) theory proposes that people are risk seeking before reaching the target return. They will become risk averse only after the target return has been achieved. However, people may become increasingly risk averse when they are closer to their goals. When the difference between the target return and current wealth level is larger, the risk averse strategy will make it impossible or difficult to reach the target value so people have to be risk seeking. However, when they are close to their goals, they could reach the goal without bearing a large amount of risk. Thus, their strategies will change from risk seeking to risk averse as they are approaching the target return and the risk averse strategy will last beyond the target return. So, the reversal of risk preference may happen even before the target return is reached.

Hypothesis 2: In the gain domain, people will be risk seeking when the current wealth level is low and they are far away from their financial goals; people will be risk averse when the current wealth level is high and they are close to their financial goals.

2.   Will implicit and vague financial goals have the same effect as a clear and explicit goal on consumers' decision-making and preferences under risk?

In real life, most people have some kind of financial goals such as increasing economic status, saving enough for children's college education, and saving enough for retirement. However, these kind of goals do not explicitly specify the amount they need to accumulate by a specified period of time. In this case, when making financial decisions people may still consider their current situation rather than focusing on their long-term well-being. There may be no clear pattern of consumers' risk preferences. Generally risk seeking people may be even more risk seeking and generally risk averse people may be even more risk averse. However, if there is no loss involved, due to the lack of a specified amount and time, people may be risk seeking achieving their goal without a clear risk preference reversal.

> Hypothesis 3: In the gain domain, people with a clear and explicit financial goal will be risk seeking at a low wealth level and become increasingly risk averse as they approach their financial goal; people with a vague and implicit goal will be risk seeking without a risk preference reversal.

3.   Will achievement goals and security goals lead to different risk strategies?

In the loss domain, a financial goal is usually a security goal stated as a bottom line that consumers want to retain. According to Lopes' (1987) security motivation theory, security goals increase the need for security and will make people risk averse.

> Hypothesis 4: In the loss domain, people with financial goals will be more risk averse than people without financial goals before reaching their goals, when wealth level and general risk preferences are controlled.

According to Atkinson's (1957) achievement motivation theory and Lopes' (1987) security motivation theory, people seeking feelings of success and achievement are more risk tolerant and people with a high need for security are more risk averse. An achievement goal in

the gain domain, which requires people to increase wealth to a certain level, will lead to achievement motivation and result in risk seeking decisions. On the contrary, a security goal in the loss domain, which requires people to avoid reducing wealth to a certain level, will increase the need for security and result in risk averse decisions. If so, an opposite pattern of the prospect theory in gain and loss domains will be observed.

Hypothesis 5: People with achievement goals will be more risk seeking and people with security goals will be more risk averse.

The influence of wealth level on people with different types of financial goals should be different. For those with achievement goals in the gain domain, a high wealth level means that they are close to achieving their goals so they could accumulate wealth more safely. On the contrary, for those with security goals in the loss domain, where the bottom line is to maintain at least a certain amount in their accounts, a high wealth level means that they are far away from the bottom line so they could afford a large loss in exchange for the opportunity of no loss. Therefore, the risk preference pattern for different wealth levels for those with security goals should be opposite to the pattern for those with achievement goals.

Hypothesis 6: In the loss domain, people with security goals will be risk seeking at high wealth levels and become increasingly risk averse as they approach the bottom line.

CHAPTER 3

METHODOLOGY AND RESULTS

All participants in three experiments were selected from undergraduate students at the University of Georgia. This is a convenience sample. Generally, a convenience sample has low external validity. However, the major focus of this study is consumers' financial decision-making under risk. Undergraduate students are also consumers who are making real life financial decisions. Moreover, financial knowledge and experiences that may limit the generalization of the results were controlled in this study. All variables of interest were either subjective characteristics of options or general risk preferences of participants. Therefore, the external validity of this sample is moderate. All three experiments were approved by the Human Subject Office in the University of Georgia.

Experiment 1

The main purpose of this experiment was to answer the first research question. Whether having a financial goal or not was expected to influence participants' risk preferences and their investment strategy.

<u>Subjects</u>

Ninety-five undergraduate students participated in the experiment to earn class extra credit. All participants were in an intermediate financial management class so they had a general understanding of investments and financial risks. They participated in the experiment at the end of Spring 2005.

<u>Materials</u>

There were twenty questions in the gain domain with expected values ranging from $300 to $1,600 (Appendix I). There was a similar set of questions in the loss domain (Appendix II). Each question had two options with one sure option and a risky option that was stated as different combinations of probabilities and potential returns. The sure option was coded 1, and the risky option was coded 2. In later analysis, participants' scores to all questions were summed to obtain total risk scores. Participants with higher risk scores were more risk seeking than those with lower risk scores. The result of each option was randomly assigned before hand. Since participants' financial knowledge and experiences may influence their risk preferences and decision-making regarding certain investment tools such as stocks, mutual funds and bonds, no specific investment tool was mentioned in these questions. All questions involved only probabilities and potential outcomes.

In order to control participants' general risk preferences when investigating their decisions during the game, two questionnaires were used to measure their attitudes toward general financial risks and their attitudes toward risk behaviors in several domains. Participants' general financial risk attitude was measured with a revised one-item question adopted from the Survey of Consumer Finances (Appendix III). Three choices were coded from 1 to 3 with higher scores indicating a higher level of risk tolerance and lower scores indicating a lower level of risk tolerance. Participants' attitudes toward risk behaviors were measured with a 12-item questionnaire. These 12 items were selected from the domain-specific risk-taking scale developed by Weber, Blais, & Betz (2002), with 2 items from each domain---gambling, investments, health, social, recreational, and ethical. The categorization of domains was based on the factor analysis results. The domain-specific risk-taking scale had moderately high reliability

with Cronbach's alphas ranging from 0.70 (social domain) to 0.89 (gambling domain).

Participants were asked to indicate the likelihood that they would engage in the described

activity or behavior if they were to find themselves in that situation. Answers to each item

ranged from 'very unlikely' to 'very likely' and were coded from 1 to 5 with higher scores

indicating risk seeking behaviors and lower scores indicating risk averse behaviors.

Design

The research design was a mixed 4 (wealth level: 4 levels) X 2 (financial goal: goal vs.

no goal) design. Financial goal was a between-subject factor and wealth level was a within-

subject factor.

Procedure

The experiment was conducted via personal computers and the experimental instrument

was developed using a survey tool called "Survey Monkey". The participants were randomly

assigned to either the goal or control group with 50 participants in the goal group and 45

participants in the control group. All participants were told that they would receive five points

for just participating in the experiment. Before the simulated investment game began, there were

instructions informing the participants in the goal group that their goal was to raise the amount in

their account to $20,000 by the end of the game and those who have achieved this goal would be

rewarded with ten points in addition to the basic five points for participation (Appendix I).

Participants in the control group were informed that they would receive five extra credit

points. All participants in both groups had $0 in their accounts when they started. Additional

instructions were shown telling all participants that the account balance would be adjusted

according to their investment outcomes and how to calculate new account balances using the

Excel spreadsheet provided by the experimenter.

After reading the instructions, participants started the game by clicking "next" and the first question would appear. After participants selected one option and clicked 'next', the result would appear on the screen. Participants could go to the next question once they inputted the new account balance. For both groups, the game would be over when it ran out of questions. After finishing the game, participants were asked to fill out a short survey regarding general risk behaviors and financial risk preferences. At the end, they were asked to fill out their names and indicate which class they were in for extra credit purposes.

Analysis

This experiment was to answer the first research question, which had two hypotheses so there were two dependent variables associated with each hypothesis. The first hypothesis was about the influence of a financial goal on participants' risk preferences so the dependent variable was the risk preferences of participants in different groups, which were measured with the average scores of participants in the experimental and control group. The main independent variable was whether participants have a financial goal or not. Participants' general financial risk preference, risk behaviors and the account balance during the game might influence their decisions during the game, so all three factors were measured and controlled in the analysis. Average account balance for each participant during the whole game was calculated and used as a covariate in the analysis.

First, the main effect of financial goal (between-subject) was analyzed using a one-way ANCOVA with general financial risk preference and average account balance as covariates. None of the risk behavior questions were found significant in the preliminary analysis and they reduced the effect of general financial risk attitude (but still significant), so they were deleted in

later analysis to avoid the multi-collinearity problem. Deleting the risk behavior questions did reduce the effect of financial goal treatment but not to a significant extent.

If the prediction of the "target return" theory is correct, participants in the experimental group should be more risk seeking than those in the control group in order to achieve the pre-determined financial target. Therefore, the average score of participants in the experimental group should be higher than the average score of participants in the control group. The statistical results showed that there was a significant difference in risk preferences between the experimental group and control group ($F_{(1, 90)}$ =6.88, p= .01). However, contrary to the prediction, participants in the financial goal group were more risk averse (mean=1.4852) than those in the control group (mean=1.5709). Participants' general financial risk attitude ($F_{(1, 90)}$ =8.30, p= .005) and average account balances ($F_{(1, 90)}$ =26.40, p= .0001) had a significant influence on participants' risk preferences during the game.

Table 1

Average account balance at each wealth level (Experiment 1)

Wealth level	Goal N=50	No goal N=45
1	2,773	2,667
2	9,715	9,268
3	15,715	15,092
4	20,757	19,952

Second, the effect of wealth level in the experimental and control groups were examined. Each participant had 20 account balance numbers and they were equally divided into four wealth levels. Wealth level 1 included the account balance after the first five questions; wealth level 2 included the account balance from question six to ten; wealth level 3 included the account

balance from question eleven to fifteen; and wealth level 4 included the account balance from question sixteen to twenty. The average account balances in each wealth level for both groups were very close and no significant differences were found in the average account balances between the two groups (Table 1). The average account balance in the third wealth level in the financial goal group was 15,715, which was very close to the $20,000 goal. Most participants reached the goal at the end of the third wealth level or at the beginning of the last wealth level (questions 15, 16 and 17).

Each participant's risk preference in each wealth level was measured with the total score to the questions in the corresponding wealth level. The results are reported in Table 2. A repeated measures analysis of variance showed that there was a significant within subject effect of wealth level ($F_{(3, 279)} = 13.97$, $p= .0001$). Further comparison of the means in each wealth level between the two groups showed that there were no significant differences between the two groups in the two lower wealth levels. In the third wealth level, the difference in total scores between the two groups was very close to the .05 significance level ($t_{(93)} = 1.53$, $p = .06$). Whereas in the highest wealth level, participants in the goal group were more risk averse than those in the control group ($t_{(93)} = 1.77$, $p = .03$).

Table 2

Total risk scores at different wealth levels (Experiment 1)

Wealth level	Goal N=50		No goal N=45	
	Mean	SD	Mean	SD
1	7.30	1.13	7.31	1.31
2	7.64	1.17	7.73	1.39
3	7.22	1.10	7.69	1.35
4	7.84	1.25	8.36	1.13

According to the second hypothesis, participants in the experimental group should be risk seeking in low and median wealth levels and become increasingly risk averse when they are approaching the target amount. When comparing the total scores in different wealth levels within the goal group, such risk preference reversal pattern was found. A paired t test showed that the total scores between the first two wealth levels were not significantly different even though there was a small increase in the total scores from level 1 to level 2 ($t_{(98)}$ =1.4783, p = .14). The total score in level 3 (mean = 7.22) dropped significantly ($t_{(98)}$ =1.9273, p = .05) from the total score in level 2 (mean = 7.64) and it was even lower when compared to the total score in level 1 (mean = 7.30). Then, the total score increased significantly ($t_{(98)}$ =2.7027, p= .008) from level 3 to level 4 (mean = 7.84). These results revealed that participants became more risk averse when they were very close to the financial goal and they became risk seeking again after reaching the goal. It confirmed the second hypothesis. In the control group, the risk preference pattern between different wealth levels was different.

According to Friedman and Savage's (1948) theory and Gonzalez-Vallejo et al's (2003) finding, it was predicted that participants in the control group should be more risk seeking when they had a high wealth level than when they had a low wealth level because at a high wealth level they could afford a greater loss. This prediction was also confirmed. No significant differences were found in the total scores between the first three levels, even though the total score increased from level 1 (mean = 7.31) to level 2 (mean = 7.73) and then declined slightly in level 3 (mean = 7.69). Then, the total score increased significantly ($t_{(88)}$ =2.5534, p = .012) from level 3 to level 4 (mean = 8.36).

A frequency analysis for each question in the game showed that participants in the goal group were more risk averse when answering certain questions. All these questions involved

50/50 chance or 40/60 chance. The frequency analysis of the final account balance showed that the proportion of participants who reached $20,000 in the goal group was significantly higher than that in the control group ($\chi^2_{(1)} = 5.9974$, $\underline{p} = .0143$).

<div align="center">Experiment 2</div>

The main purpose of this experiment was to answer the second research question, which concerned the different influences of a clear goal and an unclear goal. It was expected that unclear financial goals would not trigger a clear risk preference reversal as clear financial goals with a specific amount.

Subjects

Seventy-five undergraduate students participated in the experiment to earn class extra credit. Unlike those in the first experiment, participants in this experiment were from an introductory consumer economics class, which did not introduce general concepts of investments and financial risk. They participated in this experiment at the beginning of Summer 2005.

Materials

The questions used in this experiment were the same as the set of questions used in the first experiment. As in the first experiment, the order of two options was randomly generated by the survey software for each participant, and the result of each option was assigned randomly in advance.

Design

The research design was a mixed 4 (wealth level: 4 levels) X 2 (financial goal: clear goal vs. unclear goal) design. The financial goal was a between-subject factor and wealth level was a within-subject factor.

Procedure

The participants were randomly assigned to either the clear goal or unclear goal group with 38 participants in the clear goal group and 37 participants in the unclear goal group. The whole procedure was the same as in the first experiment except for the instructions given to the unclear goal group. Participants in the unclear goal group were told that they should try to raise the amount in their accounts as much as possible and 15 participants with the highest account balance at the end of the game would be rewarded with an additional five extra credit points.

Analysis

First, the main effect of a clear financial goal was analyzed with a one-way ANCOVA. When average account balance and general financial risk preferences were controlled, there were no significant differences in participants' risk preferences between the two groups ($F_{(1, 71)} = 0.06$, $\underline{p} = .80$). The average scores in the clear goal group and the unclear goal group were 1.5344 and 1.5430 respectively.

According to the third hypothesis and the results from the first experiment, participants in the clear goal group should show a risk preference reversal when they are approaching the goal, whereas participants in the unclear goal group should not. The pattern of risk preference reversal was examined with a repeated measures ANOVA. As in the first experiment, four wealth levels were formed, each containing five consecutive questions and the account balances after the corresponding questions. The average account balance at the third wealth level in the clear financial goal group was $15,929, which was very close to the $20,000 goal (Table 3). Nearly 70% of the participants reached the goal at the fifteenth and sixteenth questions. A significant within-subject effect of wealth level was found ($F_{(3, 219)} = 7.34$, $\underline{p}= .0001$).

Table 3

Average account balance at each wealth level (Experiment 2)

Wealth level	Clear goal N=38	Unclear goal N=37
1	2,683	2,705
2	9,748	9,216
3	15,929	14,831
4	20,991	19,672

There were no significant differences in the total scores between the two groups at any of the four wealth levels. However, paired t tests revealed a risk preference reversal pattern in the clear goal group (Table 4). There was a significant increase in the total scores from level 1 to level 2 ($t_{(74)} = 2.0576$, $p = .04$). The total score in level 3 (mean = 7.40) dropped significantly ($t_{(74)} = 2.383$, $p = .018$) from the total score in level 2 (mean = 7.95) and it was even lower when compared to the total score in level 1 (mean = 7.45). Then, the total score increased significantly ($t_{(74)} = 2.7027$, $p = .012$) from level 3 to level 4 (mean = 8.05).

Table 4

Total risk scores at different wealth levels (Experiment 2)

Wealth level	Clear goal N=38		Unclear goal N=37	
	Mean	SD	Mean	SD
1	7.45	1.15	7.46	0.99
2	7.95	0.96	7.54	0.96
3	7.40	1.05	7.59	1.19
4	8.05	1.18	8.11	1.15

No such risk preference reversal was found in the unclear goal group. The total scores increased steadily from the first level to the last level (7.46 to 7.54 to 7.59 to 8.11). However, the increases between the four levels were not statistically significant. The last increase from level 3 to level 4 was very close to the 0.05 significance level ($t_{(72)}$ = 1.9111, p = .06).

Frequency analysis for each question in the game showed that participants in the clear goal group were more risk seeking when answering certain questions. All these questions involved 10/90 chance or 20/80 chance with a very low chance to gain a considerably large amount. The frequency analysis of the final account balance showed no difference in the proportion of participants who reached $20,000 between the two groups ($\chi^2_{(1)}$ = 2.0783, p = .1494).

Experiment 3

The main purpose of this experiment was to answer the third research question, which dealt with the different influences of different types of goals on participants' decisions under risk. Achievement goals were expected to be associated with risk seeking decisions while security goals were expected to be associated with risk averse decisions.

Subjects

Eighty-seven undergraduate students participated in the experiment to earn class extra credit. Participants in this experiment were from either an intermediate financial management class or an introductory housing class. Both classes introduced some knowledge of investments but not financial risk. They participated in the experiment at the beginning of Fall 2005.

Materials

There were two sets of questions with one set in the gain domain and the other set in the loss domain. The set of questions in the gain domain was the same as those used in previous

experiments. There were twenty questions in the loss domain with expected values ranging from

$300 to $1,600 loss (Appendix II). The combination of probabilities and potential outcomes were

the same as those in the gain domain except that all potential outcomes were loss instead of gain.

The sure option was coded 1, and the risky option was coded 2. As in the first two experiments,

participants' scores to all questions were summed to obtain total risk scores. Participants with

higher risk scores were more risk seeking than those with lower risk scores. Options in each

question were in random order. The amount of loss for each question was the same as the amount

of gain in the previous experiments. Questionnaires used to measure participants' general

attitudes toward financial risks and risk behaviors were the same as those used in previous

experiments.

Design

        The research design was a 4 (wealth level: 4 level) X 3 (goal: achievement vs. security

vs. control/loss) mixed design. Financial goal was a between-subject factor and wealth level was

a within-subject factor.

Procedure

        The participants were randomly assigned to one of the three groups: the achievement goal

group, the security goal group, or the control/loss group with 29 participants in each group. The

procedure was the same as in previous experiments except for the instructions. Participants in the

achievement goal group received the same instructions as those in the clear goal group in the

second experiment. Participants in the security goal group were informed that they had $20,000

in their account to start the game. Their goal was to keep a positive balance at the end of the

game. Those who reached the goal would receive 5 points in addition to the basic five points for

participation. Participants in the control/loss group were informed that they would receive five

points for participation. All participants were informed that their account balances would change according to the outcomes of their choices. (Appendix II)

<u>Analysis</u>

First, the main effect of financial goal was analyzed with a one-way ANCOVA. According to hypotheses 4, participants in the security goal group were expected to be more risk averse than those in the control/loss goal group. According to hypothesis 5, participants in the achievement goal group were expected to be more risk seeking than those in the security goal group. Neither of the two hypotheses was supported. When average account balance and general financial risk preferences were controlled, there were no significant differences in participants' risk preferences among the three groups ($F_{(2, 83)} = 0.13$, $p = .88$). The control/loss group had the highest average score of 1.60, followed by the security goal group (1.56). The achievement goal group had the lowest average score of 1.52.

According to the last hypothesis, participants in the security goal group were expected to become more risk averse when they were running out of money. This hypothesis was examined with a repeated measures ANOVA. As in the first experiment, four wealth levels were formed, each containing five consecutive questions and the account balances after the corresponding questions (Table 5). However, unlike the wealth levels in the first two experiments, the average account balances in the four wealth levels in the security goal group and the control/loss group decreased rather than increased because there was no chance of any gain in the loss domain. The average account balance at the third wealth level in the security goal group was $4,612, which was very close to the $0 bottom line. Among participants who had a negative balance by the end of the game, about two thirds of them had an account balance that dropped under zero after

question 18 or 19. Therefore, the last wealth level reflected participants' decisions just before reaching the $0 bottom line.

Table 5

Average account balance at each stage (Experiment 3)

	Loss		Gain
Stage	Security goal	No goal	Achievement goal
	N=29	N=29	N=29
1	17,474	17,479	2,694
2	10,246	9,815	9,738
3	4,612	3,744	15,751
4	416	-446	20,824

A significant within-subject effect of wealth level was found ($F_{(3, 168)} = 5.25$, $p= .0017$). There were no significant differences in the total scores between the security goal group and the control/loss group at any of the four wealth levels. The results are reported in Table 6. However, paired t tests revealed that participants in the security goal group were more risk averse at the end of the game than they were at the third wealth level ($t_{(56)} = 1.9585$, $p = .05$). The total scores decreased from 8.00 at wealth level three to 7.24 at wealth level four. The general trend of participants' risk tolerance level was declining, except that there was a slight increase at the third wealth level (from 7.79 to 8.00). A similar decreasing trend was found in the control/loss group.

In order to compare the risk preference level of the achievement and security goal groups, a repeated measures ANOVA was conducted at four stages of the game. The categorization of the four stages was the same as the categorization of wealth levels in the above analyses. In the security goal group, participants' account balances kept decreasing; in the achievement goal

group, participants' account balances kept increasing. Therefore, average account balances
during the four stages had large differences between the two groups.

Table 6

Total risk scores at different stages (Experiment 3)

| Stage | Loss | | | | Gain | |
| | Security goal N=29 | | No goal N=29 | | Achievement goal N=29 | |
	Mean	SD	Mean	SD	Mean	SD
1	8.17	1.28	8.21	1.08	7.41	1.24
2	7.79	1.24	8.10	1.05	7.79	1.08
3	8.00	1.66	8.00	1.49	7.28	1.12
4	7.24	1.27	7.66	1.34	7.90	1.23

By comparing participants' total scores during each stage, significant differences between
the two groups were found at the first, third and last stages. Participants in the achievement goal
group were more risk averse than those in the security group ($t_{(56)} = 2.2968$, $p = .02$) in the first
stage. Participants in the achievement goal group were more risk seeking than those in the
security goal group ($t_{(56)} = 2.0104$, $p = .04$) in the last stage. Differences at both the beginning
and the end of the game were consistent with the prediction that participants were more risk
averse at lower wealth levels and more risk seeking at higher wealth levels. However,
participants in the achievement goal group were significantly more risk averse than those in the
security goal group in the third stage ($t_{(56)} = 1.9308$, $p = .05$), which is contrary to the wealth
effect. Participants in both groups had similar risk preference levels during stage two, where their
average account balances were also very close. Then, the direction of risk preference change in
both groups deviated from the general trend during the third stage. A paired t-test on risk

preference levels of participants at different wealth levels in the achievement goal group showed

a similar pattern as those in the first two experiments.

CHPATER 4

SUMMARY AND DISCUSSION

Experts in financial planning all agree that a well-defined financial goal is a crucial step in the financial planning process; however, its influences on consumers' financial risk preferences and investment strategies have rarely been investigated. "Target return" theory proposed that people are risk seeking before reaching their goals. An observation of some investment managers' behavior was consistent with the theory (Cox & Munsinger, 1985). However, investment managers obviously had much more financial knowledge and experience than ordinary consumers, which made it hard to generalize the results and the "target return" theory to the general population. Moreover, "target return" theory divides the whole investment period into two parts: pre-goal and post-goal, and it assumes that people only adjust their risk preferences and investment strategies after reaching the goal. This assumption ignores the fact that the investment period before reaching the goal itself could also be a long and complicated period. Even during the pre-goal investment period, consumers may also adjust risk preferences and investment strategies. The results of the first two experiments in the current study suggest that consumers may divide the pre-goal period into several sub-periods and adopt different strategies during different periods even before reaching their goal.

Summary of Findings

The current study investigated participants' risk strategies under different circumstances. Results of the first two experiments showed that participants with a clearly defined financial goal did adopt different risk strategies from those with no financial goal or an unclear financial goal.

However, contrary to the first hypothesis, participants in the goal group were more risk averse than those in the group without a goal. The second and the third hypotheses regarding the risk preference reversal in the clear goal group were supported. No risk preference reversal was found in the control group or the unclear goal group. No significant differences in risk preferences were found among the achievement goal group, the security goal group and the control/loss group. Thus, the fourth and the fifth hypotheses were not supported. However, different risk strategies were found between the achievement goal group and the security goal group just before reaching the target amount. A strong wealth effect was found in all groups. Participants became more risk seeking as wealth level increased; thus the last hypothesis was supported.

<div align="center">Risk Preference Reversal</div>

Contrary to the prediction according to "target return" theory, participants in the goal group were more risk averse than those in the control group. A detailed analysis of their risk preferences during different wealth levels revealed that the different risk preferences between participants with and without a financial goal came from the second half of the investment game. At the beginning of the game, there were no significant differences between the two groups. In the first half of the game, participants in both groups showed an increasing risk tolerance trend. During the third wealth level, when they were very close to the pre-set financial goal, participants in the goal group suddenly became risk averse and the increasing risk tolerance trend did not continue. Surprisingly, the risk preference scores of participants in the control group also dropped a little but not as dramatically as in the goal group. One possible reason may be that participants exchanged information about the financial goal and some participants in the control group thought they also had a $20,000 financial goal without carefully reading the instructions.

During the last wealth level, participants in both groups increased their risk tolerance

substantially. The size of the increase in both groups was very similar. Participants in both

groups started at the same risk tolerance level, but participants in the goal group ended up at a

much lower risk tolerance level than those in the control group. The general trend was still

increased risk tolerance as wealth level increased. Participants' risk preference patterns are

illustrated in Figure 7. "Target return" theory predicted participants' behaviors in the first half of

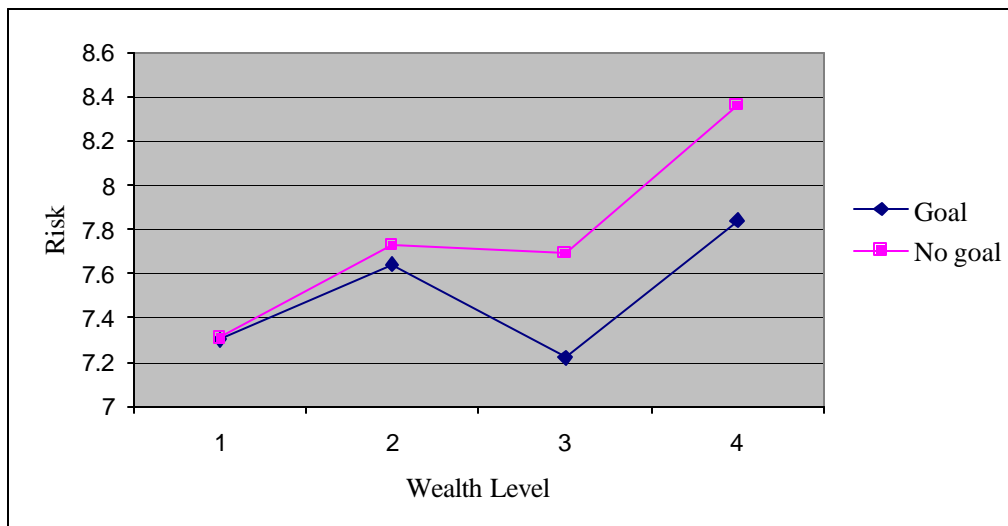the game correctly, but not the second half of the game.

Figure 7: Risk preference comparison (Experiment 1)

The second experiment did not find significant differences in average risk tolerance level

between the two groups. However, the analysis of participants' risk tolerance level at different

wealth levels showed a similar pattern as in the first experiment (Figure 8). The risk tolerance

level of participants in clear goal group first increased, then declined substantially just before

reaching the goal, and increased again after reaching the goal. The risk preference level of

participants in the unclear goal group increased steadily but not significantly until the last wealth

level. Both groups showed an increased trend in risk preference level even though there were ups and downs in the clear goal group. When analyzing the risk preferences of two groups without breaking down by wealth levels, the ups and downs evened out so no difference was found between the two groups.
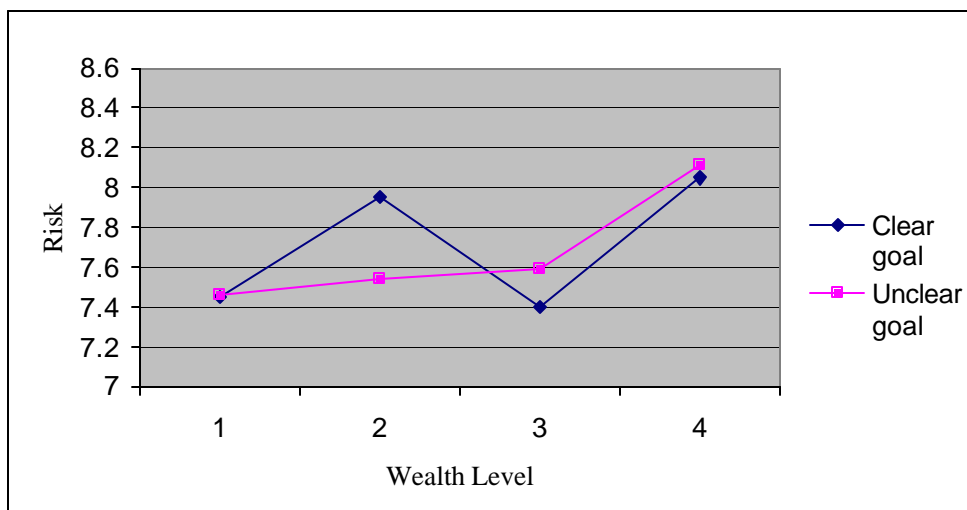

Figure 8: Risk preference comparison (Experiment 2)

The risk preference pattern of participants in the clear goal group in the second experiment is consistent with the pattern of participants in the goal group found in the first experiment, which confirms that a risk preference reversal just before reaching the financial goal does exist.

Differences between the Achievement Goal and the Security Goal

By comparing participants' strategies between the achievement goal group and the security goal group, there are several differences worth noting even though no significant difference was found in the average scores between the two groups.

First, although there was no significant difference in the average risk preference level between the two groups, the difference between the two groups at the third stage of the game was opposite of the wealth effect (Figure 9). Risk preference changes at the third stage in both groups strayed away from their general trends. The questions in the third stage included different combinations of probabilities and potential outcomes and four expected values. Thus, such divergence could not be explained by the characteristics of those questions alone, nor could it come from the wealth effect. From the second stage to the third stage, the size of the decrease in the achievement goal group (0.52) was larger than the size of the increase in the security goal group (0.21). Participants in the achievement goal group became more risk averse in the third stage. The reason might be that they were very close to the goal and a conservative strategy could guarantee the steady move towards the goal. Since there were only gains in the achievement goal group, there was no economic constraint. Whereas in the security goal group, participants might be willing to take more risk hoping for smaller losses when their account balances dropped to a very low amount. Lopes (1987) found that players in a competitive game chose risky moves when they were in a bad situation at the end of the game. The bad situation was an environmental constraint but no economic constraint existed in the game. However, on the loss side of the investment game there was an economic constraint because a huge potential loss in the risky option could destroy the hope of a positive account balance immediately. The economic constraint might reduce participants' desire to take more risk to some extent. The differences between the two groups may be the mixed result of wealth level, option characteristics and financial goal.
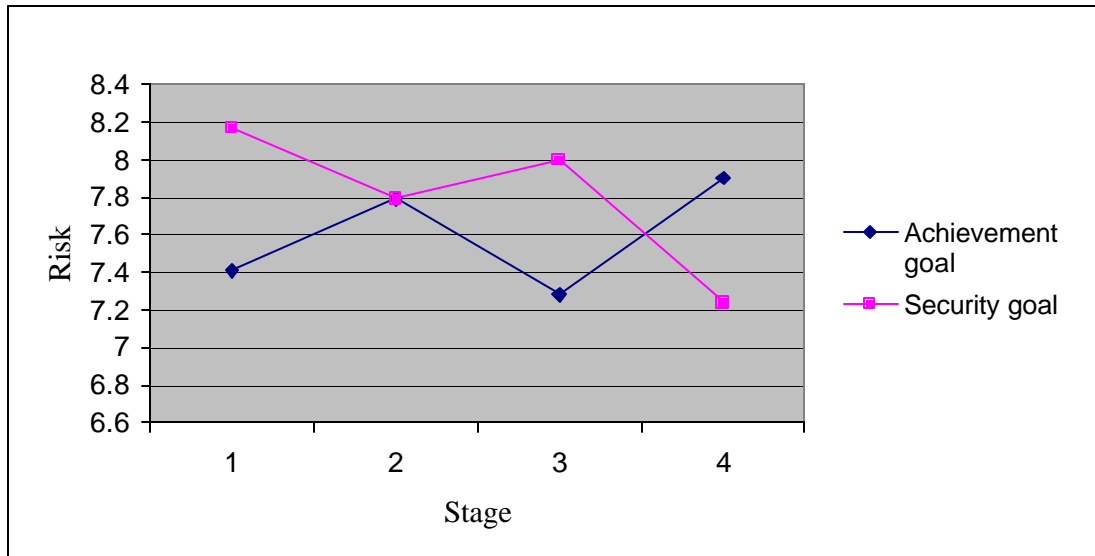
Figure 9: Risk preference comparison (Experiment 3)

Second, standard deviations in the security goal group were much higher than standard deviations in the achievement goal group at all wealth levels. Standard deviations in the security goal group ranged from 1.24 to 1.66, whereas standard deviations in the achievement goal group ranged from 1.08 to 1.24. One possible explanation may be that participants were more sensitive to loss than to gain. Thus, participants in the security goal group were more sensitive to option characteristics and their own wealth level, which might cause more careful evaluation of these factors and lead to more differences in choices. In addition, the pain brought by a certain amount of loss may be greater than the joy brought by the same amount of gain. Participants who suffered a loss might have a greater reaction to the loss and they might carry those feelings to later decisions, which made their choices more unpredictable.

Third, a huge loss could change participants' risk preferences in subsequent decisions, whereas the same amount of gain may not have such a dramatic impact. In question 8, participants who chose the risky option either suffered a huge loss of \$4,800 in the security goal

group or had a huge gain of \$4,800 in the achievement goal group. A one-way ANOVA showed a significant difference in risk preferences between participants who suffered the loss and those who did not ($F_{(1, 27)}$ = 12.22, p = .002). Participants who suffered the loss became significantly more risk averse during the rest of the game ($t_{(36)}$ = 2.33, p = .02). Participants who did not suffer the loss did not show significant change in risk preferences before and after the loss ($t_{(18)}$ = 1.59, p = .13). In the achievement goal group, participants who had a huge gain and those who did not showed no significant difference in risk preferences afterwards ($F_{(1, 27)}$ = 0.47, p = .50). The \$4,800 gain did not significantly change participants' risk preferences after the gain ($t_{(28)}$ = 1.60, p = .12). Participants who did not have the gain also did not change risk preferences significantly afterwards ($t_{(26)}$ = 0.71, p = .48). However, the average risk score of participants who had the gain decreased slightly after the gain, which was opposite of the general increasing trend as wealth level increases. The average score of participants who did not have the gain increased a little after the question, which was consistent with the general increasing trend. A similar pattern existed in the first two experiments. The average risk scores of participants in the goal groups (both clear and unclear) declined slightly (not statistically significant) after the \$4,800 gain. In contrast, the average scores of participants who had the gain in the control group increased slightly after the question. In all groups, the average scores of participants who did not have the gain increased.

Limitations

Participants in all three studies are undergraduate students, who were unlikely to have real life investment experiences. It limits the generalization of the results to older populations. Many students, especially those from lower level classes, are supported by their parents and have never made big financial decisions, so they may not fully understand their own financial risk

preferences or their risk preferences may not be stable. The concept of risk preference is still unclear to them. Older people may have a better understanding of their risk preferences through various investments and financial decisions and they may associate risk preferences and their financial goals better. The third experiment suggests a possible risk preference reversal in the security goal group. Further studies need to be done to investigate the possible reversal using a larger sample size with more investment experience.

Questions in the investment games involve either gains only or losses only. Even though decisions in both gain and loss situations should take opportunity cost into account, opportunity costs are indirect and unclear. Participants may concentrate more on directly stated gains or losses. In real life situations, most financial decisions involve both direct gains and losses. Two conflicting motivations---security and achievement---exist in each decision. It is more useful to investigate people's strategy in approaching financial goals by combining both gain and loss in one decision. It is also useful to identify which motivation is dominant when people are moving closer to their financial goals.

<div align="center">Implications to Financial Planners and Consumers</div>

Communication of appropriate financial strategies and understanding clients' risk preferences are essential for a successful financial planner. However, many times it is difficult for clients to fully understand the benefits of a plan because they are not comfortable with the risks involved. Results of this study suggests that consumers may be willing to take more risk during certain stages of the investment period, depending on how far away they are from their financial goals. The strategies that participants used in the investment games are rational and reasonable. Participants in the achievement goal groups first increased risk tolerance and then reduced risk tolerance when they were very close to the goal. This strategy is consistent with

what financial planners suggest for retirement planning. However, retirement planning generally focuses on age, rather than the amount needed for retirement. If financial planners explain the retirement goal to clients and show them the amount needed by retirement age, clients may have a better idea how far away they are from the goal. For most consumers, their financial goals are not clear so they don't have a clear idea of what kind of strategy to use to achieve their goals. The Retirement Confidence Survey (2004) conducted by the Employee Benefit Retirement Research Institute found that the majority of subjects did not calculate the amount of money they needed for retirement. Most of them stated their retirement goal as to retire at a certain age and live comfortably. When they saw the calculation, they were shocked to learn that the numbers were far beyond their expectation. Clearly letting clients know the amount of money needed to achieve their goal and their progress toward the goal would reduce the difficulty of communication and help consumers understand the recommendations and decisions made by financial planners.

It is sometimes very difficult to explain to consumers different kinds of investment risks (systematic vs. unsystematic risks) and their impacts on investment assets. Without adequate information and knowledge in financial risks, many consumers may focus more on the outcomes of their investment decisions within a relatively short period rather than analyzing the risks involved in each investment instrument. Two possible problems exist. First, such consumers do not see the whole picture of their investments. Second, they are very sensitive to losses so they might be eager to sell investments that are losing money and switch to investments with gains. Often times, it will result in a "buy high and sell low" situation. Having a well-defined financial goal might be helpful to cure consumers' short-sight problem. By focusing on how far away

from the pre-determined financial goal rather than recent gain/loss, consumers may make more rational decisions.

The wealth effect in the current study shows that the economic constraint plays an important part in consumers' risk preferences. While a financial plan may be good in the long run, if the client does not feel comfortable with the risks because he/she cannot bear large losses, the financial planner should take into consideration not only the client's general risk tolerance but also his/her acceptable loss. The financial planner could adjust the risk down (i.e., choose low-risk investments) for a while and gradually increase the risk level (i.e., choose high-risk investments) when the client's economic status increases. In addition, there may be an anchor effect as risk tolerance increases. Clients may feel more comfortable accepting a little more risk each time rather than suddenly accepting substantially more risk. A huge initial loss could lead to more risk averse behaviors later so financial planners should avoid investment opportunities with large potential losses.

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APPENDIX I

Instructions and Investment Game (Gain Domain)

- Groups with a clear, achievement financial goal:

Instructions

READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE YOU CONTINUE
TO DO THE INVESTMENT GAME.

Suppose that you plan to start a new business in five years. It costs $20,000 to set up the
business. During these five years, you have a series of investment opportunities to accumulate
the amount. For each investment opportunity, there are two investment instruments that offer
different chances of potential gains. Choose one option that you think is better between these
two options. As in a real life situation, higher return is associated with higher risk in the long
run. Remember that your account balance will change according to the outcome of your
chosen investment option. Your goal is to raise the $20,000 needed to start the new business
before you run out of investment opportunities. If you are too conservative or too risk averse,
then you will not be able to achieve the $20,000 goal. The investment game will end if there
is no investment opportunity left. You will be awarded 5 more extra credit points if you reach
the $20,000 goal.

In order to keep track of your account balance, a spreadsheet is provided by the experimenter.
Once you know the result of your investment choice, put the amount you win in Column B,
and your new account balance will be calculated automatically in the yellow cell in Column
D. Put in the new number in the yellow cell when you are asked to give your new account
balance. This calculation of new account balance after each investment choice is for your
information only so that you will know how far away you are from your $20,000 goal. The
experimenter can track your account balance and will give extra credit points according to the
experimenter's record. Therefore, if you put in the wrong account balance, you will have
wrong information to make subsequent investment decisions. So, be careful! Make sure you
put in the right amount that you win.

Investment 1: Option 1
                         Option 2   Next

You won $XXX!
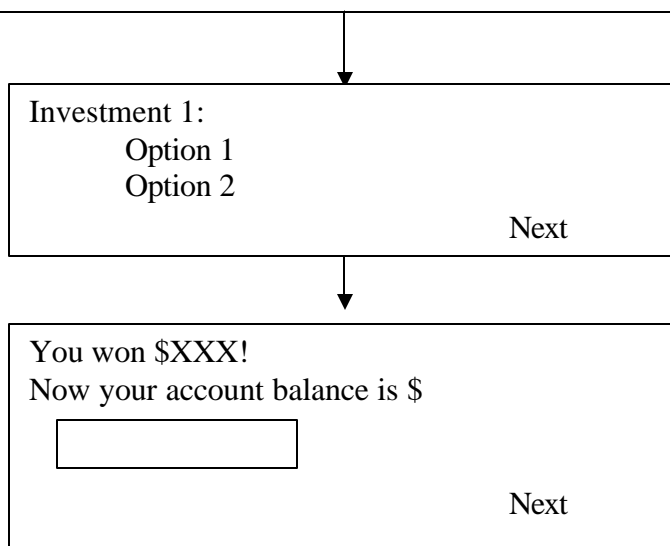Now your account balance is $ [   ]   Next

---

- Groups with no financial goal:

Instructions

READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE YOU
CONTINUE TO DO THE INVESTMENT GAME.

Suppose that you plan to start a new business in five years. During these five years, you
have a series of investment opportunities to accumulate money for the business. For each
investment opportunity, there are two investment instruments that offer different chances
of potential gains. Choose one option that you think is better between these two options.
As in a real life situation, higher return is associated with higher risk in the long run.
Remember that your account balance will change according to the outcome of your
chosen investment option. The investment game will end if there is no investment
opportunity left.

In order to keep track of your account balance, a spreadsheet is provided by the
experimenter. Once you know the result of your investment choice, put the amount you
win in Column B, and your new account balance will be calculated automatically in
Column D. Put the new account balance in the box when you are asked to give your new
account balance. This calculation of new account balance after each investment choice is
for your information only so that you will know how much money you have accumulated.
The experimenter can track your account balance and will give extra credit points
according to the experimenter's record. Therefore, if you put in the wrong account
balance, you will have wrong information to make subsequent investment decisions. So,
be careful! Make sure you put in the right amount that you win.

Investment 1:
   Option 1
   Option 2

                                        Next

You won $XXX!
Now your account balance is $

[   ]

                                        Next

- Groups with an unclear, achievement financial goal:

Instructions

READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE YOU CONTINUE TO DO THE INVESTMENT GAME.

Suppose that you are making investments for your retirement account. During these five years, you have a series of investment opportunities to accumulate as much as possible in your retirement account. For each investment opportunity, there are two investment instruments that offer different chances of potential gains. Choose one option that you think is better between these two options. As in a real life situation, higher return is associated with higher risk in the long run. Remember that your account balance will change according to the outcome of your chosen investment option. Your goal is to earn as much as possible before you run out of investment opportunities. The investment game will end if there is no investment opportunity left. You will be awarded 5 more extra credit points if you are one of the 15 participants with the highest account balance.

In order to keep track of your account balance, a spreadsheet is provided by the experimenter. Once you know the result of your investment choice, put the amount you win in Column B, and your new account balance will be calculated automatically in the yellow cell in Column D. Put in the new number in the yellow cell when you are asked to give your new account balance. This calculation of new account balance after each investment choice is for your information only so that you will know how much money you have earned so far. The experimenter can track your account balance and will give extra credit points according to the experimenter's record. Therefore, if you put in the wrong account balance, you will have wrong information to make subsequent investment decisions. So, be careful! Make sure you put in the right amount that you win.

Investment 1:
    Option 1
    Option 2

Next

You won $XXX!
Now your account balance is $

Next
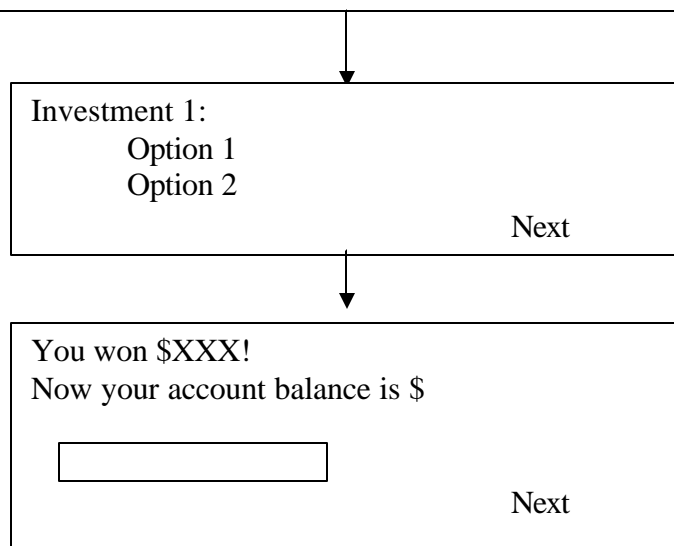
Investment 1 (Expected Value = $800)   (outcome)
- A sure gain of $800
- A 10% chance to gain $2600 and a 90% chance to gain $600   (600)

Investment 2 (Expected Value = $1600)
- A sure gain of $1600
- A 25% chance to gain $1300 and a 75% chance to gain $1700   (1700)

Investment 3 (Expected Value = $800)
- A sure gain of $800
- A 50% chance to gain $1600 and a 50% chance to gain nothing   (0)

Investment 4 (Expected Value = $300)
- A sure gain of $300
- A 40% chance to gain $150 and a 60% chance to gain $400   (400)

Investment 5 (Expected Value = $1200)
- A sure gain of $1200
- A 20% chance to gain $2200 and a 80% chance to gain $950   (950)

Investment 6 (Expected Value = $1200)
- A sure gain of $1200
- A 50% chance to gain $2400 and a 50% chance to gain nothing   (2400)

Investment 7 (Expected Value = $1600)
- A sure gain of $1600
- A 20% chance to gain $2400 and a 80% chance to gain $1400   (1400)

Investment 8 (Expected Value = $1200)
- A sure gain of $1200
- A 10% chance to gain $4800 and a 90% chance to gain $800   (4800)

Investment 9 (Expected Value = $300)
- A sure gain of $300
- A 50% chance to gain $600 and a 50% chance to gain nothing   (600)

Investment 10 (Expected Value = $1600)
- A sure gain of $1600
- A 40% chance to gain $1150 and a 60% chance to gain $1900   (1900)

Investment 11 (Expected Value = $1200)
- A sure gain of $1200
- A 40% chance to gain $750 and a 60% chance to gain $1500   (750)

Investment 12 (Expected Value = $300)
- A sure gain of $300
- A 20% chance to gain $860 and a 80% chance to gain $160   (860)

Investment 13 (Expected Value = $800)
- A sure gain of $800
- A 20% chance to gain $2000 and a 80% chance to gain $500   (500)

Investment 14 (Expected Value = $800)
- A sure gain of $800
- A 25% chance to gain $200 and a 75% chance to gain $1000   (1000)

Investment 15 (Expected Value = $1600)
- A sure gain of $1600
- A 50% chance to gain $3200 and a 50% chance to gain nothing   (0)

Investment 16 (Expected Value = $1200)
- A sure gain of $1200
- A 25% chance to gain $1800 and a 75% chance to gain $1000   (1800)

Investment 17 (Expected Value = $300)
- A sure gain of $300
- A 10% chance to gain $1200 and a 90% chance to gain $200   (200)

Investment 18 (Expected Value = $800)
- A sure gain of $800
- A 40% chance to gain $500 and a 60% chance to gain $1000   (1000)

Investment 19 (Expected Value = $1600)
- A sure gain of $1600
- A 10% chance to gain $5200 and a 90% chance to gain $1200   (1200)

Investment 20 (Expected Value = $300)
- A sure gain of $300
- A 25% chance to gain $120 and a 75% chance to gain $360   (360)

[Note: The number in ( ) is the outcome of the corresponding alternative.]

APPENDIX II

Instructions and Investment Game (Loss Domain)

- Groups with a clear, security goal:

Instructions

Suppose that you have your own remodeling company. In the remodeling business, there are many risks such as fire, water damage, and unexpected increase in material prices, etc. You set aside $20,000 as an emergency fund to protect your business from the above risks. For each risky event, you could choose between: 1) use the emergency fund to pay a premium to buy an insurance policy to protect you against the disaster, or 2) use the emergency fund to pay for the damage. During five years, you have a series of such decisions to make. For each decision, there are two options that offer different chances of potential loss. Choose one option that you think is better between these two options. Remember that your account balance will change according to the outcome of your chosen option. Your goal is not to use up all the $20,000 in the emergency fund. The decision game will end if there is no risky event left.
****
YOU WILL BE AWARDED AN ADDITIONAL 5 EXTRA CREDIT POINTS IF YOU KEEP A POSITIVE ACCOUNT BALANCE AT THE END OF THE GAME.
****
In order to keep track of your account balance, a spreadsheet is provided by the experimenter. Once you know the result of your choice, put the amount you lose in Column B, and your new account balance will be calculated automatically in the yellow cell of Column C. Put the new account balance in the box when you are asked to give your new account balance. This calculation of new account balance after each choice is for your information only so that you will know how much money is left in your account. The experimenter can track your account balance and will give extra credit points according to the experimenter's record. Therefore, if you put in the wrong account balance, you will have wrong information to make subsequent decisions. So, be careful! Make sure you put in the right amount.

Investment 1: Option 1
                      Option 2   Next

You lose $XXX!
Now your account balance is $ [   ]   Next

- Groups with no security goal:

Instructions

Suppose that you have your own remodeling company. In the remodeling business, there are many risks such as fire, water damage, and unexpected increase in material prices, etc. You set aside $20,000 as an emergency fund to protect your business from the above risks. For each risky event, you could choose between: 1) use the emergency fund to pay a premium to buy an insurance policy to protect you against the disaster, or 2) use the emergency fund to pay for the damage. During five years, you have a series of such decisions to make. For each decision, there are two options that offer different chances of potential loss. Choose one option that you think is better between these two options. Remember that your account balance will change according to the outcome of your chosen option.

In order to keep track of your account balance, a spreadsheet is provided by the experimenter. Once you know the result of your choice, put the amount you lose in Column B, and your new account balance will be calculated automatically in the yellow cell of Column C. Put the new account balance in the box when you are asked to give your new account balance. This calculation of new account balance after each choice is for your information only so that you will know how much money is left in your account. If you put in the wrong account balance, you will have wrong information to make subsequent decisions. So, be careful! Make sure you put in the right amount.

Investment 1:
        Option 1
        Option 2

                                        Next

You lose $XXX!
Now your account balance is $

[   ]

                                        Next

Investment 1 (Expected Value = $800)
- A sure loss of $800
- A 10% chance to lose $2600 and a 90% chance to lose $600   (600)

Investment 2 (Expected Value = $1600)
- A sure loss of $1600
- A 25% chance to lose $1300 and a 75% chance to lose $1700   (1700)

Investment 3 (Expected Value = $800)
- A sure loss of $800
- A 50% chance to lose $1600 and a 50% chance to lose nothing   (0)

Investment 4 (Expected Value = $300)
- A sure loss of $300
- A 40% chance to lose $150 and a 60% chance to lose $400   (400)

Investment 5 (Expected Value = $1200)
- A sure loss of $1200
- A 20% chance to lose $2200 and a 80% chance to lose $950   (950)

Investment 6 (Expected Value = $1200)
- A sure loss of $1200
- A 50% chance to lose $2400 and a 50% chance to lose nothing   (2400)

Investment 7 (Expected Value = $1600)
- A sure loss of $1600
- A 20% chance to lose $2400 and a 80% chance to lose $1400   (1400)

Investment 8 (Expected Value = $1200)
- A sure loss of $1200
- A 10% chance to lose $4800 and a 90% chance to lose $800   (4800)

Investment 9 (Expected Value = $300)
- A sure loss of $300
- A 50% chance to lose $600 and a 50% chance to lose nothing   (600)

Investment 10 (Expected Value = $1600)
- A sure loss of $1600
- A 40% chance to lose $1150 and a 60% chance to lose $1900   (1900)

Investment 11 (Expected Value = $1200)
- A sure loss of $1200
- A 40% chance to lose $750 and a 60% chance to lose $1500   (750)

Investment 12 (Expected Value = $300)
- A sure loss of $300
- A 20% chance to lose $860 and a 80% chance to lose $160 (860)

Investment 13 (Expected Value = $800)
- A sure loss of $800
- A 20% chance to lose $2000 and a 80% chance to lose $500 (500)

Investment 14 (Expected Value = $800)
- A sure loss of $800
- A 25% chance to lose $200 and a 75% chance to lose $1000 (1000)

Investment 15 (Expected Value = $1600)
- A sure loss of $1600
- A 50% chance to lose $3200 and a 50% chance to lose nothing (0)

Investment 16 (Expected Value = $1200)
- A sure loss of $1200
- A 25% chance to lose $1800 and a 75% chance to lose $1000 (1800)

Investment 17 (Expected Value = $300)
- A sure loss of $300
- A 10% chance to lose $1200 and a 90% chance to lose $200 (200)

Investment 18 (Expected Value = $800)
- A sure loss of $800
- A 40% chance to lose $500 and a 60% chance to lose $1000 (1000)

Investment 19 (Expected Value = $1600)
- A sure loss of $1600
- A 10% chance to lose $5200 and a 90% chance to lose $1200 (1200)

Investment 20 (Expected Value = $300)
- A sure loss of $300
- A 25% chance to lose $120 and a 75% chance to lose $360 (360)

[Note: The number in ( ) is the outcome of the corresponding alternative.]

APPENDIX III

Questionnaires Measuring Risk Attitude

- Which of the following statements comes closest to the amount of financial risk that you are willing to take when you save or make investments?
1. Not willing to take any financial risks

2. Take average financial risks expecting to earn average returns

3. Take substantial financial risk expecting to earn substantial returns

- For each of the following statements, please indicate the likelihood that you would engage in the described activity or behavior if you were to find yourself in that situation.

Provide a rating from *Very Unlikely* to *Very Likely*, using the following scale:

1	2	3	4	5
Very unlikely	Unlikely	Not sure	Likely	Very likely

1. Going camping in the wilderness. (R) _____

2. Swimming far out from shore on an unguarded lake or ocean. (R) _____

3. Taking some questionable deductions on your income tax return. (E) _____

4. Disagreeing with an authority figure on a major issue. (S) _____

5. Investing 5% of your annual income in a very speculative stock. (I) _____

6. Betting a day's income on the outcome of a sporting event

   (e.g., baseball, soccer, or football). (G) _____

7. Driving a car without wearing a seat belt. (H) _____

8. Investing 10% of your annual income in a new business venture. (I) _____

9. Gambling a week's income at a casino. (G) _____

10. Eating high cholesterol foods. (H) _____

11. Starting a new career in your mid-thirties. (S) _____

12. Revealing a friend's secret to someone else. (E) _____

[Note: G = Gambling (2 items)
      I = Investment (2 items)
      H = Health/Safety (2 items)
      R = Recreational (2 items)

S = Social (2 items)
E = Ethical (2 items)]