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Does Binding or Feeback Influence Myopic Loss Aversion - An Experimental Analysis

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Does Binding or Feedback Influence Myopic Loss Aversion?
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Abstract:

Empirical research has shown that a lower feedback frequency combined with a longer binding period decreases myopia and thereby increases the willingness to invest into a risky asset. In an experimental study, we disentangle the intertwined manipulation of feedback frequency and binding period to analyze how both variables alone contribute to the change in myopia and how they interact. We find a strong effect for the length of commitment, a much less pronounced effect for the feedback frequency, and a strong interaction between both variables. The results have important implications for real world intertemporal decision making.

Keywords: intertemporal decision making, myopic loss aversion, feedback frequency, length of commitment, evaluation period.

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1 Introduction

This paper investigates two important features of intertemporal decision making. First, it considers how decisions are influenced by the number of periods a decision maker is committed to a decision, i.e. for how long he is bound to his choice. Take the stock market as an example for intertemporal decision making. Suppose you own some cash and want to make an investment into some risky asset, given some fixed planning horizon (e.g. your year of retirement). Does the amount you invest into the risky asset depend on the time you have to stay committed to your investment, e.g. does it depend on whether you can change the amount invested each month or only each year? The second feature that is studied is the feedback frequency. Considering the stock market context again, the question arises if the frequency of feedback does influence the amount invested into the risky asset. Take, e.g., a (risky) investment fund that sends information about its current value each year vs. another fund that sends similar information each quarter. Does the difference make people invest more or less into such funds? In addition to the impact of each of these variables alone, one has to ask if there is any interaction between length of commitment and feedback frequency. Knowing the answers to the above questions is essential. The sheer amount of long term investments into the stock market makes it worthwhile to study factors which influence these investments. Defined contribution saving plans in which investors split their monthly contribution between a bond and a stock fund, are a real world example for the decision situation investigated in this paper.

In addition to the practical relevance of our study, our results are important for interpreting previous work. It will be shown that one can not properly interpret previous results without understanding the independent and joint influence of feedback frequency and commitment. Finally, knowing the influence of both variables might help us to design better investment decision support tools.

The concept of myopic loss aversion (MLA), introduced by Benartzi and Thaler (1995), can answer some of the above questions. The key idea of MLA is that, because of loss aversion, a sequence of risky investments looks less attractive in myopic evaluation. This argument was originally confirmed in the controlled environment of two experimental studies. Gneezy and Potters (1997) examined which portion of a riskless endowment participants were willing to invest in a risky asset, whereas Thaler et al. (1997) asked individuals to split their money between two assets of different riskiness. In both studies, a manipulation of the degree of myopia systematically influenced the willingness to invest in the riskier option: If participants received less frequent feedback and were forced to make a binding multi-period decision, they evaluated the assets less myopically and were more willing to accept the risk.

These original results on the impact of myopia on risk taking were confirmed and extended in many ways. Haigh and List (2002) replicated the study of Gneezy and Potters (1997) with traders from the Chicago Board of Trade and found even stronger effects of MLA. Professional experience thus does not seem to weaken the bias. Gneezy, Kapteyn and Potters (2003) demonstrated the effect in an experimental market setting. Market prices for risky assets were significantly higher if feedback was provided less frequently and decisions were binding for several periods. Markets thus do not seem to eliminate MLA. Langer and Weber (forthcoming) build on Prospect Theory (Tversky and Kahneman, 1992) to derive refined hypotheses about the impact of myopia on risk taking. They confirmed their predictions in an experimental setting similar to Gneezy and Potters (1997). Summing up, all the evidence on MLA suggests, that the willingness to invest into the risky asset is influenced by the simultaneous manipulation of feedback frequency and binding period.[1] However, we know basically nothing about each factor's influence alone or about a possible interaction effect.

In our study, we find three main results. First, binding decisions cause people to be less myopic, perhaps because it forces them to think over a longer time horizon. Participants invest more into the risky asset in the binding condition than in the non-binding condition. This tendency does not diminish over time. Second, providing less frequent feedback seems to help people learn over time that it is better to go with the risky prospect, i.e. to be less myopic. Third, there is not a simple main effect for the combination of binding and feedback, but an interaction between these two variables. The strongest effect is observed when participants have their decisions bound, but receive frequent feedback. The effect is even stronger than the combination of long binding period and less frequent feedback. It seems that if people's decisions are bound, more frequent feedback is helpful, because over time it becomes more salient how occasional losses are wiped out by larger gains.

In Section 2, we will present some conceptual thoughts on MLA and introduce hypotheses as well as the design of our study. The results are presented in Section 3. The paper ends with a short discussion in Section 4.

2 Some General Thoughts on MLA and Experimental Design

2.1 Myopic Loss Aversion

MLA combines two important behavioral concepts: loss aversion and myopic evaluation. Loss aversion refers to the fact that in the evaluation of a risky alternative individuals tend to weigh losses more heavily than gains.[2] Myopia is the short-sightedness that induces a decision maker to evaluate each alternative of a sequence independently whereas a rational decision maker would evaluate the sequence as a whole. Loss aversion implies that a myopic decision maker will invest too little into the risky asset, i.e. myopia leads to decreased willingness to take risks. The question addressed in this paper is to what degree myopia (and thus the risk attitude) is influenced by commitment and by feedback, and how these two variables interact.

Most experimental research on MLA uses the feedback frequency and simultaneously the binding period to manipulate myopia. Less frequent feedback delivers distributional information on a more aggregated level, a longer binding period induces investors to think some periods ahead. The experimental finding that these manipulations lead to a higher willingness to invest in a lottery sequence (Gneezy and Potters 1997, Haigh and List 2002, Gneezy, Kapteyn and Potters 2003) shows that the feedback frequency and the binding period are in fact able to influence the degree of myopia in the evaluation. The results of Langer and Weber (forthcoming), though questioning the robustness of MLA, provide additional support for this mechanism. They extend the argument from myopic loss aversion to myopic prospect theory (MPT) considering not only loss aversion but also diminishing value sensitivity. MPT implies that myopia results in stronger risk aversion for most sequences of alternatives but results in lower risk aversion for sequences based on alternatives with small loss probabilities and high loss sizes. They find experimental support for their refined predictions, demonstrating on the one hand that the effect of myopia on risk taking is less general than suggested by MLA, but showing at the same time that the basic mechanism of inducing different degrees of myopia through the feedback frequency and the binding period seems to be robust.

In this paper, we are only interested in the phenomenon of inducing different degrees of myopia. To avoid potential ambiguity in the results due to the divergences between MLA and MPT, our experimental analysis concentrates on alternatives for which the predictions about the impact of myopia on the attractiveness of the sequence of gambles are unique. For a prospect that offers a 40% chance to gain 7% on the invested amount and a 60% chance to lose 3%, as used in our experiment, a less myopic evaluation of multiple plays should be generally (i.e. in MLA and MPT) more attractive.

In addition to the separate consideration of binding and feedback, our design differs from most designs used in the literature (e.g. Gneezy and Potters 1997) in one important aspect. Most studies use an additive approach, i.e. the decision maker faces identical investment opportunities in each period and the aggregated outcome of the decision sequence is the sum of all single decision outcomes.

$$FW = \sum_{t=1}^{T} X \cdot \left[\alpha(t) \cdot [1 + r(t)] + [1 - \alpha(t)]\right], \tag{1}$$

where FW is the final wealth, X is the identical (new) endowment in each period, α(t) is the proportion of endowment invested into the risky asset in period t with $0 \leq \alpha(t) \leq 1$, r(t) is the return on the risky asset in period t, and T the planning horizon.[3]

We use a multiplicative approach instead, in which the returns of the periods are compounded. Investors receive an initial endowment that is transferred from period to period, altered by the outcomes of the investment decisions.

$$FW' = Y \cdot \prod_{t=1}^{T} \left[\alpha(t) \cdot [1 + r(t)] + [1 - \alpha(t)]\right], \tag{2}$$

where FW' is the final wealth, Y is the initial endowment, α(t) is the proportion of current wealth invested in the risky asset in period t, r(t) is the return on the investment in period t, and T the planning horizon.

Clearly, the multiplicative case is more realistic than the additive case as it better resembles the accrual of returns in real asset markets. On the other hand, it might lead to weaker results regarding MLA. Myopia must be expected to be less extreme since the obvious relevance of early round decisions for later round endowments might induce investors to think in a less myopic manner. It is interesting to examine, how strong the effects of MLA remain in this more realistic multiplicative setting.

In the following we will present the hypotheses first and then explain which design is needed and used to test the hypotheses.

2.2 Hypotheses

This paper is about the effect of binding and feedback on myopia which itself influences the amount invested into the risky asset. As described in formula (2), α(t) is the percentage of current wealth a person invests in period t into the risky asset. Thus α(t), or just α in case the period is of no importance, is the key variable for which hypotheses should be derived. We will use the notation α^* for the average percentage invested over the whole planning horizon. There will be two conditions for binding: "b" for single period binding and "B" for multiple period binding, and two conditions for feedback: "f" for frequent feedback which will be given each period and "F" for feedback on a less frequent basis. Thus, e.g. the variable $\alpha_{Bf}(t)$ denotes the percentage of wealth invested into the risky asset in period t, where the decision maker is committed to his investment decision for multiple periods, but receives feedback about outcomes after each period.[4]

The first hypothesis states that we will be able to extend the results presented in the literature for the additive case to the multiplicative case: A longer binding period and simultaneously less feedback will increase the amount invested into the risky asset.[5]

Hypothesis 1: $\alpha_{bf}^* < \alpha_{BF}^*$.

The second hypothesis states that both binding and feedback frequency alone will influence the amount invested into the risky asset. Section 2.1 has shown that the degree of myopia influences α. Now, both more binding and less feedback frequency should mitigate myopia which is the rationale behind hypothesis 2.

Hypothesis 2: $\alpha_{b\bullet}^* < \alpha_{B\bullet}^*$ and $\alpha_{\bullet f}^* < \alpha_{\bullet F}^*$.

We ex ante see no reason to hypothesize any interaction effect between both variables (even if we have found one).

So far we have considered the average allocation over time. Next, we will present some refined hypotheses regarding the pattern of allocations over time. Previous experimental research has shown that allocations to the risky asset will generally increase over time, independent of the specific treatment. Langer and Weber (forthcoming) found such an effect for an additive allocation scenario. Similar empirical evidence can be found in Weber and Camerer (1992), where individuals played an investment game. We believe that in these asset allocation experiments learning plays an important role. Over time, subjects learn to cope with the risky situation in the experiments, ambiguity about the whole process is diminishing. This results in an increase of risk taking.

Hypothesis 3: For all treatments, the proportion of wealth $\alpha(t)$ invested in the risky asset increases over time.

So far, we have not considered a possible difference between the effect of binding and the effect of feedback. Clearly, it should make a difference in the beginning of the experiment. Binding should have an immediate effect, as through binding subjects become less myopic right away. In contrast, feedback should just influence subjects over time (and should not have any effect in period 1).

Hypothesis 4: $\alpha_{\bullet f}(1) = \alpha_{\bullet F}(1)$ and $\alpha_{b\bullet}(1) < \alpha_{B\bullet}(1)$.

2.3 *Design of the Experiment*

In our computerized experiment, participants faced 30 independent draws of the same gamble. At the beginning of the experiment, each individual received an initial endowment of 25 € which could be totally or partially invested in a lottery L = (+7 %, .4; –3 %, .6) that increased the invested amount by 7 % or decreased it by 3 % with the stated probabilities. This gamble has an expected return of +1 %. Following the multiplicative case, the endowment in period t+1 was equal to the outcome of the investment in period t plus the amount transferred, i.e. not invested in period t: $Y(t + 1) = Y(t)\,[\alpha(t)\,[1 + r(t)] + [1 - \alpha(t)]]$. Participants were fully informed about the return distribution of the asset and the fact that asset returns of different periods were stochastically independent.

Two factors were varied within the experiment, binding period and feedback frequency, resulting in a 2x2 design. Short binding – condition b – was for one period, longer binding (longer commitment) was for three periods – condition B. High frequent feedback was given each period – condition f - , low frequent feedback was given after each third period – condition F .

In design bf, subjects were asked in each period to make a new allocation decision, i.e. to state which portion of their current endowment they wanted to invest in the risky asset. Following the decision, the lottery was played out and the change in wealth calculated and displayed. Figure 1 shows a typical screen from the experimental condition bf. On the top left side of the screen the current wealth (here 28.62 €) is displayed. Below, the allocation decision is made by either using a slider or typing in the number (here 91 %). The feedback box at the bottom appears after the draw and presents the outcome of the gamble (here –3 %) as well as the calculation of gains or losses and the new wealth (here 27.84 €).

Insert Figure 1

In design Bf, participants` allocation decisions were binding for three rounds. Hence, though the gambles were played out and the feedback was presented in each round, participants could only adjust their allocation after each third round. In design bF, feedback about the outcome of the investments was presented on a more aggregated basis. After each third round participants received information about the total change of wealth since the last provision of feedback. Nevertheless, allocations could be adjusted in each single round. In design BF, participants made binding decisions for three rounds and got feedback information only about the aggregated change of wealth over the three periods.

The experimental subjects were master students from Mannheim University recruited in an advanced finance class. Overall 107 students took part in the experiment, 26 in treatment BF and 27 in each of the other treatments. They individually entered the computer lab and were randomly assigned to one of the treatments by the computer. They read the instructions on the screen, were given the opportunity to ask questions, and independently started the experiment. The outcomes of the gambles were randomly generated for each individual participant by the computer, according to the specified return distribution. On average, the experiment took about 30 minutes, 15 minutes for reading the instructions and 15 minutes for the 10 (in treatments Bf and BF) or 30 (in treatments bf and bF) allocation decisions. All participants received a flat show up fee of 3 € and had a 10 % chance to be picked by the computer for real payment according to their final wealth in the experiment. The twelve selected individuals earned an additional 30.19 € on average. The payment procedure was ex ante known to participants.

3 Results[6]

The average allocation for the different conditions are given in Table 1 and in Figure 2.

Insert Table 1

Table 1 shows that we find a main effect for binding ($\alpha_{b\bullet}^* < \alpha_{B\bullet}^*$, $p < 0.01$, Mann-Whitney one-tailed) but no effect for feedback. Thus hypothesis 2 can only be partly confirmed. This is surprising given the fact that in most other studies presented in the literature so far the feedback frequency is suggested to be the driving force. Figure 2 helps to understand the surprising result. It clearly demonstrates that there is a significant interaction effect (ANOVA, $p < .05$) between both variables binding and feedback frequency. Both manipulations alone increase the percentage invested into the risky asset ($\alpha_{bf}^* < \alpha_{Bf}^*$, $p < .01$ and $\alpha_{bf}^* < \alpha_{bF}^*$, $p < .05$) as the dotted lines visualize. However, the joint effect is reversed ($\alpha_{Bf}^* > \alpha_{BF}^*$, n.s) or not existent ($\alpha_{bF}^* \approx \alpha_{BF}^*$) at best. The data indicate that the effect of a longer binding period is stronger when the feedback frequency is higher. We will discuss this finding in more detail below. Nevertheless, we can confirm hypothesis 1 and thus replicate the usual findings in a multiplicative setting ($\alpha_{bf}^* < \alpha_{BF}^*$, $p < .05$).

Insert Figure 2

Next, we consider the hypotheses regarding the development of allocations over time. To give a first overview of the data, figure 3 displays the average allocation to the risky asset at each point of time, $\alpha^*(t)$, for each condition. Allocations in general seem to increase over time, as predicted in hypothesis 3, though the effect is far from being monotonic.

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Insert Figure 3

For a first simple test of hypothesis 3, we compute for each individual the average allocation in the second half (periods 16-30) and in the first half (periods 1-15) of the experiment and define the 'trend' to be the difference between these numbers. As shown in table 2, the median trend turns out to be positive in three of the four treatments. It is highest in treatments bF (11%) and lowest in treatment BF (0%). By a Wilcoxon signed rank test the trend is significantly positive on a 1% level for treatments Bf and bF and on a 5% level for treatment bf. In treatment BF the effect is insignificant, we even observe more participants with a negative (11) than a positive (9) trend.

Insert Table 2

Hypothesis 4 states that the allocation in period 1 is the same both for low and high feedback frequency and that it is larger in case subjects make binding decisions for three periods. Calculating the medians (means) we get:

$\alpha_{\bullet f}(1) = 50.0\%\ (49.3\%)$, $\alpha_{\bullet F}(1) = 50.0\%\ (49.8\%)$ and

$\alpha_{b\bullet}(1) = 36.5\%\ (41.5\%)$, $\alpha_{B\bullet}(1) = 50.0\%\ (57.6\%)$.

The difference between $\alpha_{\bullet f}(1)$ and $\alpha_{\bullet F}(1)$ is insignificant, the difference between $\alpha_{\bullet b}(1)$ and $\alpha_{\bullet B}(1)$ significant on a 1% level. The results clearly support hypothesis 4.

In our examination of hypotheses 1-3, we have considered average allocations over the complete course of the experiment. We now want to investigate how much subjects will allocate to the risky investment in the long run. This seems especially important in light of the applications mentionend in the introduction. Based on the allocations during the experiment, we estimate a process that converges to some limit allocation $\alpha(\infty)$, or α_∞ for short, for $t \to \infty$. More explicitly, we consider a partial adjustment model

$$\alpha'(t) = b + c \cdot \alpha'(t-1) \quad (3)$$

and estimate the parameters b, c, and $\alpha'(1)$ to minimize the quadratic deviation of α' from α.[7] Because of the interfering end effects in the data (s. Figure 3), we exclude the allocations of the final three rounds from the fitting procedure.[8] We further impose the natural restriction on the allocation function $\alpha'(t)$ to be in the domain [0, 1] for all t. This is achieved by restricting the estimated parameters to $\alpha'(1) \in [0, 1]$, $c \in (0, 1)$, and $b \in [0, 1-c]$. The function then monotonically converges to the long run allocation $\alpha_\infty = \frac{b}{(1-c)} \in [0, 1]$ for $t \to \infty$.

Insert Figure 4

To provide a general impression of the results, figure 4 presents such fitted functions $\alpha'(t)$ for the average allocations within each treatment. It can be seen that $\alpha'(t)$ is increasing in all four treatments (giving further support to hypothesis 3). The values of b, c, $\alpha'(1)$, and $\alpha(\infty) = \frac{b}{(1-c)}$ are summarized in table 4. Again, the interaction effect is shown in the data as $\alpha_{Bf}(\infty)$ and $\alpha_{bF}(\infty)$ are both larger than $\alpha_{BF}(\infty)$. In the long run, the combined manipulation of feedback frequency and binding period thus seems to have less impact on the willingness to invest into the risky asset than each manipulation alone.

Insert Table 3

To test the significance of the long run effects, we use the above described procedure to fit functions $\alpha'(t)$ to each individual's allocations and compare the resulting individual long run allocations $\alpha(\infty)$ for the different treatments. The results are summarized in table 5.

Insert Table 4

Interestingly, in conditions Bf and bF more than half of the participants have an $\alpha(\infty)$-value of 100%, i.e. in the long run their willingness to invest is only limited by the fact that at the maximum the complete endowment can be invested. A Mann-Whitney test shows that $\alpha_{bf}(\infty)$ is significantly smaller than $\alpha_{Bf}(\infty)$ on a 1% level, whereas the difference between $\alpha_{bf}(\infty)$ and $\alpha_{bF}(\infty)$ is only marginally significant.[9] Thus, even in the long run, subjects invest more into the risky asset when decisions are made binding or feedback is given more frequently – no such effect is observed if both manipulations are present.[10]

4 Discussion

In this paper, we investigate the effect of binding period and feedback frequency on myopic loss aversion and examine the robustness and determinants of the phenomenon. In contrast to pre-vious studies, our experimental design is based on a multiplicative scenario that better resembles the investment process in real asset markets. We further disentangle the intertwined manipulation of feedback frequency and binding period, commonly used in previous research, to better understand how both aspects contribute to the change in myopia.

We find that both isolated manipulations have an impact on myopia and thereby the willingness to invest, also in the multiplicative scenario. Surprisingly, we find a strong and persistent interaction effect. The effect of the feedback frequency is reversed for the long binding period. This is an interesting result as usually the manipulation of the feedback frequency is considered the main driving force for myopic loss aversion effects in experimental studies. The underlying intuition is that a longer binding period induces the decision maker to think about the consequences of the investment decision in a more far-sighted way, thereby moderating the negative effects of narrow framing (Kahneman and Lovallo, 1993). This effect is especially strong if the decision makers get frequent feedback, i.e. they easily learn over time that occasional losses are wiped out by larger gains. Contrary to previous research, limiting feedback helps people to learn not to behave myopically but not so when you bind decisions. In that case, the binding manipulation actually gets investors into a broader time horizon but now the feedback manipulation (i.e. limiting feedback) in conjunction with binding, if anything, has a negative effect. This effect becomes especially clear as for the estimated behavior in the long run.

The documented effect of decision flexibility on risk taking behavior has obvious relevance for investment advice and the design of saving plans. Making investment decisions unchangeable for many periods could –somewhat counterintuitive– help to increase the investor's willingness to invest in risky assets. Stock funds should advertise the possibility to make, e.g., a year long commitment, but should send statements more frequently during the year.

Quite a number of questions remain. We found the effects described in the literature to persist in a multiplicative setting, whereas we do not know which of the two settings (additives and multiplicative) induces stronger effects. It is not clear to what degree our results (as well as the results presented in literature so far) depend on the specific parameters chosen in the experiment (type and parameters of the sure and risky alternative, differences between low and high frequency feedback and differences between periods of commitment). Finally, our explanation for the strong effects of frequent feedback and longer binding is ex post. It would be worthwhile to run new studies to better understand the nature of this important interaction effect.

5 Literature

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[1] A different approach is used in Benartzi and Thaler's (1999) analysis of MLA. They manipulate the presentation format of the lottery sequence and rule out a myopic evaluation by displaying the aggregated distribution of the sequence instead of the repeated trial format.

[2] For a review of loss aversion cf. Kahneman, Knetsch and Thaler (1991) and Tversky and Kahneman (1992).

[3] The fraction 1-$\alpha(t)$ is kept at hand and thus remains unchanged.

[4] We will denote $\alpha_{f\bullet}(t)$ and $\alpha_{F\bullet}(t)$ if we consider the average amount invested for "f" and "F" for both binding conditions. Note, that $\alpha_{\bullet B}(t)$ has to remain unchanged for those periods where the decision is binding.

[5] It should be clear that decreasing the decision flexibility is not just a framing issue, but a slight change of the decision problem even from a normative point of view. As Gneezy and Potters (1977) argue, however, the effect on the risk taking behavior should be minor.

[6] Note that all tests in the result section are nonparametric and are based on medians unless specified otherwise.

[7] This process is used in market experiments to estimate equilibrium prices (see, e.g. Camerer, Loewenstein and Weber, 1989).

[8] Such end-effects are also found in other similar experiments, e.g. Weber and Camerer (1992). We belief that these experiments reflect the conventional wisdom that one should lower the exposure to risk at the end of the planning horizon.

[9] Marginal significance is also given for the difference between $\alpha_{Bf}(\infty)$ and $\alpha_{BF}(\infty)$.

[10] Thus the long run data is not in line with hypothesis 1 and not in line with the findings of previous studies. It should be noted, however, that the previous research mostly concentrates on average allocations over time and does not consider estimated long run allocations. Thus our results are not directly comparable to the literature.

	$\alpha_{b\bullet}$*	$\alpha_{B\bullet}$*	$\alpha_{\bullet f}$*	$\alpha_{\bullet F}$*
	n=54	n=53	n=54	n=53
Mean	58.4%	69.4%	63.3%	64.4%
Median	57.8%	70.0%	64.3%	64.7%

Tab. 1: Average proportion of wealth invested in risky asset lottery over all 30 rounds

Design	bf	Bf	bF	BF
	N=27	n=27	n=27	n=26
Mean trend	7.2%	9.5%	10.5%	3.2%
Median trend	7.3%	6.0%	11.0%	0.0%
# of subjects with pos. (neg) trend	20 (7)	17 (5)	17 (6)	9 (11)
Signed rank test (Wilcoxson)	$p<0.05$	$p<0.01$	$p<0.01$	n.s.

Tab. 2: Change of average allocation in first half (rounds 1-15) to average allocation in second half (rounds 16-30) of the experiment.

Condition	bf	Bf	bF	BF
$\alpha'(1)$	38.0 %	61.7 %	39.1 %	53.8 %
b	0.091	0.064	0.109	0.132
c	0.836	0.923	0.849	0.804
$\alpha(\infty) = \frac{b}{(1-c)} = \lim_{t\to\infty} \alpha'(t)$	55.8 %	82.8 %	72.1 %	67.7 %

Tab. 3: Process $\alpha'(t) = b + c \cdot \alpha'(t-1)$ fitted on average allocations in each design.

	$\alpha_{bf}(\infty)$	$\alpha_{Bf}(\infty)$	$\alpha_{bF}(\infty)$	$\alpha_{BF}(\infty)$
mean	62.0 %	83.8 %	78.0 %	67.0 %
median	71.0 %	100.0 %	100.0 %	71.0 %

Tab. 4: Long run allocations $\alpha(\infty)$, individually determined for each participant.

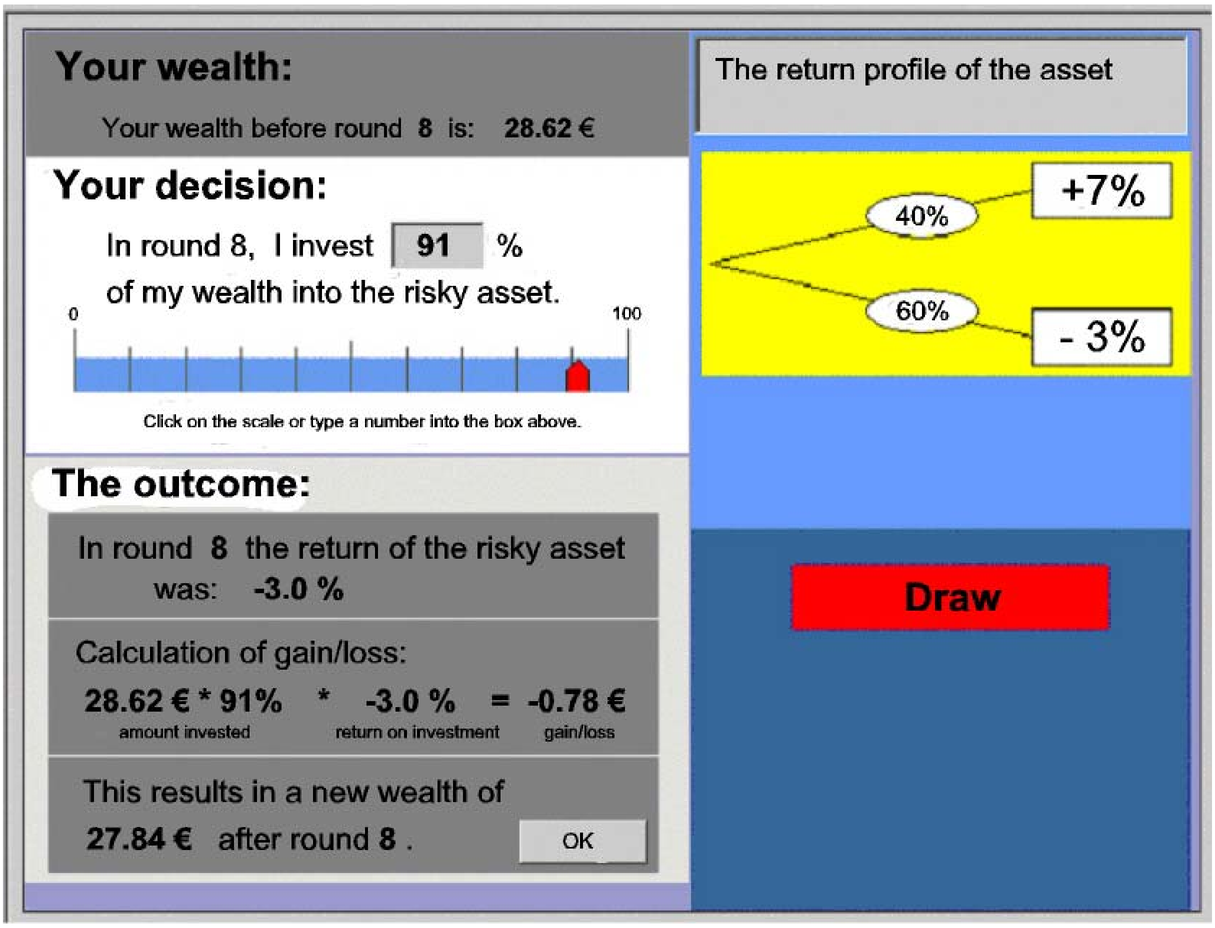

Fig. 1: Screenshot from condition"bf" (translated).

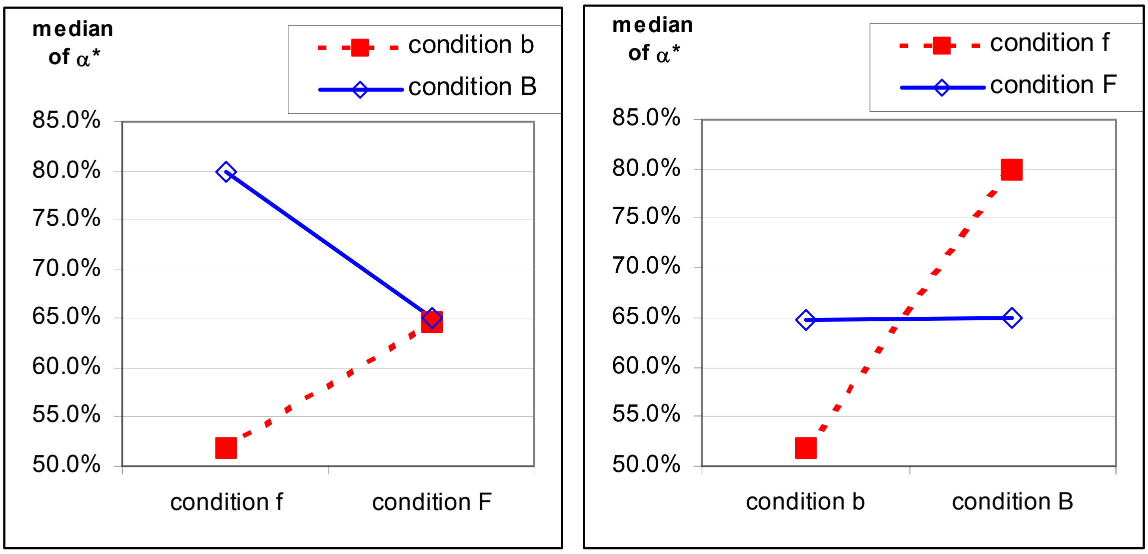

Fig. 2: Interaction of binding and feedback manipulation

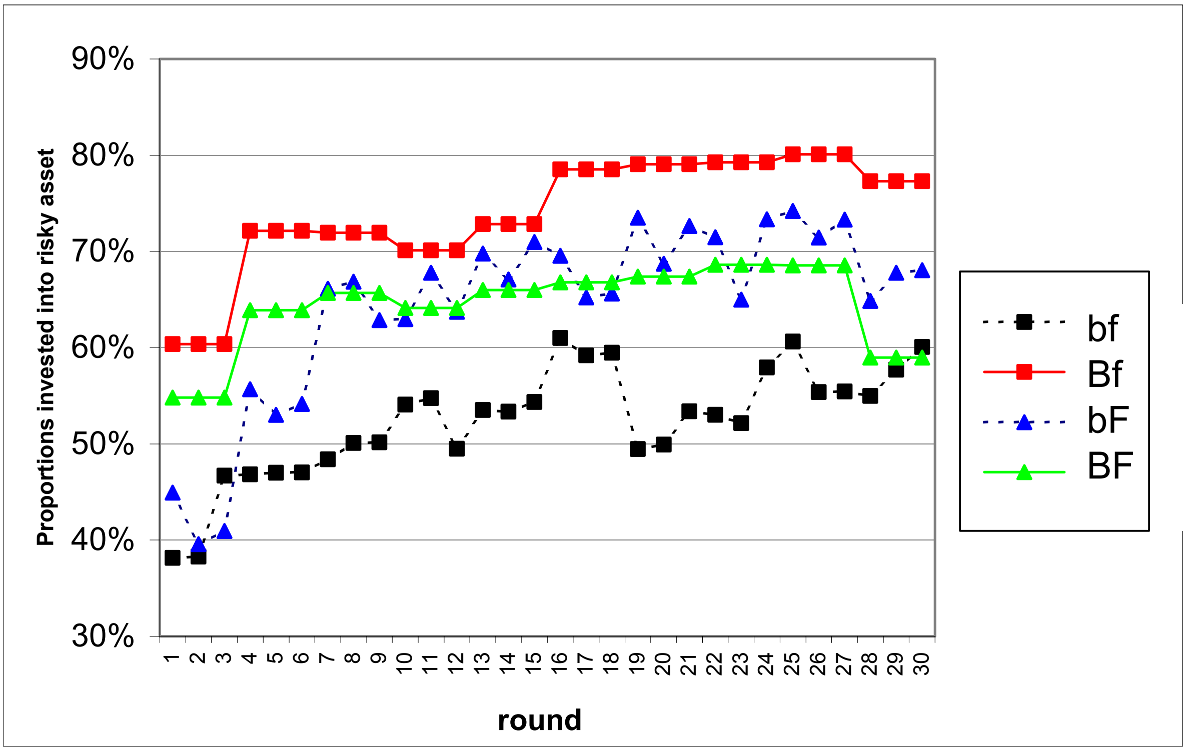

Fig. 3: Average allocation to the risky asset for each period and each treatment

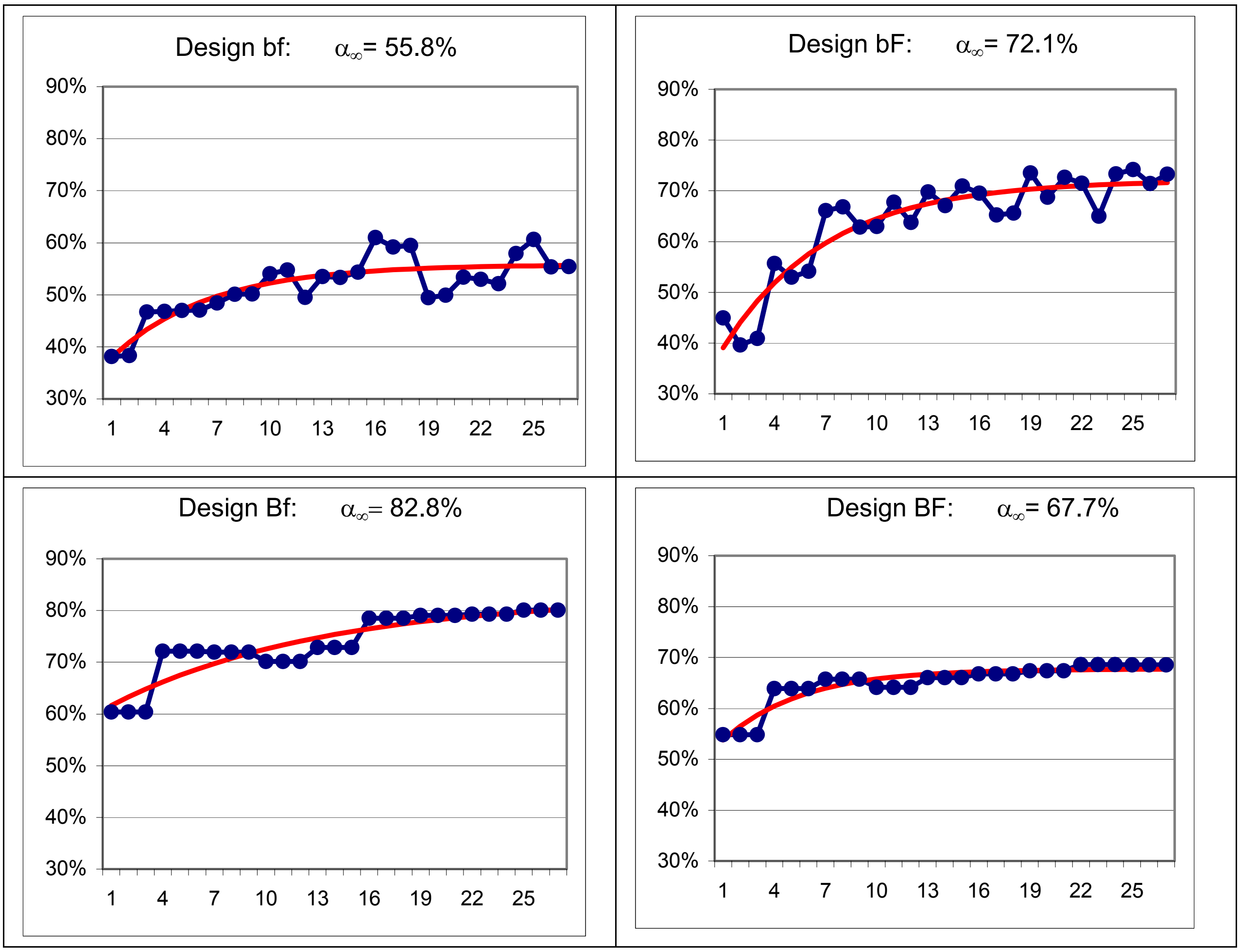

Fig.4: Average allocations in each treatment and fitted process $\alpha'(t) = b+c\cdot\alpha'(t-1)$.

Original Instruction Screens of Internet Experiment "Does Binding or Feedback…" (and translations).

Welcome to this internet experiment for the finance course at the university of Mannheim

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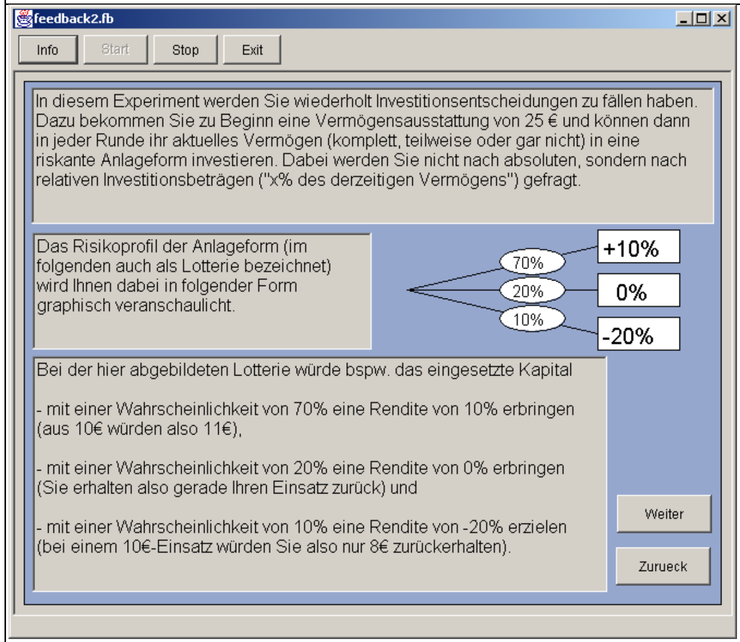
Dear participant of the experiment,

We would like to thank you for taking your time to participate in this experiment. Please first read the instructions carefully. If there are any unclear statements, please do not start the experiment, but send an e-mail with your question to sekretariat@bank.bwl.un-mannheim.de.

If the same questions are asked repeatedly, we will set up a FAQ- section (frequently asked questions) on the entry page to the experiment at www.internetexperiment.de. On this page you can check for answers to your question in advance.

Go on

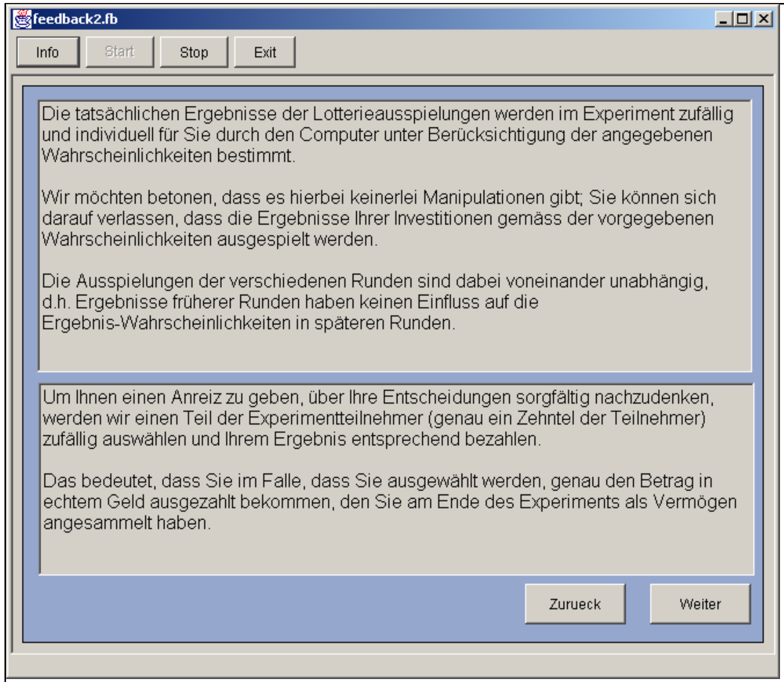


In this experiment you will repeatedly be asked to make investment decisions. In the beginning you will receive an initial endowment of 25 €. In each round, you can invest your current endowment (completely, partly or not at all) in a risky asset. Here, you will not be asked about the absolute, but the relative amount of investment ("x% of your current endowment").

The risk profile of the asset (in the following referred to as lottery) will be visualised as follows: …

With the here shown lottery the invested capital would
have a return of 10% with a probability of 70% (10 € would become 11 €)
have a return of 0% with a probability of 20% (you would get the invested 10 € back)
have a return of –20% with a probability of 10% (for an investment of 10 € you would only get 8 € back).

Go on / Back



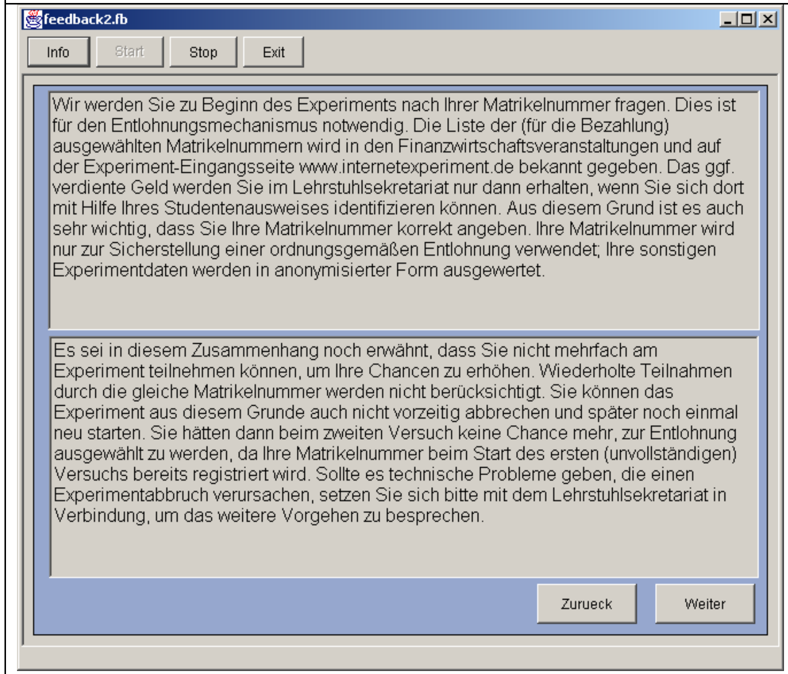
The actual lottery outcomes in the experiment will be generated randomly and individually by the computer, taking into account the quoted probabilities.

We would like to emphasize that there are no manipulations. You can trust us that the results of you investments will be played out according to the provided probabilities.

The outcomes in the different rounds are independent, i.e. the outcomes in earlier rounds do not influence the probability of the results in later rounds.

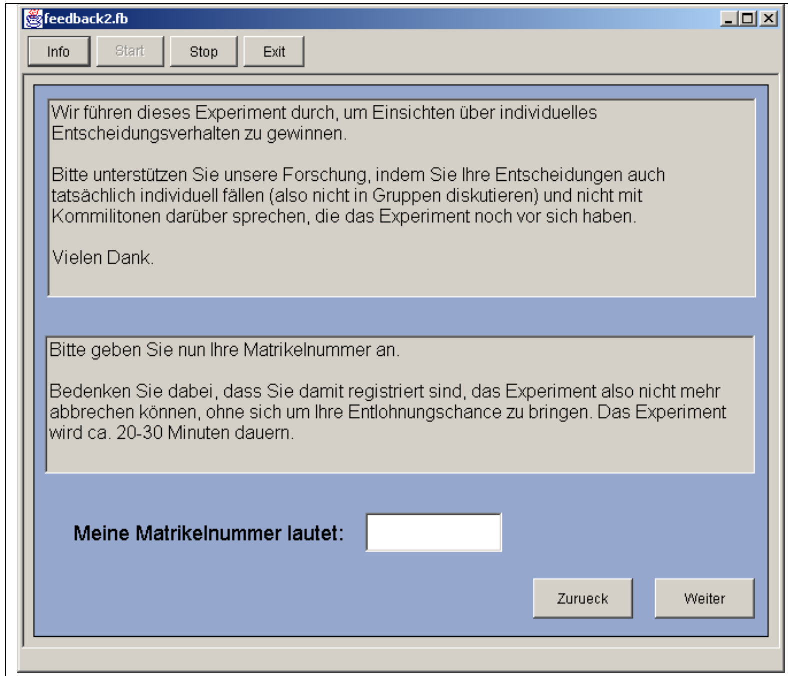
To give you an incentive to think carefully about your decision, we will choose a portion of the participants (exactly one tenth of the participants) randomly and pay them according to their wealth at the end of the experiment.

This means that in case you are selected, you will receive exactly the amount in real money that you have accumulated at the end of the experiment.



We will ask you for you Student ID at the beginning of the experiment. This is important for the payment mechanism. The list of Ids (selected for payment) will be announced in the finance lecture as well as displayed on the entry page for the experiment www.internetexperiment.de. The possibly earned money can be picked up in the departmental administration office. For identification purposes an ID-Card is required. For that reason it is extremely important that you enter your correct Student ID-Number. Your ID will only be used for payment purposes , all other data collected in the experiment will be analysed anonymously.

In this context we would also like to mention, that you cannot participate several times in the experiment in order to improve your chances. Repeated participation with the same Student ID-Number will not be taken into account. For that reason, you can also not stop the experiment in an early stage and start it later again. For the second try, you would not have the chance to be chosen for the real payment, as your ID has already been registered at the start of your first incomplete attempt of the experiment. In case of technical difficulties that cause a break off, please contact the departmental administration office to discuss further steps.



We are conducting this experiment to gain insights about individual decision making.

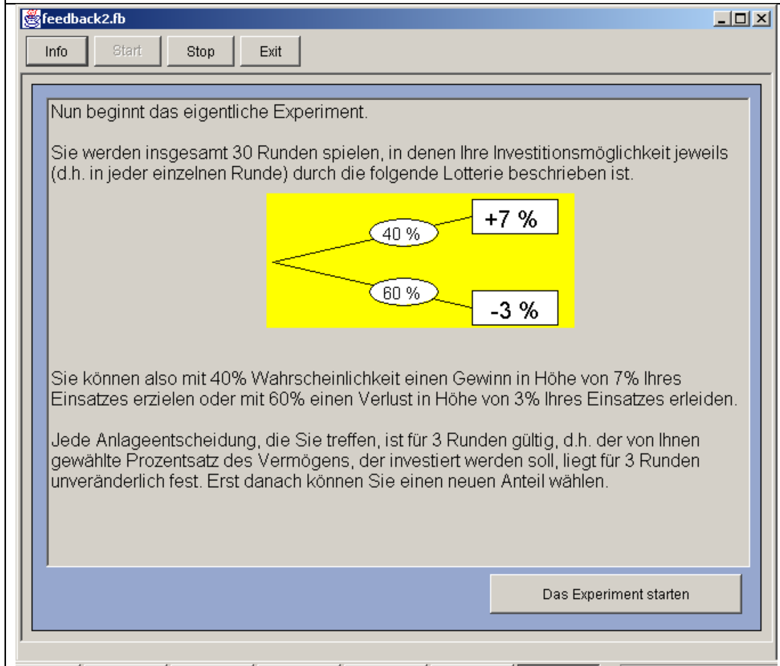
Please support our research by making your decisions on your own (no group discussions) und please do not talk to your classmates that have not done the experiment yet.

Thank you very much.

Please enter your Student ID-Number now.

Please remember that with this step you will be registered for the experiment and thus cannot stop it anymore without loosing the chance of receiving the real payment. The experiment will take approximately 20-30 minutes.

My Student ID-Number is:



Now the actual experiment does start.
You will play overall 30 rounds, in which the investment option is always (i.e. in each single round) described by the following lottery. …

You can thus gain 7% on the invested amount with a probability of 40% and lose 3% of the invested amount with a probability of 60%.

B/F: Each investment decision you make is valid for three rounds, i.e. the percentage of wealth you chose for investment is fixed for 3 rounds. Thereafter you can chose a new percentage. (screenshot)

B/f: Each investment decision you make is valid for three rounds, i.e. the percentage of wealth you chose for investment is fixed for 3 rounds. Thereafter you can chose a new percentage. However, you will receive feedback about the change of your wealth after each round.

b/F: Before each round you have to decide again which part of your endowment you want to invest. However, you will only receive feedback about the change of your current wealth after each third round.

b/f: Before each round you have to decide again which part of your endowment you want to invest.

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