The Role of Expectations in the Formation of Reference Points over Time

This paper studies the role of expectations in the formation of reference points over time. We present a questionnaire study and an experiment in which both expectations and the status quo are salient. We find that when expectations are present, they have a significant impact on reference point formation and subsequent risky choice. Therefore, it is generally not sufficient to equate the reference point with the status quo.

Keywords: Prospect Theory, Reference Dependent Preferences, Reference Point

INTRODUCTION

There is now a great deal of evidence that the reference point has an important role in a person's evaluation of the outcome of a choice. According to Kahneman and Tversky's (1979) prospect theory, whether an outcome is perceived as a gain or as a loss compared to the reference point has a strong influence on risk attitudes. In general, people exhibit risk aversion in the domain of gains, risk seeking behavior in the domain of losses, and significantly greater aversion to losses than appreciation of gains.

Reference dependency has been employed in many different fields to explain risk attitudes that are inconsistent with expected utility theory (see Camerer, 2000, for an overview). Most of these studies assume some kind of reference point and then show that given this specification and prospect theory preferences empirical anomalies can be explained: Odean (1998) takes the initial status quo (purchase price of a stock) as a reference point to explain why small investors exhibit risk seeking behavior for losing stocks. Genesove and Mayer (2001) show the same effect among homeowners. Samuelson and Zeckhauser (1988) take the current status quo as a reference point in the evaluation of different health-care plan options. Camerer et al. (1997) examine why New York City cab drivers work longer hours on bad days, taking a target income as the reference point. Rizzo and Zeckhauser (2007) take the same kind of reference point to explain physicians' behavior. Winer (1986) predicts brand choice of different products assuming that price expectations determine the reference point.

These studies are able to explain many important observations. However, they can lead to inconsistent predictions, depending on the specification of the reference point. For example, an investor who decides to sell stock from his portfolio has bought those shares at the initial purchase price, might has formed expectations about the stock's subsequent performance, and observes the current stock price. Therefore, the question of what constitutes the reference point is of high importance for the application of prospect theory. For instance, de Meza and

Webb (2007) argue: "Determining the reference income is the most problematic aspect of prospect theory" (p.71).

Kahneman and Tversky (1979) suggest that different factors may determine the reference point, such as the status quo, expectations or aspiration level. However, they do not specify how the reference point is formed and updated, given each of these factors. In a recent model, Köszegi and Rabin (2006, 2007) reconcile the seemingly different predictions on risk attitudes in the domains that result from the application of different reference points. The unification is based on the assumption that a person's reference point is her recent expectations held about outcomes[1]. They argue that although in most studies the reference point is assumed to be the status quo, virtually all of this evidence comes from situations in which people plausibly expect to keep their status quo. For example, different findings on the willingness to pay, willingness to accept gap (see Plott and Zeiler, 2005) can be reconciled in this way. The authors also point out that there is too little evidence on the determinants of reference points.[2] Their primary motivation for equating the reference point with expectations is that it helps to reconcile different approaches. In contrast, experimental or empirical studies in support of this assumption are scarce.

Therefore, the aim of the present study is twofold. First, we extend a newly developed method by Arkes et al. (2008) to examine the role of expectations in the formation of the reference point over time. Second, we test whether this potential effect translates into subsequent risky choice as predicted by prospect theory. In both studies expectations and the status quo are salient. We show that when expectations are present they have a significant

[1] Heidhues and Köszegi (2008) examine a model of price competition in which customers' reference points are determined by recent expectations. In the disappointment-aversion models of Loomes and Sugden (1986) and Gul (1991), expectations based on the lottery's certainty equivalent play a similar role in a person's utility. Shalev (2000) presents another theoretical model where the reference point is given by expectations. Compte and Jehiel (2003) incorporate preferences in a bargaining model and assume a reference point based on expectations. Lim (1995) considers this kind of reference point in her integration of range-frequency theory and prospect theory.

[2] Bowman et al. (1999) make the same remark in their model of consumption and savings based on prospect theory.

impact on reference point formation and subsequent risky choice. Therefore, in general it is not sufficient to equate the reference point with the status quo.

The questionnaire study was designed to test the impact of expectations on reference point formation. Subjects answered questions about a hypothetical stock trading scenario. Building on the approach by Arkes et al. (2008), we asked subjects what stock price today will generate the same utility as a previous change in a stock price. This approach allows us to calculate the magnitude of reference point adaptation. We extended this approach to incorporate expectations. In particular, we deliberately gave participants different information regarding the expected price movement. We used the subjects' responses to calculate the newly formed reference point and found that it had a significant impact on price expectations.

The experiment considered the impact of expectations on subsequent risky choice. Participants first played a lottery where they could win two amounts of money. In a second step we measured their willingness to take risks using choices between a paid lottery and different safe payments (see Holt and Laury, 2002). We found that subjects who had won the smaller amount in the first lottery were significantly more risk seeking than were the subjects in a control group. This behavior indicates that they had perceived the outcome of the first lottery as a loss relative to their reference point. The reference point therefore had been affected by the expectation to win even more in the first lottery.

Several papers test for the impact of expected outcomes on the satisfaction with the actual outcome indicating a change in the reference point due to expectations. Mellers et al. (1999) show that unattained outcomes affect self-reported emotions. Medvec et al. (1995) show a similar result for the satisfaction among Olympic medalists and Heyman et al. (2004) for the self-rated pleasure in a sequence of lotteries.[3] In a similar setting, Breiter et al. (2001) find

[3] Psychological research on *met expectations* shows in a number of domains that the degree to which expectations are met has a positive impact on subsequent satisfaction (see for example Greenhaus et al., 1983, on organizational behavior and Cadotte et al., 1987, on consumer psychology).

neuroscientific support for the hypothesis that expectations-based counterfactuals affect reactions to outcomes. One of the few studies arguing to the contrary is the study by Brown et al. (2008). In the context of a new system implementation in an organization, they found that expectations do not influence satisfaction with the new system. All of these papers assess subjects' satisfaction. They do not calculate the magnitude of the reference point adaptation nor do they consider risky choice.

A different strand of the literature is concerned with risky choice and employs a similar setting to our second experiment. However, these authors use different specifications to answer different questions. Thaler and Johnson (1990) test for hedonic editing whereby gains are segregated and losses integrated. Their subjects receive an initial payment and then make a risky choice whereas the control group makes just the risky choice resulting in the same combined payoffs. They find only partial support for the hedonic editing hypothesis. Gneezy and Potters (1997) examine the impact of the frequency of evaluations. Participants had to invest in a lottery involving gains and losses. They find that more money is invested if outcomes are evaluated less frequently. More closely related to our approach, Kameda and Davis (1990) examine the impact of prior losses on risky decisions and find that they increase risky behavior. However, they do not consider the impact of prior gains that are smaller than expected. Therefore, their findings can be explained without a shift in the reference point due to expectations.

Recently, several authors have acknowledged the concept of variable and adaptive reference points and hence examined the formation of reference points over time. In their examination of the path dependency of preferences Hoeffler et al. (2006) predict a key role of the historical status quo in shaping preferences. Chen and Rao (2002) study happiness in the progress of individual wealth changes. They find that subjects are happier following an intermediate decrease in wealth than with an intermediate increase in wealth when both are

reverted after some time. These findings indicate a partial reference point adaptation to a recent level of wealth. Gneezy (2005) infers the reference point adaptation from subjects' decisions when to sell their stocks. His experimental results suggest the reference point to be the historical peak. However, he is considering only mixed prospects of gains and losses. In addition, due to his focus on adaptation over a longer time horizon, several prior experiences could interfere. Georgellis et al. (2007) examine the dynamics of adjustment towards reference points for key workplace attributes and show the non-linear nature of the dynamic path of adaptation. Arkes et al. (2008) examine shifts in the reference point following gains and losses. They consider only historical and recent status quo and find that adaptation is significantly greater following a gain than following a loss.

Most closely related to our study is Abeler et al. (2008). They consider the role of expectations for reference point formation in a real effort experiment. Their methodology goes in a similar direction of our second experiment.[4] While these authors examine the effect of an expectations-based reference point on the provision of effort, we consider the effect on risk-taking behavior.

THE POTENTIAL IMPACT OF EXPECTATIONS GIVEN PROSPECT THEORY PREFERENCES

Before we present our experimental design in more detail, we would like to exemplify how the reference point can be affected by expectations and how this adaptation can have an effect on subsequent risky choice. First, consider the case that only the recent status quo plays a role in the formation of the reference point over time. At some initial date $t=0$ the initial reference

[4] Subjects in their experiment either receive a piece rate or a fixed payment. However, they have to finish working on the task before they know which of the two payment schemes they will receive. The authors find that individuals in a high fixed payment treatment work significantly more than those in a low fixed payment treatment. This finding can be explained if subjects have taken the expected payment as their reference point.

point R_0 will be formed. For example this could be the purchase price of a stock (historical status quo). This reference point determines the origin of the prospect theory value function (see solid line in Figure 1).

<Please insert Figure 1 here>

In *t=1* the individual receives some new information, e.g., regarding the current stock price (recent status quo). In this kind of setting Arkes et al. (2008) and related research have shown that the reference point will adapt partly toward the recent status quo P_1 resulting in the new reference point R_1. Figure 1 shows this adaptation under the assumption that the shape of the value function remains unchanged (dotted line). In *t=2* the individual evaluates the current outcome C_2. For example, if C_2 lies above the reference point R_1, the outcome will be assessed as a gain. Given prospect theory preferences, a person in this situation will generally show risk averse behavior.

How can expectations affect this behavior? Consider again the situation in *t=1*. Now the individual not only learns the recent status quo, but also forms expectations regarding the possible outcome in *t=2*[5]. If expectations have no influence on the later assessment of the outcome, the individual should have the same reference point adaptation toward R_1 as before. If, however, expectations do play a role in the formation of the new reference point in *t=1*, we could for instance see a situation as presented in Figure 1 (dashed line). In this example expectations E_1 exceed the recent status quo and we thus see a stronger adaptation of the

[5] We follow Köszegi and Rabin (2006, 2007) and consider those expectations held in the "recent" past (*t=1*) about current outcomes (*t=2*). As they point out, this should not mean that beliefs are slow to adjust to new information, but that preferences do not instantaneously change when beliefs do. They give the following example for this setting: "When somebody finds out five minutes ahead of time that she will for sure not receive a long-expected $100, she would presumably immediately adjust her expectations to the new situation, but she will still five minutes later assess not getting the money as a loss" (Köszegi and Rabin, 2006, footnote 9).

reference point toward a point $R^e_1 > R_1$. The actual outcome C_2 would then be assessed as a loss relative to this new reference point R^e_1. A person with prospect theory preferences would exhibit risk seeking behavior in this kind of situation.

QUESTIONNAIRE STUDY: EXPECTATIONS AND THE ADAPTATIONS OF REFERENCE POINTS

The goal of the questionnaire study is to examine the role of expectations in the formation of reference points over time, when both expectations and the recent status quo are salient. To do so we employed and extended a method introduced by Arkes et al. (2008). We asked subjects what stock price today will generate the same utility for them as a previous stock price that increased from the initial purchase price.

This allows us to calculate the magnitude of the reference point adaptation under the assumptions that the purchase price serves as the initial reference point ($P_0=R_0$) and that the value function remains stable over time. The reasoning is the following: The previous price change is assessed based on the initial reference point R_0 resulting in utility $U_{R0}(P_1)$ in $t=1$. We ask subjects what stock price P^* in $t=2$ will generate the same utility. For example, without a shift in the reference point, subjects will still state P_1. We are interested in the new reference point R^* with $U_{R^*}(P^*)=U_{R0}(P_1)$. Under the assumption that the shape of the value function remains unchanged, the following equation holds:

$$P^* - R^* = P_1 - R_0 \quad => \quad \Delta R = R^* - R_0 = P^* - P_1 \tag{1}$$

Given this equality we are able to derive the reference point adaptation (ΔR).

Subjects

A total of 266 first year business undergraduates at a large German university, the Technische Universität Dortmund, answered our brief questionnaire in a classroom setting. The total

number of respondents for each scenario is denoted by *n*. All students voluntarily filled out the questionnaire. The mean age of the participants was 22.1. Forty-four percent of the participants were women.

Design, Procedure and Materials

The study used a between-subjects design with four conditions: one control condition and three experimental conditions that varied in the information regarding expected price movements. The participants were randomly assigned to one condition. They were given task instructions and asked to complete a paper-based questionnaire. Participants in the control condition read the following scenario taken from Arkes et al. (2008) and translated into German:

"Two months ago, you bought a stock for 30€ per share. One month ago, you were delighted to learn the stock was trading higher – at 36€ per share. This month, you decide to check the stock's price again. At what price would the stock need to trade today to make you just as happy with the stock's price this month as you were when you learned the stock had risen from 30€ to 36€ last month?"

This basic scenario does not control for expectations. We therefore extended the approach to examine the role of expectations. In the experimental conditions, the following additional information was presented following the second sentence: "One month ago you also learned that this month's stock price is expected to range between x€ and y€, with each price within this interval being equally likely." In Condition two (base expectations) the interval was set from 30€ to 50€, in Condition three we lowered the expectations to range from 25€ to 45€, and in Condition four we increased the expectations to range from 35€ to 55€.

After reading the scenario, participants were asked to indicate the stock price generating the same utility as the previous price increase. Afterwards participants filled out a short paper-based questionnaire not part of this study.

<Please insert Table 1 here>

Results

In the control condition (Condition 1), subjects on average assert that an upward movement of the stock price to 41.12€ would give them the same pleasure as last month's price **i**ncrease to 36€. Given equation (1) and an unchanged prospect value function, the reference point adaptation is 5.12€ (P^*-P_1=41.12€-36€) and the new reference point is 35.12€.

We compared our results with those of Arkes et al. (2008). In their study, the mean reported price was 40.24$ with 18.84% indicating a price equal or below 36$, 35.5% between 36$ and 42$, 25.36% equal 42$ and 45.7% above 42$. A comparison of the two samples on differences in both location and shape of the distribution using the Kolmogorov-Smirnov test shows that the two data sets are not significantly different (Z=0.907, p=0.38). Our results are thus consistent with the results from Arkes et al. (2008).

Condition 2 incorporates explicit expectations into the basic scenario. We designed this condition to test the feasibility of our extended design. The expected value of the future stock price of 40€ in Condition 2 roughly fits the mean reported stock price in Condition 1 where subjects' responses were based on the recent status quo alone. The given expectations in Condition 2 therefore hold no new kind of information for the adaptation of the reference point. We thus hypothesized that the two mean reported stock prices would show no significant differences. Table 2 contains the distribution and mean by subjects to Conditions 1 and 2.

<Please insert Table 2 here>

Our point estimates indicate that with 5.69€, adaptation in Condition 2 exceeds the adaptation in Condition 1 slightly by 0.57€. As hypothesized, statistical comparison of means between Condition one with 41.12€ and Condition 2 with 41.69€ reveals no significant differences (Mann-Whitney-U = 2116.50; p=0.782). Our proposed method of incorporating expectations into the basic design is thus able to produce consistent results. Any changes in the adaptation of the reference point that we might find in Conditions 3 and 4 should therefore be due to the information contained in the expected values and not due to our method of including expectations at all.

We thus expected to find a significant impact of expectations on reference point formation in Conditions 3 and 4. In Condition 3 we gave a price range from 25€ to 45€ with an expected price of 35€ and in Condition 4 from 35€ to 55€ with an expected price of 45€. The ranges were constructed in a way that each should encompass the recent status quo (36€) as well as the mean reported price in the control condition (41.12€) in which no expectations were explicitly given.

If expectations play a role in the formation of reference points one must expect lower (higher) reported mean stock prices compared to Conditions 1 and 2 when expectations are lower (higher). Table 3 contains the distribution and mean by subjects to Conditions 3 and 4.

<Please insert Table 3 here>

The average answer to Condition 3 was 40.09€, which implies an adaptation of 4.09€. The average answer to Condition 4 was 43.88€, which implies an adaptation of 7.88€. As predicted, subjects on average report lower prices if the expected value is below the

adaptation information contained in the recent status quo and higher prices if the expected value is above this information contained in the recent status quo. Statistical comparisons of means show significant differences both between Conditions 1 and 3 (U=1734.50; p=0.065) as well as between Condition one and four (U=1699.00; p=0.007). Comparisons between Conditions 2 and 3 (U=1737.00; p=0.020) as well as 2 and 4 (U=1891.00; p=0.017t=-2.660; p=0.009) are equally significant. The mean adaptation for each of the four scenarios discussed thus far is displayed in Table 4.

<Please insert Table 4 here>

To consider all four conditions simultaneously, we conducted a one-way analysis of variance (ANOVA). The results confirm our hypothesized role of expectations on the adaptation of reference points on a significant level [$F(3,262)=9.706$, $p<0.0001$].

Furthermore, Table 4 shows differences in the magnitude of reference point adaptation. Compared to Condition 2 with base expectations, information about higher expected outcomes (Condition 4) yield an additional adaptation of 2.19€ (7.88€ - 5.69€). In contrast, information about lower expected outcomes (Condition 3) provokes a lower adaptation of only 1.60€ (5.69€-4.09€). An analysis of variance on the squared differences in reference point adaptation compared to Condition 2 confirms the differences on a significant level (F=4.358; p=0.039). The impact of expectations on reference point formation is therefore stronger for expected gains than for expected losses. This finding is consistent with the results of Arkes et al. (2008) based on changes in the recent status quo (recent stock price). They found that adaptation after gains is greater than after losses.

In summary, we find that expectations tend to influence the adaptation of reference points. Subjects shift reference points more strongly upward if expected values exceed the

information for adaptation contained in the recent status quo and vice versa they adapt less strongly if expected values are lower. Thus when expectations are present it is not sufficient to equate the reference point with the recent status quo.

EXPERIMENTAL STUDY: EXPECTATIONS AND RISK TAKING PROPENSITY

The experiment was designed to test for the impact of expectation-driven reference point adaptation on risk preferences.

Subjects

Ninety business undergraduates at Technische Universität Dortmund voluntarily participated in the experiment. Their mean age was 21.8 years and half of the participants were men. Subjects were paid according to their gains in the lotteries. Payments ranged from 1€ to 17€. The experiment and the subsequent questionnaire took approximately 30 minutes to complete.

Design, Procedure and Materials

The experiment included two between-subjects conditions. Participants in the control condition (n=30) received a fixed initial endowment of 4€ whereas participants in the experimental condition (n=60) were presented with the following lottery: with 50% probability they could win an initial endowment of 4€ and with another 50% probability they could win an initial endowment of 10€. Thus participants were confronted with an expected endowment of 7€. Subjects in the experimental condition were divided into two groups, A and B, each holding the same number of subjects and a flip of a coin decided which group was awarded with 4€ and which group with 10€. In the following, we were only interested in those subjects endowed with 4€, either through the lottery or through the fixed initial endowment. Thus all subjects were confronted with the same recent status quo.

In the second part of the experiment, we examined participants' propensity to take risks. We followed Holt and Laury (2002) and presented all subjects with a choice table between a paid lottery and different safe payments (see table in the Appendix). The written instructions explained the types of choices that the subjects had to make in the table and how payment would work. We also gave a short oral explanation. Subjects made choices in a table with nine rows. In each row they had to decide whether to play a lottery or to opt for a safe payment. In the lottery they would either win 7€ or lose 3€, each with 50% probability. Each row contained exactly the same lottery but the safe option increased in 50- cent steps gradually from an initial 0€ in row one up to 4€ in Row 9. After all choices had been made, one row was randomly selected. The choice in this row was payoff relevant: either the subject was awarded with the safe payment or a flip of a coin determined whether the subject won the 7€ or had to pay the 3€. This procedure gave subjects an incentive to make a choice in each row according to their true preferences and thus was incentive-compatible.

If subjects have monotonic preferences, they prefer the lottery up to a certain level and then switch to the safe payment for the remaining rows of the choice table. The switching point is informative about the propensity to take risks. The later the switch between the lottery and the safe payment, the more risk-seeking a subject is.

Finally, after the experiment all subjects filled out a short paper-based questionnaire containing questions on gender, age and miscellaneous personality traits.

Given prospect theory preferences and the adaptation of the reference point according to Experiment 1, we hypothesized that subjects who had received the lower amount in the lottery (experimental condition) would be willing to take higher risks and thus switch later from the lottery to the safe payment compared to subjects in the control condition.

The reasoning is the same as described in Figure 1: Reference points in the control condition will adapt to the recent status quo P_1, in this case the fixed endowment of 4€ (see dotted line

in Figure 1). In contrast, the expected value in the lottery is higher and therefore participants in the experimental condition are likely to adapt their reference points more strongly (see dashed line in Figure 1). As in Köszegi and Rabin (2006, 2007) we assume that the reference point is influenced by *recent* expectations. Therefore, after receiving the 4€ in the lottery, subjects will not instantly change their reference point, but will consider the money as a loss given their reference point R^e_1. In contrast, subjects in the control condition will consider themselves to be in the gain region relative to their reference point. Given prospect theory preferences, subjects in the experimental conditions will be more risk seeking than subjects in the control condition although both have actually received the same amount of money.

Results

We begin our empirical analysis by looking at the distribution of choices in the risk task. The upper graph in Figure 3 shows for each level of safe payment the number of subjects in the control condition that switched at this level away from the lottery to the safe payment. The lower graph displays the same information for those individuals in the experimental condition endowed with 4€. In each condition 30 subjects completed the choice table. In the control condition, two subjects did not switch to the safe payment and in the experimental condition seven subjects stuck to the lottery. Both the subjects in the control condition and the subjects in the experimental condition switch to the lottery at a median safe payment of 3€ (Row 6). However, subjects in the control condition switch alternatives on average at Row 5.1 while subjects in the experimental condition switch alternatives on average at Row 6.6. Thus, subjects in the experimental condition show a relatively higher propensity to take risk than do those in the control condition.

<Please insert Figure 2 here>

In order to assess the statistical significance of these results, we tested the data using the one-tailed Mann-Whitney-U-test (see Table 5 for results). Results corroborate the hypothesis that subjects in the experimental condition show a higher propensity to take risk compared to participants in the control condition (U=288.5, p=0.007). Post et al. (2008) find similar results in a more complicated dynamic setting of the game show “Deal or No Deal”.

<Please insert Table 5 here>

In addition we tested the differences between subjects in the control condition and those subjects in the experimental condition awarded with 10€ during the first lottery. One would hypothesize no differences between the two groups, as all subjects should regard their initial endowment as a gain and should adapt toward the recent status quo and thus showing identical risk-taking behaviour. Even though subject in the control condition switched rows on average at Row 5.1, subjects in the experimental condition (10€) switched alternatives on average at Row 5.6, statistical comparison indicate no significant differences in risk-taking behavior (U= 391; p=0.187).

CONCLUSION

The aim of the present study was to examine the role of expectations in the formation of the reference point over time. We employed a newly developed questionnaire method and a paid experiment and found support for the hypothesis that expectations play an important role in the formation of reference points and have an impact on subsequent risky choice. Our findings thus point to the importance of recent models on reference dependent behavior that equate the reference point with expectations (Köszegi and Rabin, 2007). Furthermore, our

result holds when expectations as well as the status quo are salient. When expectations are present it is therefore not sufficient to equate the reference point with the status quo.

Our study can be seen as a first step in examining the role of expectations in the formation of reference points. For future research it would be interesting to apply our approach into the field. Furthermore, our results should be examined to hold not only in situations of monetary comparisons but also in situations like the advancements in key workplace attributes (see Georgellis et al., 2007) or general life quality.

As reference point formation and updating is still an open field in behavioral economics, there are important future research directions worth considering. First, other important types of referents, like aspiration levels, intermediate wealth states or social norms, could assist in determining the reference point. These types should be incorporated into future experiments aiming at explaining reference point adaptation over time. In addition, what happens if many salient pieces of information could serve as reference point? To which does a person compare the outcome? These are just some of the unanswered questions on the formation of reference points.

APPENDIX

Choice Table

	Alternative 1		Alternative 2	
1	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		0 Euro for sure	
2	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		0,50 Euro for sure	
3	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		1 Euro for sure	
4	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		1,50 Euro for sure	
5	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		2 Euro for sure	
6	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		2,50 Euro for sure	
7	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		3 Euro for sure	
8	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		3,50 Euro for sure	
9	Win 7 Euro with probability of 50%, Lose 3 Euro with probability of 50%,		4 Euro for sure	

Instructions for Experiment 1

Thank you for participating in our short questionnaire study!

Please complete the following questionnaire. Take your time and carefully read the questions. There are no right or wrong answers in the second part of the questionnaire. We are only interested in your personal assessment. All answers will be made anonymous.

1. Personal information

How old are you?; What is your field of study?; Please indicate your gender.

2. Personal assessment

Please imagine the following situation:

"Two months ago, you bought a stock for 30€ per share. One month ago, you were delighted to learn the stock was trading higher – at 36€ per share. [*Only in experimental conditions:* One month ago you also learned that this month's stock price is expected to range between x€ and y€, with each price within this interval being equally likely.]

This month, you decide to check the stock's price again. At what price would the stock need to trade today to make you just as happy with the stock's price this month as you were when you learned the stock had risen from 30€ to 36€ last month?"

Please indicate the stock price that would make you just as happy here:

Instructions for Experiment 2 (experimental condition)

Welcome to this experiment! Please read these instructions carefully.

All decisions you make in this experiment are anonymous. At the end of the experiment you will also be paid out anonymously. During the experiment no communication is allowed.

1. Personal information

How old are you?; What is your field of study?; Please indicate your gender.

2. General information

We will be playing two lotteries with you where you can win real money.

To do so we have divided all participants into two groups: Group A and Group B.

You are part of: Group A

3. Lottery One

The first lottery has the following payoffs:

Win 4€ with 50% probability/Win 10€ with 50% probability

We will now toss a coin. Your payoff will be calculated in the following way:

“Heads”: Group A wins 4€, Group B wins 10€

“Tail”: Group A wins 10€, Group B wins 4€

4. Lottery Two

The table below shows in each row two alternatives. You can choose in each row between participation in a lottery (Alternative 1) or a safe payment (Alternative 2).

Please fill in the table below as follows: Start with the first row and move down from row to row. In each row, you have to decide between Alternative 1 and 2. Alternative 1 is the same in each row. Only the safe payment in Alternative 2 is increasing with each row.

After you have made your choices, we will select one of the rows by chance. This row will determine your payment: If you have selected Alternative 1 in this row, we will play the lottery with you. If you have selected Alternative 2 in this row, you will receive the safe payment.

Please mark in each row only one alternative with a cross (all in all 9 crosses)

For the table please refer to the Appendix.

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