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A reverse sunk cost effect in risky decision making: Sometimes we have too much invested to gamble [1]

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Abstract

The sunk cost effect refers to the empirical finding that people tend to let their decisions be influenced by costs made at an earlier time in such a way that they are more risk seeking than they would be had they not made these costs. This finding seems to be in conflict with economic theory which implies that only incremental costs and benefits should affect decisions. The effect is often explained in terms of prospect theory of (Kahneman, D., Tversky, A., 1979. Prospect theory: An analysis of decision under risk. Econometrica 47, 263–291), suggesting that sunk costs may induce a 'loss frame,' consequently causing risk seeking behavior. We argue that sunk costs may also result in risk aversion. In the present study we investigated the effect of time and effort investments (Behavioral Sunk Costs) on risky decision making in gain and loss situations. The results show that, in agreement with prospect theory, participants were more risk averse in gain situations than in loss situations. Moreover, incurring Behavioral Sunk Costs appeared to increase risk aversive choices, i.e., a reverse sunk cost effect.

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Furthermore, the results suggest that, in loss situations, Behavioral Sunk Costs mainly lead to risk aversive behavior if opting for the 'safe' alternative is not accompanied by an increased possibility to regret the decision.

PsycINFO classification: 3000; 3040

JEL classification: D81; C91

Keywords: Decision making; Sunk cost; Risky choice

1. Introduction

Imagine that you have been working the whole afternoon. Now you and your co-workers are going to rest in the sun, have a beer, and wait for the boss to come over to pay your wages. The boss comes up, but before she pays you the promised $50, she offers you the following deal: instead of taking the $50 you can play a gamble. She will throw a fair coin in the air and you may guess whether it will land on heads or on tails. If you guess it right she will pay you $100, but if you are wrong she will pay you nothing. Would you accept the gamble, or would you take the $50?

Now, imagine this situation. You are at work, and for some unknown reason your boss offers you the following gamble: she will throw a fair coin in the air and you may guess whether it will land on heads or on tails. If you are right she will pay you $100, if you are wrong she will pay you nothing. Instead of the gamble you can have an additional $50 (on top of your wages). Would you accept the gamble, or would you take the $50?

The important question following these two situations is, of course, will you choose the same option in both choices? In other words, do you think, or feel, that these choices are equivalent, or do you find them different? It is significant to note that the formal representation of both choices is equal. Both are choices between a certain gain of $50 and a risky gain of either $100 or $0. When you did not choose the same option twice, you were engaged in the irrational process of honoring sunk costs. You let costs made at an earlier time, influence your subsequent decisions. According to economic theory, which implies that only incremental costs and benefits should affect decisions about future events, honoring sunk cost is irrational.

In the present paper we discuss the effects of sunk cost on risky decisions. The general question underlying this research is: how is risk taking behavior

affected by prior costs and outcomes? This is an important question, since decisions are rarely made in isolation. Choices are often evaluated with prior investments, costs, and outcomes in the back of our head, and, although economic theory tells us to consider only the future, it is a well established fact that historical or sunk cost influence our decisions (see e.g. Arkes and Blumer, 1985; Thaler and Johnson, 1990).

A sunk cost, as defined by Arkes and Blumer (1985), involves a prior "investment in money, effort, or time" (p. 124). The name the *sunk cost effect* was coined for the finding that people may become more risk seeking after making such an initial investment (Arkes and Blumer, 1985; Thaler, 1980). An example of this effect was given by Thaler (1980), example 4, p. 47. "A family pays $40 for tickets to a baseball game to be played 60 miles from their home. On the day of the game there is a snowstorm. They decide to go anyway, but note in passing that had the tickets been given to them, they would have stayed home". Thus, consistent with empirical sunk cost research, this

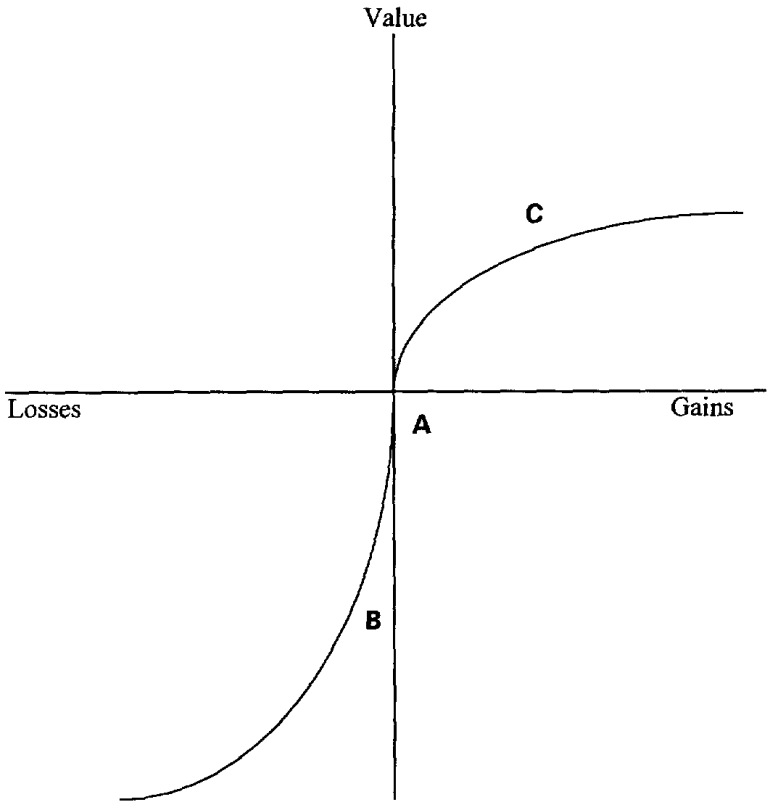

Fig. 1. Prospect theory's value function.

example shows that incurring a sunk cost (i.e., buying the ticket themselves) promotes risk seeking, namely driving through a snowstorm with uncertain outcomes. If they had not incurred the sunk cost (i.e., if they would not have bought the ticket themselves) risk aversion would have been the result, namely, staying at home. Teger (1980) describes people's view in these situations as if they have "Too much invested to quit". Arkes and Blumer, and Thaler, explained the sunk cost effect in terms of prospect theory (Kahneman and Tversky, 1979) by suggesting that sunk costs may induce a loss frame (i.e., initial investments may be perceived as losses) resulting in risk-seeking behavior to avoid losses.

2. Prospect theory and the sunk cost effect

Prospect theory is a descriptive model of decision making under risk. One of the main features of prospect theory is that choices are not evaluated in terms of final assets, but in relation to a reference point. The outcome of a choice will be coded as a gain when it is above the reference point and as a loss when it is below the reference point (see Fig. 1). Because of diminishing marginal value the value function is concave for gains and convex for losses. As a consequence of this S-shaped value function, people are generally risk aversive in gain situations and risk seeking in loss situations. [2] Another characteristic of the value function is that it is steeper for losses than for gains, implying that losses loom larger than gains. This means that the pleasure associated with a gain of $100 is less intense than the pain associated with a loss of the same amount. The reference point usually corresponds to the current asset position; i.e. the status quo. Kahneman and Tversky note however, that "there are situations in which gains and losses are coded relative to an expectation or *aspiration level* that differs from the status quo" (Kahneman and Tversky, 1979, p. 286; emphasis added).

[2] It should be noted that in their recent formulation of 'cumulative prospect theory' Tversky and Kahneman (1992) refined the general prediction of prospect theory by arguing that (a) people are risk seeking for losses of high probabilities and risk avoiding for losses of low probabilities, and (b) people are risk seeking for gains of low probabilities and risk avoiding for gains of high probabilities. This refinement does appear to improve prospect theory's predictive value (but see also Li, 1995) for risky decision making under high and low probabilities. In the present study, however, we presented our participants only with risky choices involving probabilities of 0.50. Therefore, predictions in the present study were derived from the original version of prospect theory (Kahneman and Tversky, 1979).

Explanations of the sunk cost effect in terms of prospect theory imply that prior investments are not totally discounted. In these cases prospects are not viewed anymore from the status quo (point A in Fig. 1), but from a point on the loss side of the value function (point B in Fig. 1). According to this explanation, prior investment is seen as a loss, and is still present in the decision maker's mind when evaluating subsequent prospects. Then, as a result of the convex shape of the value function for losses, further losses do not cause large decreases in value. As seen from point B, gains cause large increases in value. A risky reinvestment, adding funds to the sunk cost in hope of a better outcome (with the risk of increasing the losses even further), is therefore more likely to happen than total withdrawal (opting for the sure loss).

We agree with this interpretation, but at the same time we argue that sunk cost may also result in risk aversion. What seems essential is that in previous sunk cost research, only the risky alternative provides participants the opportunity to reach their *aspiration level* [3] (e.g. to make up for their prior losses). Aspiration level is an important concept in theories of decision making (cf., Payne et al., 1980). It is suggested (Simon, 1955) that people sometimes simplify choices by coding the outcomes as satisfactory if they are above the aspiration level, and as unsatisfactory if they are below. Of course, aspiration levels may also be satisfied by risk averse choices. In these cases incurring sunk cost promotes risk aversion.

Consider, e.g., a person who has incurred a sunk cost, e.g., worked all afternoon, as in our opening example. This person has the choice between a safe option with a certain outcome ($50) and a risky option with either an outcome that is better than the certain outcome ($100), or an outcome that is worse ($0). Assume that $50 equals this person's aspiration level, because this is the money this person expected. If this aspiration level is then used as a reference point (this would imply drawing a new curve with the origin at C, and A in the loss domain, see Fig. 1), the safe option will be satisfactory. Larger gains will cause only moderate increases in value. Since the current asset position (point A in Fig. 1) is perceived as a loss, and losses loom larger than gains, the safe option will be more appealing than the risky one. Even if 'winning' in the risky option provides a much better possible outcome, it is

[3] Aspiration level has been defined by Weiner (1995) as "the level of future performance in a task that an individual explicitly undertakes to reach" (p. 362). Moreover, Weiner argued that "aspirations are influenced by individual differences, prior performance, task characteristics... " (p. 362).

only the safe option that always satisfies the aspiration level. Thus, sometimes sunk costs may promote risk aversion.

Although the sunk cost effect involves an investment in money, effort or time (Arkes and Blumer, 1985), previous sunk cost research focuses almost uniquely on how prior *financial* commitments influence subsequent decisions. In real life, however, many of our investments do involve *effort* and *time*. In the present study we therefore investigated the effect of prior time and effort investments in a risky decision making task. To differentiate these investments from financial investments we will refer to these types of sunk cost as *behavioral sunk costs*.

Relying on prospect theory we investigated risk taking for Gains and Losses in scenarios depicting situations in which participants had incurred behavioral sunk costs (Behavioral Sunk Cost Present) or had not incurred Behavioral Sunk Costs (Behavioral Sunk Cost Absent). In the present experiment the participants in the Gain situations made decisions between a safe option that provided them a certain gain and a risky option that provided them with a probable larger gain or no gain at all. In the Loss situations the options provided them either with a certain loss or, with a probable larger loss or no loss at all. The Behavioral Sunk Cost Absent participants were asked to make the choice between a certain outcome and a risky better outcome. In the Behavioral Sunk Cost Present conditions participants read that they had engaged in some work (i.e., invested some time and effort) before they had to make a choice between the certain and the risky option. We hypothesized that these behavioral sunk costs would increase their aspiration level; mainly because people may dislike the feeling that they have worked for nothing. During life we learn that certain inputs are rewarded, and as a consequence we anticipate an outcome in accordance with our inputs (see e.g., equity theory; Walster et al., 1977). Moreover, outcomes that do not satisfy the aspiration level result in more negative affect when behavioral costs were invested in reaching the aspiration level (van Dijk et al., 1997). Opting for the risky option then, does not only involve the risk of losing the gamble, but also the risk of experiencing the feeling of having worked for nothing. The safe option, however, may satisfy the (increased) aspiration level. Facing a choice between an uncertain option (which may not satisfy the aspiration level) and a safe option (which satisfies the aspiration level), participants having incurred sunk cost may prefer the safe option (showing risk aversion).

Thus, we predicted that participants in the Behavioral Sunk Cost Present conditions would be more risk aversive than those in the Behavioral Sunk

Cost Absent conditions. Based on prospect theory, we made the additional prediction that participants in the Gain situations would be more risk aversive than those in the Loss situations.

3. Regret and the sunk cost effect

In most research on risky decision making, participants choosing the safe alternative are not informed about the result that would have been had they selected the risky alternative. In real life, however, people may receive information about foregone outcomes, e.g. people deciding not to invest in particular stocks may learn about future stock prices. Also, race-track bettors deciding not to bet on the long shot will learn after the race is finished whether this option would have resulted in a better outcome. This, of course, also applies to cases in which people incur a sunk cost. Sometimes after making an investment you learn whether this was the right thing to do, sometimes you do not.

Feedback on foregone outcomes is one of the determinants of post-decisional regret (Bell, 1982). This post-decisional regret may, however, be pre-decisional anticipated by the decision maker, and taken into account when making the decision. Thus, risk taking behavior is related to anticipation of regret (Bell, 1982; Loomes and Sugden, 1982; Ritov, 1996; Zeelenberg and Beattie, 1996; Zeelenberg et al., 1996; see for reviews, Zeelenberg, 1995, 1996). Following this line of reasoning we investigated, for exploratory reasons, the relation between risk taking and the possibility of receiving feedback on the outcome of risk taking. In the Feedback Present condition participants read in the scenario that they would always learn the outcome of the risky option, even if they chose the safe option. In the Feedback Absent condition they read that they would only learn the outcome of the risky option if they chose this option.

We argue that effects of the anticipation of regret are related to the situation of multiple reference points (see also, Boles and Messick, 1995). Outcomes can be evaluated in relation to the status quo or aspiration level, but also in relation to outcomes that would have been had you chosen differently. This is most likely to happen when people expect the reception of feedback on what might have been. Counterfactual outcomes are made extra salient in these situations and can influence the evaluation of the outcomes. In the Feedback Absent condition choosing the safe option minimizes

the possibility of experiencing regret. In the Feedback Present condition choosing the safe option may lead to regret if the risky option would have resulted in a better outcome.

We realize that feedback after having chosen for a safe option can also lead to rejoicing, the positive counterpart of regret. This emotion is experienced when a risky option would have resulted in a worse outcome. The rejoicing following a good choice is, however, less intense than the regret following a bad one (Boles and Messick, 1995). Moreover, people are influenced more by negative information than by positive information (Taylor, 1991). Consequently, the anticipation of rejoicing is less likely than the anticipation of regret to have an influence on the decision making process (cf. Beattie et al., 1994; Larrick and Boles, 1995; Zeelenberg et al., 1996).

Thus, expected feedback on the eventual outcome of the risky option may make the safe alternative less attractive. Although Kelsey and Schepanski (1991), using basically the same manipulation, found that the expectation of feedback had no effect on the amount of risk seeking or avoidance, we still think that the inclusion of this factor in the experimental design is worthwhile. First, recent research shows effects of expected feedback (Ritov, 1996; Larrick and Boles, 1995; Zeelenberg et al., 1996; Zeelenberg and Beattie, 1996). Second, and more importantly, the present experiment provides an interesting addition to the work by Kelsey and Schepanski. In the present experiment, we argue, the participants' aspiration level will be increased when they incurred a sunk cost. These participants feel that more is at stake when choosing between the safe and the risky options. The possible regret associated with choosing the safe option in the Feedback Present conditions will therefore be more painful. Consequently, the tendency to opt for the risky option will be stronger in these conditions.

Earlier, we predicted that incurring sunk costs would make people more risk averse. Our present discussion of the effect of feedback suggests that this prediction needs to be qualified: incurring sunk costs may not lead to more risk aversive choices if it is accompanied by feedback on the risky option. Since the value function is steeper for losses than for gains, we suggest that the possible regret is more painful in choices between losses than in choices between gains. Anticipation of regret will therefore have a bigger impact on the decision making process in the loss situations. We predict that, as a consequence, the effect of feedback on foregone outcomes will be strongest for participants who have to make a choice between losses after they incurred a sunk cost. Hence in these conditions the effect of incurring sunk costs will be smaller.

To summarize, we predicted that participants in the Gain situations would be more risk averse than participants in the Loss situations. We also predicted that participants in the Behavioral Sunk Cost Present conditions would be more risk averse than participants in the Behavioral Sunk Cost Absent conditions, and that this effect of Behavioral Sunk Cost would be weakest for the participants in the Feedback Present conditions making choices in Loss situations.

4. Method

4.1. Participants and design

One hundred and eighty two students of the University of Amsterdam participated in this experiment as part of a course requirement. They were randomly assigned to one of the conditions of the 2 (Outcome: gain vs. loss) × 2 (Behavioral Sunk Cost: absent vs. present) × 2 (Feedback: absent vs. present) factorial design.

4.2. Materials and procedure

Participants were presented with one of eight possible scenarios describing a situation in which a choice had to be made. They were asked to read the scenario carefully and to indicate what they would choose in that situation. The participants in the Outcome gain condition read about a choice between a safe option, resulting in a sure gain of 50 Guilders, and a risky option, resulting in either a gain of 100 Guilders or a gain of 0 Guilders. In the Outcome loss conditions participants read about a choice in which they would either lose 50 Guilders for sure when choosing the safe option, or they would lose 100 Guilders or 0 Guilders when choosing the risky option. The outcome of the risky option depended on the toss of a fair coin (50% chance of winning, 50% chance of losing). Participants in the Behavioral Sunk Cost present conditions learned that they had done some work before they were confronted with the choice. Participants in the Behavioral Sunk Cost absent conditions were also asked to make the choice but did not learn anything about events that took place before they were confronted with the choice. In the Feedback present condition participants learned, before making the choice, that independent of their choice the coin would always be tossed.

Thus, when they decided to choose the safe option, they would always learn what might have been, had they chosen the risky option. In order to make the feedback manipulation more salient participants were also asked to choose whether the coin would land on head or tails, irrespective of their final choice for the safe option or the gamble. The participants in the Feedback absent condition did not receive any of this information. Then participants indicated which option they chose, and also how certain they were about their choice.

As an example, the scenario presented to participants in the Outcome: gain, Behavioral Sunk Cost: present, Feedback: present, condition is depicted below.

Imagine the following situation:
You just finished a dirty job for someone. It was hard work. You are now waiting for your payment. This person is coming to you and offers you a choice. You can receive 50 Dutch Guilders for the job, or you can play a gamble. The gamble goes as follows: a fair coin will be tossed and you have to say whether it will be head or tails. If you are right, you will get 100 Dutch Guilders, if you are wrong you will get 0 Guilders.
Even if you will choose the 50 Guilders, and not the gamble, the coin will be tossed. In this way you will always learn what you might have received had you chosen the gamble. Imagine that you chose the gamble, what would you choose (tick one)?
I choose ☐ head
☐ tails
You chose head or tails, now please indicate whether you choose the sure gain or the gamble (tick one)?
I choose ☐ 50 Guilders
☐ the gamble, 100 Guilders or 0 Guilders
How certain are you about your choice (circle one number)?
not very certain 1 2 3 4 5 6 7 8 9 *very certain*

In the Loss condition, participants were presented with a gamble involving negative outcomes. For example in the Outcome: loss, Behavioral Sunk Cost: Present conditions, participants were asked to imagine a situation in which they had to give up some of the money (i.e., losing 50 Guilders) for which they had worked, or play a gamble which could result in losing more (i.e., 100 Guilders) or losing nothing.

5. Results

The main findings of this experiment are depicted in Table 1. For the purpose of statistical analysis we constructed a variable, called *risk attitude*, that was the product of the variables choice (1 for certain option and 1 for risky option) and certainty of choice minus a half (ranging from 0.5 to 8.5). The resulting variable ranges from 8.5 to +8.5, with equal intervals of one scale point. A positive risk attitude indicated a preference for risk seeking and a negative risk attitude indicated a preference for risk avoidance. This risk attitude variable was used because it represents not only whether people prefer risk seeking (i.e., the gamble) or risk aversion (i.e., the safe option), but also the strength with which they preferred the option of their choice. It thus constitutes a more sensitive measure of participants' preferences. We would like to note, however, that the indicated choice showed a similar pattern of results.

As predicted, and in agreement with prospect theory, participants were more risk averse in gain situations than in loss situations. This resulted in the predicted main effect of Outcome, $M_{\text{Gain}} = 2.00$ vs. $M_{\text{Loss}} = 0.00$, $F(1,174) = 6.79$, $p < 0.01$. In Section 1 we reasoned that Behavioral Sunk Costs would promote risk averse choices. The highly significant main effect of Behavioral Sunk Cost corroborates this line of reasoning, $F(1,174) = 38.63$, $p < 0.0001$. Participants in the Behavioral Sunk Cost present conditions ($M = 3.62$) were much more risk averse than participants in the Behavioral Sunk Cost absent conditions ($M = 1.55$). This finding supports our hypothesis that incurring sunk costs can heighten the aspiration level. There were no other significant main effects.

Table 1
Mean risk attitude for each condition

	Gains		Losses	
	No feedback	Feedback	No feedback	Feedback
Behavioral sunk cost				
Absent	1.00 [a]	1.38 [a]	2.50 [a]	1.50 [a]
Present	5.26 [b]	5.75 [b]	3.05 [b]	0.67 [a]

Note: Scale range is from 8.5 to 8.5. A positive risk attitude indicates a preference for *risk seeking* and a negative risk attitude indicated a preference for *risk avoidance*. Means within columns not sharing a common superscript differ significantly ($p < 0.005$).

In addition, the analysis yielded a marginally significant Behavioral Sunk Cost × Outcome interaction, $F(1,174) = 2.82$, $p < 0.10$, suggesting that the effect of incurring behavioral sunk cost was stronger for Gain situations than for Loss situations. Further analyses showed that, as predicted, the effect of Behavioral Sunk Cost was weakest for the participants who made choices about losses and expected feedback on foregone alternatives. Comparisons of the relevant means resulted in significant differences between the Behavioral Sunk Cost absent and present groups in the gain-feedback conditions, the gain-no feedback conditions, and the loss-no feedback conditions, all $Fs(1, 174) > 9.02$, $ps < 0.005$. The difference in the loss-feedback conditions was, however, not significant, $F(1,174) = 1.88$, *ns*. These comparisons support our hypothesis that the effect of the Behavioral Sunk Cost is the weakest for those making choices between losses and who expect to receive feedback on the risky alternative. This finding corroborates our reasoning that feedback in this situation makes other reference points salient, like the worst possible outcome.

6. Discussion

Whereas previous research has indicated that incurring a sunk cost results in risk seeking behavior, the present study clearly shows that incurring a sunk cost can also result in risk avoiding behavior. We argue that this is most likely to occur when a risk avoiding choice allows the decision maker to reach his or her aspiration level. In the present experiment participants made a choice between a safe and a risky option after they incurred a sunk cost or not. We argue that the different options of a choice tend to be evaluated in reference to an aspiration level; outcomes above the aspiration level are coded as satisfactory, and outcomes below the aspiration level as unsatisfactory. We also argue that incurring Behavioral Sunk Cost increases the aspiration level. Hence, the certain outcome of the safe option might be coded as satisfactory, while of the risky option only the 'winning' outcome might be coded as satisfactory. Then, the choice in the Behavioral Sunk Costs Present conditions may be reframed as one between an option that satisfies the aspiration level under all circumstances and an option that satisfies the aspiration level only under some circumstances, but fails to satisfy the aspiration level under other circumstances. This reasoning was supported by the fact that participants in the Behavioral Sunk Cost conditions were more likely to choose the safe option, than the other participants. The data presented suggest that the famous

words of Teger (1980) 'Too much invested to quit' should sometimes be rephrased as 'Too much invested to gamble'.

Recently, in a study on escalation of commitment, Schaubroeck and Davis (1994) also found support for the idea that sunk costs do not invariably result in risk seeking. They argue that in the traditional escalation research sunk costs lead to additional investments partly because of the exclusive focus on situations in which totally withdrawing from investment is the only available alternative to reinvestment. In their experiment, after participants made an unsuccessful investment, Schaubroeck and Davis (1994) provided them with different risky alternatives instead of a risky and a safe alternative. Both risky alternatives provided the participants a chance to reach their aspiration levels (recovery of the sunk cost). The participants preferred to reinvest in the less risky alternative, thus showing risk averse behavior. The present experiment, however, shows that risk aversion after incurring sunk costs can also be demonstrated in a more traditional choice between a safe and risky option, as long as the safe option satisfies the aspiration level. We therefore argue that it is not the full recovery of the sunk cost that can make people risk averse. Instead, it is the increased aspiration level that may make people more risk averse.

The insights from this study can be related to other economic psychological phenomena like, for example, 'windfall gains' (see Arkes et al., 1994). Windfall gains are gains that were not expected. These unanticipated gains are spent more easily than anticipated gains of equal size. One could argue that this also implies that people will be more risk seeking after unanticipated gains. In other words anticipated gains may make people risk averse, and this is exactly what we suggest in the present study.

A second finding in the present experiment is that the expectation of feedback on forgone outcomes can influence economic decision making. In regret theory (Bell, 1982; Loomes and Sugden, 1982) feedback on what might have been plays a prominent role. Although theoretic work has pointed to 'the importance of what might have been' in risky decision making, to our knowledge there is still little empirical support for this idea. A recent exception is a study by Larrick and Boles (1995) (see also Ritov, 1996; Zeelenberg et al., 1996; Zeelenberg and Beattie, 1996), which shows that anticipated regret also influences other economic behaviors, i.e. negotiation. In their study participants negotiated about a signing bonus they could earn when deciding to work for a certain company ALPHA. Participants either expected to learn or expected not to learn the offer of a competing company BETA after they reached an agreement with ALPHA. Participants who expected to learn

the offer of BETA, could regret or rejoice about their decision to accept the bonus offered by ALPHA. These participants were more risk seeking, wanted to have a higher bonus and were less likely to reach agreement, than participants who did not expect to learn the offer of BETA.

In sum, complex economic decisions, like risky decisions in sunk cost situations, are influenced by how the outcomes of these decisions are evaluated. Outcomes are evaluated in relation to a reference point, which is usually the status quo. The present research shows, as Kahneman and Tversky (1979) argue, that there are situations in which outcomes are coded relative to other reference points. These reference points include increased aspiration levels created by prior investments, and counterfactual outcomes made salient by feedback on foregone alternatives.

References

Arkes, H.R., Blumer, C., 1985. The psychology of sunk cost. Organizational Behavior and Human Decision Processes 35, 124–140.

Arkes, H.R., Joyner, C.A., Pezzo, M.V., Nash, J.G., Siegel-Jacobs, K., Stone, E.J., 1994. The psychology of windfall gains. Organizational Behavior and Human Decision Processes 59, 331–347.

Beattie, J., Baron, J., Hershey, J.C., Spranca, M.D., 1994. Psychological determinants of decision attitude. Journal of Behavioral Decision Making 7, 129–144.

Bell, D.E., 1982. Regret in decision making under uncertainty. Operations Research 30, 961–981.

Boles, T.L., Messick, D.M., 1995. A reverse outcome bias: The influence of multiple reference points on the evaluation of outcomes and decisions. Organizational Behavior and Human Decision Processes 61, 262–275.

Kahneman, D., Tversky, A., 1979. Prospect theory: An analysis of decision under risk. Econometrica 47, 263–291.

Kelsey, D., Schepanski, A., 1991. Regret and disappointment in taxpayer reporting decisions: an experimental study. Journal of Behavioral Decision Making 4, 33–53.

Larrick, R.P., Boles, T.L., 1995. Avoiding regret in decisions with feedback: A negotiation example. Organizational Behavior and Human Decision Processes 63, 87–97.

Li, S., 1995. Is there a decision weight π? Journal of Economic Behavior and Organization 27, 453–463.

Loomes, G., Sugden, R., 1982. Regret theory: An alternative theory of rational choice under uncertainty. The Economic Journal 92, 805–824.

Payne, J.W., Laughhunn, D.J., Crum, R., 1980. Translation of gambles and aspiration level effects in risky choice behavior. Management Science 26, 1039–1060.

Ritov, I., 1996. Probability of regret: Anticipation of uncertainty resolution in choice. Organizational Behavior and Human Decision Processes 66, 228–236.

Schaubroeck, J., Davis, E., 1994. Prospect theory predictions when escalation is not the only chance to recover sunk cost. Organizational Behavior and Human Decision Processes 57, 59–82.

Simon, H.A., 1955. A behavioral model of rational choice. Quarterly Journal of Economics 69, 99–118.

Taylor, S.E., 1991. Asymmetrical effects of positive and negative effects: The mobilization-minimization hypothesis. Psychological Bulletin 110, 67–85.

Teger, A.L., 1980. Too Much Invested to Quit. Pergamon Press, New York.

Thaler, R.H., 1980. Toward a positive theory of consumer choice. Journal of Economic Behavior and Organization 1, 39–60.

Thaler, R.H., Johnson, E.J., 1990. Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. Management Science 36, 643–661.

Tversky, A., Kahneman, D., 1992. Advances in prospect theory: cumulative representations of uncertainty. Journal of Risk and Uncertainty 5, 297–323.

van Dijk, W.W., van der Pligt, J., Zeelenberg, M., 1997. Effort invested in vain: Effects on the intensity of disappointment (Manuscript under review).

Walster, E., Walster, W., Berscheid, E., 1977. Equity: Theory and research. Allyn & Bacon, Newton, MA.

Weiner, B., 1995. Aspiration level. In: Manstead, A.S.R., Hewstone, M.(Eds.), The Blackwell Encyclopedia of Social Psychology. Blackwell, Oxford, p. 362.

Zeelenberg, M., 1995. Toward an economic psychology of regret. In: Nyhus, E., Troye, S.V. (Eds.), Frontiers in Economic Psychology. Proceedings of IAREP-XX, vol. 2. NHH, Bergen, Norway, pp. 858–873.

Zeelenberg, M., 1996. On the importance of what might have been: Psychological perspectives on regret and decision making. Doctoral dissertation, University of Amsterdam.

Zeelenberg, M., Beattie, J., 1996. Feedback, regret and decision making. In: Roland-Lévy, C. (Ed.), Social and Economic Representation. Proceedings of IAREP-XXI, vol. 2. Université René Descartes, Paris, pp. 897–910.

Zeelenberg, M., Beattie, J., van der Pligt, J., de Vries, N.K., 1996. Consequences of regret aversion: Effects of expected feedback on risky decision making. Organizational Behavior and Human Decision Processes 65, 148–158.